Of Man and Nature: Drivers and Barriers within Malaysia's Carbon Mitigation Policy Ecosystem

By

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Abstract

Since 2000, Malaysia’s GDP has risen by 264.4% and its population by 30.4%. The government has strongly pushed economic growth and development and aims to reach high-income status by 2020. At the same time, Malaysia has publicly committed to reduce its carbon intensity on a GDP basis by up to 45%. The outcome of this tension between Malaysia’s development ambitions and its climate change goals may foreshadow the carbon trajectory for much of the rest of the developing world that will similarly seek to obtain high-income status in the coming decades. Through a series of in-country interviews in January 2018, I explored the workings of Malaysia’s carbon mitigation policy ecosystem to understand what Malaysia has already done to implement its decarbonization objective and what remains to be accomplished.

I find that in three of Malaysia’s core carbon mitigation policy sectors – transportation and urban planning, renewable energy, and forestry – the government and other actors have implemented a range of mitigation approaches. While the government, NGOs, corporations, and the public have achieved some initial successes, many barriers still inhibit mitigation efforts.

I also identify cross-cutting themes from the interviews that operate within the policy sectors and the carbon mitigation policy ecosystem as a whole. These themes both enable and inhibit carbon mitigation. These include: a diversity of actors; state transfer pathways; internalization of exogenous drivers; a focus on sustainability planning and action; federal-state friction; absence of climate control hub; limited government enforcement, capacity, and regulation; and sustainability and development aspirations and constraints. I further find that both the policy sectors and these themes fit within the theories of decarbonization pathways and carbon lock-in.

I conclude by offering six core recommendations to the new Malaysian government that won office on May 9, 2018 that focus on driving both carbon mitigation and economic growth: improve public transportation connectivity, maximize the efficacy of existing renewable energy policies, shift the energy system, align federal and state incentives around forest protection, improve the government's internal program management, and start adaptation efforts now.

Thesis Supervisor: Lawrence Susskind
Thesis Reader: Janelle Knox-Hayes
Acknowledgements

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I am in debt to the many Malaysian interviewees who graciously shared their time with me. This thesis would not be possible without their knowledge, experiences, connections, and generosity. This research was also made substantially easier and more enjoyable through the company and help of three fellow researchers: Yasmin Zaerpoor, Selmah Goldberg, and Jungwoo Chun.

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Introduction

I first visited Malaysia in January 2017 as part of a MIT practicum where I spent three weeks in Kuala Lumpur and the state of Johor. I was struck by the contrast between what Malaysia recently was and what it is rapidly aspiring to be. The heart of Kuala Lumpur, anchored by the almost 1,500-foot-tall Petronas Towers, is far more developed than many of the United States’ major cities. Though, on trips to rural sites in Johor, I saw remnants of the country’s not too distant past, with hastily constructed shacks surrounded by immense, dark depths of plantations.

In the coming decades, more and more of Malaysia will look like Kuala Lumpur and less and less like the villages I visited in Johor. While this development will improve the lives of almost all Malaysians, it could come at a high cost to the environment, particularly by increasing national greenhouse gas emissions. The Malaysian government does have carbon mitigation goals in place but to what impact?

I returned to Malaysia in January 2018 to explore Malaysia’s carbon mitigation policy ecosystem. Over the course of several weeks, I interviewed Malaysian stakeholders across a range of sectors and organizations to uncover the drivers leading to mitigation successes and the barriers inhibiting decarbonization. I particularly sought to understand what Malaysia has already done to reach its decarbonization goals and what more remains to be accomplished.

I start in Chapter One by introducing the historical, social, governmental, and political contexts that underpin carbon mitigation in Malaysia. I then discuss the pathways and path dependencies literature in chapter Two. In Chapter Three, I overview the interview methodology and
stakeholders interviewed; highlight Malaysia’s major carbon mitigation plans and policies; use the interview data to explore the successes and failures of major polices within the urban planning and transportation, renewable energy, and forestry sectors; and analyze what the state of these three sectors suggests about Malaysia’s ability to reach its broader mitigation plans and goals. Chapter Four synthesizes the interview information to develop major inhibiting and enabling themes within the policy ecosystem and connects them with the highlighted policy sectors. I then map the policy system to the literature on carbon pathways and path dependencies to understand linkages between theory and practice and to exact actionable lessons from these linkages in Chapter Five.

I conclude in Chapter Six by developing five core recommendations to better support Malaysia’s carbon mitigation efforts. Over the course of writing this thesis, control of the Malaysian government changed parties in an historic election after sixty years of one-party rule. This new governing coalition has a unique window of opportunity to push through reform. With this in mind, I target my recommendations at the new government and suggest ways forward to limit emissions while building a growing economy.
Chapter 1 - Setting the Scene: Climate Change in Malaysia

*The Malaysian Government understands that choosing to leave no one behind or working towards sustainability is not an either or choice, it’s both – Senior International Development Official*

The Challenge

As Malaysia goes, so may the world. While the United States of America attracts the majority of global attention for its climate change policy (or lack thereof), its carbon dioxide (CO2) emissions per capita peaked in 1973 and its total emissions peaked in 2007 (World Bank, 2017a). From 2000 to 2014, the United States’ gross domestic product (GDP) increased by 69.1% and its population by 12.8%. Over the same fourteen years, Malaysia’s GDP increased by 264.4% and its population by 30.4%, making its economic growth nearly four times larger, and its population growth three times larger, than that of the United States (World Bank, 2018).

The United States and other developed countries of the Global North still face substantial political and policy challenges to decarbonization of their economies. However, lower economic and population growth mitigate many of the challenges of national decarbonization. Malaysia, and similar rapidly developing countries, face a substantially more difficult challenge of decarbonizing in the face of quickly growing populations and economies, while also attempting to alleviate substantially higher levels of poverty (IPCC, 2015; Roser & Ortiz-Ospina, 2017). Thus, much of the future of global decarbonization will rest upon the success of Malaysia and the rest of developing world to balance development and carbon mitigation.
Malaysia

This remainder of the chapter briefly introduces Malaysia’s history; population, ethnic, makeup, and culture; economy; government and politics; climate risks; and carbon mitigation strategies. Malaysia’s history, and the role of British colonialism strongly influence modern Malaysian society, and both Malaysian history and society account for Malaysia’s government structure and political dynamics. In turn, socio-governmental factors affect how Malaysia responds to climate risks and determine its responsive policy measures. Understanding these connections places Malaysian climate politics and politics in context.

Figure 1: Map of Malaysia

History

Malaysia is a tropical, Southeast Asian country with two principle land masses. Peninsular Malaysia lies at the southern terminal of continental Asia, and East Malaysia composes the
majority of the northern section of Borneo. Malaysia neighbors Thailand, Indonesia, Singapore, and Brunei.

Malaysia’s proximity to historical global trade routes has regularly exposed it to a near constant influx of global traders and travelers from China, India, the Islamic world, and beyond. By the 14th century, Islam arose as the dominate religion, leading to the rise of several regional sultanates. Portugal arrived as a colonial power 1511 and The Netherlands in 1641. Britain supplanted other European powers as the main colonial power starting in the late 1700s. British rule was only interrupted by the Japanese invasion and control during the Second World War from 1941 to 1945. Great Britain regained control after the war and granted Malaysia independence in 1957. Malaysia took on its modern boundaries by 1965, with the entrance of East Malaysia and Singapore in 1963 and the subsequent expulsion of Singapore two years later (Hooker, 2003; (“Malaysia: History | The Commonwealth,” 2018).

The British colonial era substantially shaped the culture, boundaries, language, and history of the region. Many regional borders result from colonial era divisions. Great Britain arguably also catalyzed Singapore’s eventual divergence from Malaysia by establishing the island as a free port, leading to a broader ethnic and cultural mix (Hooker, 2003). While some historians term the British and other regional colonizers as benevolent, Great Britain employed violence as a vehicle to maintain control, frequently pitting various Malaysian ethnic, religious, and geographic groups against each other and also bringing in groups thought of as more loyal, such as Indians, to maintain control. Great Britain also cultivated a favored Malay ruling class, including the appointment of religious sultans to control the rest of the population (Hooker, 2003; “Playing
with fire,” 2015). To this day, while Bahasa Malaysia acts as the official language, English is widely spoken, especially among the middle and upper classes.

Population, Ethnic Makeup, and Culture

As of 2017, Malaysia’s population was estimated at slightly under 31.5 million, with over 80% of the population in Peninsular Malaysia. Kuala Lumpur, the capital and largest city, has a population of just under 7 million (CIA World Factbook, 2018). The Malaysian population is highly urban with over 70% of people living in cities. While Kuala Lumpur is the largest city by a margin of six million, the populations and resulting development is spread relatively evenly throughout a variety of secondary and tertiary cities compared to other developing countries. This is a legacy of colonial British planning as well as the result of a concerted effort by the Malaysian federal government to distribute development to avoid problems associated with rapid development and resource concentration in a singular urban node (Hooker, 2003; Yaakob, 2010).

Malaysia is a multiethnic and religious society with three primary ethnic groups: Malays (62% of population), Chinese (21%), and Indians (6%). Religious divisions closely mirror the ethnic mix; the population is 61% Muslim, 20% Buddhist, 9% Christian, and 6% Hindu. Most of the Christian population is located in Eastern Malaysia (U.S. Embassy in Malaysia, 2016). The Federal Constitution denotes Islam as the official state religion (Federal Constitution, 1957). Islam has played a growing role in the government in the last decade with the implementation of stricter religious laws and punishments (The Economist, 2015; S. Hamid, 2016).
Malaysia’s multiethnic society, another artifact - while sometimes highlighted as an exemplar of ethnic harmony – is fraught with historical and current ethnic tensions (S. Hamid, 2016). British policies set the stage for and catalyzed inter-ethnic tension and violence that have persisted post-independence. Singapore’s expulsion in 1965 resulted largely from tensions between the Malay-led governing party based in Kuala Lumpur and the ethnic Chinese-led political party based in Singapore. (Hooker, 2003). Racial tensions peaked in 1969 with race-riots leading to the destruction of Chinese shops and the deaths of 600 ethnic Chinese in Kuala Lumpur (The Times, 2008). One response of many included the introduction of racially-based affirmative action for Malays, historically less well off than the Chinese and Indians. The program granted admissions preference at universities to Malays, reserved government positions, and mandated partial Malay ownership of publicly traded companies. While the government advertises these as measures to right historic inequalities, opponents argue that they disadvantage and further marginalize Malaysia’s minorities (Gudeman, 2002; Hooker, 2003; Segawa, 2013; The Economist, 2015).

Similarly to many other East Asian counties, Malaysian culture tends to be more hierarchical than most Western cultures. The concept of face-saving is also prevalent and an important aspect of social dynamics. In addition, Malaysians tend to place more emphasis on the value of the group over individualism (Heriot Watt University, 2015).

Economy

Malaysia is an upper middle-income country. Per capita GDP is $10,500 ($28,900 per capita PPP adjusted). GDP has increased by 5.7% annually since 2010. Over the past 40 years, Malaysia has
diversified its economy, moving away from solely exporting raw natural resources and supporting a growing electronic and service sectors. Services account for 55% of the Malaysian economy, industry for 37%, and agricultural for 8% (IMF, 2017; World Bank, 2017b; CIA World Factbook, 2018). The agricultural sector is increasingly dominated by palm oil and rubber, the two largest agricultural products. Palm oil and rubber processing are also two of Malaysia’s largest industries (OLANIYI, Abdullah, Ramli, & Sood, 2013). Malaysia is also the largest exporter and second largest producer of palm oil in the world (Choo Yuen, 2012; Pakiam, 2013). Malaysia holds significant oil and natural gas reserves. Funds from the gas industry make up 22% of government revenue, and the national oil company, Petronas, is one of the largest firms in the world (CIA World Factbook, 2018).

Less than 1% of Malaysians live in extreme poverty. Government anti-poverty efforts focus on the poorest 40% of the population (termed the “B40”), with many of the poorest areas of the country in East Malaysia. While wealth inequality in Malaysia is higher than the East Asian average, inequality is shrinking, with incomes of the B40 increasing 4% faster than the national average (World Bank, 2017b).

**Structure of Malaysian Government**

The Federal Constitution of Malaysia outlines the structure of the Malaysian federal government and clarifies its authority over the state governments. The Malaysian federal government uses a parliamentary system, structured on the British Westminster model, with a constitutional monarch. The king, or Yang di-Pertuan Agong, serves a five-year term and plays a largely
symbolic rule as the head of state and of Malaysian Islam. The Council of Rulers, composed of each state’s sultan (or governors for states without a sultan) elect the monarch on a rotating basis (Hooker, 2003; Federal Constitution, 1957; CIA World Factbook, 2018; Commonwealth Network, 2018; Ministry of Natural Resources and the Environment, 2015).

The parliament consists of two houses. The upper house is referred to as the Senate or Dewan Negara. Of its 70 members, the monarch appoints 44 and the state assemblies appoint the remaining 26. Senators serve three-year terms. The lower house is referred to as the House of Representatives or Dewan Rakyat. The public elects all 222 members from single member districts. Representatives serve five-year terms, unless the monarch calls for an early election (CIA World Factbook, 2018; Commonwealth Network, 2018).

The majority party in the lower house selects a party member to serve as prime minister. The prime minister, who acts as the head of government, oversees the executive branch and appointments cabinet ministers, who may be members of either house.

Malaysia has thirteen states and three federal territories. All but two of the states, Sabah and Sarawak, are located in Peninsular Malaysia. The states primarily oversee matters relating to natural resources (including land), religion, and local government. The state level control of resources and the primarily federal-level origin of conservation decrees creates schisms and implementation gaps between federal mandates and state action (Oliveira, 2016). Local government hold regulatory and tax authority, but the state governments appointment all local officials. Sabah and Sarawak have greater autonomy than the other Malaysian states, leading to
greater heterogeneity in governance structure and law. All thirteen states have unicameral legislatures (CIA World Factbook, 2018; Commonwealth Network, 2018).

Malaysia experienced one-party rule since independence under the United Malays National Organization (UNMO until May 9, 2018. UNMO traditionally led a coalition of parties that also included Indian and Chinese-dominated parties. UNMO lost the popular vote (but still gained electoral seats) in 2015 with Chinese and Indian voters defecting from UNMO-aligned minority parties. In response, UNMO shifted its political alignment by forging new coalitions with Islamic parties, which it once shunned, and emphasizing Malay nationalism. This political realignment heightened national ethnic tensions (The Economist, 2015).

UNMO and Najib Razak, Malaysia’s prime minister from 2009 to May 2018, faced additional scrutiny after 2015 when the Wall street Journal linked a missing $700 million from the 1Malaysia Development Fund to his private accounts. Resulting uncertainty and instability in the Malaysian political environment strongly influenced the governance environment. Despite rising opposition, Mr. Razak was widely expected to win the May 2018 elections, due to a healthy (though weakening) economy, strong support from rural ethnic Malays, and gerrymandering of electoral borders disadvantageous to the opposition (BBC, 2016; Ng, 2018). The increased political scrutiny and competitiveness of the elections made the UNMO government more attune than before to implementing policies and programs that served its politics interests (BBC, 2016; Ng, 2018).
To the surprise of many, UNMO lost its majority in the House of Representatives on May 9, 2018. The Pakatan Harapan (PH) coalition, or “the Alliance of Hope,” won 113 of the 222 house seats, with allies winning an additional 8 seats (Aw, 2018; Election Commission of Malaysia, 2018). In a striking political return, the 92-year old Mahathir Mohamad will serve as the new Prime Minister. Mahathir previously served as Prime Minster from 1981 to 2002, playing a crucial role in building the UNMO alliance and in catalyzing Malaysia’s economic growth (Au, 2016; J. Hamid, 2008). Mahathir mentored Najib Razak as a successor after his original protégé, Anwar Ibrahim, was convicted of sodomy charges and sent to prison. This conviction was widely seen as a move by Mahathir to limit Anwar’s growing power (BBC, 2016, 2018). During the electoral campaign, Mahathir has promised to secure a pardon from the King for Anwar (in prison again after a new sodomy charge led by Najib) who could succeed him as PM within two years. Mahathir and PH campaigned on a platform of restoring government order by cracking down on corruption, boosting a flagging wages, and improving civil rights (Leng, 2018; Ruxyn, 2018; Smith-Spark, 2018). While UNMO promised a range of handouts to voters if it won, PH advertised similar policies, including abolishment of the Goods and Service Tax and reintroduction of fuel subsidies (Ruxyn, 2018).

**Climate Change and Climate Risks in Malaysia**

Though Malaysia’s historical and current greenhouse gas emissions are relatively minor (0.6% of global emissions), it faces significant environmental risks from a changing climate (INDC, 2016). Mean temperatures in Malaysia increased by an average of 0.14°C to 0.25°C per decade over the last 60 years (Ministry of Natural Resources and the Environment, 2015). Furthermore,
regional temperatures could rise by four degrees Celsius by 2100 in a high emissions scenario (World Health Organization, 2015).

Malaysia’s location makes it vulnerable to impacts from increased temperatures, flood risk, sea level rise, drought, water shortages, food insecurity, degradation of ecosystem services, and public health risks (National Intelligence Council, 2009; Vaghefi, Shamsudin, Radam, & Rahim, 2016). Higher temperatures have increased the variability of rainfall and intensified seasonal monsoons. This trend could decrease water availability during the dry season and cause more damaging floods and resulting damage during the monsoons (Loo, Billa, & Singh, 2015).

Malaysia’s extensive coasts and large swaths of low lying ground also make it particularly vulnerable to rising sea levels and resulting land loss and damage from storms. (National Intelligence Council, 2009). Almost a third of Malaysian coasts face erosion, with climate change expected to increase the problem (INDC, 2016) In a high emissions scenario, flooding from sea level rise could impact an additional 234,500 Malaysians from 2070 to 2100 (World Health Organization, 2015).

Models also forecast a range of impacts on Malaysia’s agricultural staples. Some models predict that rice yields could moderately increases while other models show productivity declines of more than 30%, which could make the Malaysian rice industry financially unsustainable and significantly increase domestic food prices (National Intelligence Council, 2009; Vaghefi et al., 2016). As for health risks, a warming climate could put an additional 24 million Malaysians at risk of Malaria and also increase the risk of dengue. Furthermore, heat-related deaths in those
above 65 could increase by 450 times current rates under a high emissions scenario in Malaysia (World Health Organization, 2015; INDC, 2016).

If unchecked, models estimate that climate change will significantly damper Malaysia’s economic growth and cost multiple billions in damage. Forecasts of the cost of climate vary dramatically in their estimates. Under a worst-case emissions scenario (i.e. business as usual), climate change could cost Malaysia between $600 million to $11.6 trillion in the next century (with the median estimate $10 trillion). Under a reduced emissions scenario, climate change could cost Malaysia between $15 million to $1.6 trillion in the next century (with the median estimate $1.4 trillion) (Al-Amin et al, 2015; Rasiah et al. 2016; Rasiah et al., 2017; Rasiah et al. 2017). Some estimates predict that losses in tourism revenue alone decrease annual revenue by $3.7 billion in the coming decades (Raitzer et al., 2015).

Malaysian government officials acknowledge that climate change impacts, if unabated, could cost the country trillions in lost economic growth (Al-Amin et. al 2015; Biennial update 2015). Public concern about climate change has also risen over the past few years. More than 80% of polled Malaysians express concern about climate change and dissatisfaction with current government mitigation efforts. Variability in weather patterns and record-setting temperatures in 2016 raised climate change emerge as a key political issue in Malaysia (Economist Intelligence Unit 2017). A series of devastating floods in November 2017 further heightened attention to the issue, with media reports ascribing the intensity to climate change (Beng, 2017; Malaysia Mail Online, 2017; Today Online, 2017). This public concern helped push forward Malaysia’s carbon mitigation efforts (Economist Intelligence Unit 2017).
Malaysia’s INDC and Carbon-Sector Background

INDC Summary

Signatories to the United Nations Framework Convention on Climate Change (UNFCC) submitted Intended Nationally Determined Contributions (INDCs) ahead of the 2015 Conference of the Parties (COP 21) in Paris. INDCs highlight countries’ proposed carbon mitigation targets and accompanying strategies. Countries that formally joined the resulting Paris Agreement convert their INDCs to Nationally Determined Contributions (NDCs). Malaysia submitted its INDC in November 2015 and converted its INDC to a NDC in November 2016 (UNFCC, 2018).

Malaysia pledged to reduce its GHG emissions intensity of GDP by up to 45% by 2030, relative to its 2005 emissions intensity. This consists of a 35% reduction on an unconditional basis and a further 10% reduction conditional upon receiving climate finance, technology transfer, and capacity building from developed countries (INDC 2015).

Intensity Reduction Vs. Absolute Reduction

It is important to emphasize that this 45% reduction is per unit of GDP (i.e. emissions divided by GDP). Most developing countries have an intensity reduction target given the challenge of reducing total emissions during rapid development (UNFCC, 2018). Thus, Malaysia could reach its intensity reduction goal while its total GHG emissions increase (and this almost certainly will be the case) (Zhu et al., 2014). In fact, Malaysia’s total carbon emissions have increased every
year, reaching 247.6 millions tons in 2015 (BP, 2017; World Bank, 2017a). In 2011, the Malaysian government reported total GHG emissions (including carbon and other greenhouse gases) as 290.23 Mt CO2 equivalent and net emissions as 27.28 Mt CO2 equivalent. (Removals from the Land Use, Land-Use Change and Forestry (LULUCF) sector account for the substantially lower net emissions. (Ministry of Natural Resources and the Environment, 2015)).

Therefore, Malaysia’s plans and policies focus on measures that simply attempt to ensure that national GDP increases more rapidly than national carbon emissions, which will lead to carbon intensity reductions. As a result, Malaysia does not need to implement ambitious carbon reduction schemes to meet its goal but rather must improve the relative efficiency of its emitting sectors. Eventually, if Malaysia wants to contribute to limiting global temperature increases to 2 degrees Celsius, it will need to set an absolute GHG reduction target.

**National Emissions**

Much of the rise in total GHG emissions from 2000 to 2011 is attributed to 25% population growth and a tripling of the national gross domestic profit during the same period. In addition, a greater focus on national energy security and development of the palm oil sector also accounts for emission increases in those sectors (Biennial Update 2015). However, the rate of carbon emissions increase is decreasing. GHG emissions increased by an average of 8.6 million metric tons a year during the 2000 to 2011 period, but only 7.4 million metric tons a year from 2011 to 2014. However, GDP growth from 2011 to 2014 shrank to $13.4 billion per year from $18.6
billion per year from 2000 to 2011, so the decreased rate of emissions may also reflect weakened economic growth.

Malaysia calculates national intensity of carbon emissions with and without the inclusion of LULUCF sector emissions and on both a per capita and per GDP basis. Excluding LULUCF removals, the government reported 2011 GHG emissions at 9.97 tons CO2 eq per capita and 0.41 tons CO2 eq per thousand Ringgit (9.8% and 23.0% intensity reductions from 2005 levels). With the inclusion of LULUCF removals, 2011 GHG emissions were reported at 0.94 tons CO2 eq per capita and 0.04 tons CO2 eq per thousand Ringgit (20.7% and 32.5% intensity reductions from 2005 levels) (Ministry of Natural Resources and the Environment, 2015). However, World Bank data suggests that reductions could be closer to 8% to 19% of GDP (compared to a regional average of 25%) (Economist Intelligence Unit 2017; World Bank, 2017a). Malaysia’s per capita CO2 emission also remain higher than those of other countries in the region (Economist Intelligence Unit 2017).

**Sector-Level Emissions**

Emission totals are grouped into five main sectors: energy, industrial processes, agriculture, LULUCF, and waste. Malaysia’s energy sector, at 76% of the total, accounts for the vast majority of emissions. The LULUCF sector serves as a sink for 90.6% of Malaysia’s emissions, primarily through carbon uptake by Malaysia’s rainforests. (Figures 1 and 2; Ministry of Natural Resources and the Environment, 2015). From 2000 to 2011, emissions increased in every sector, with the exception of LULUCF, in which emission declined by 14%. Emissions rose by 48% in
the energy sector, the most significant increase (Figure 3; Ministry of Natural Resources and the Environment, 2015). Carbon dioxide makes up half of Malaysian’s GHG emissions. However, from 2000 to 2011, emissions of methane and nitrous oxide, both more potent greenhouse gases, increased at a more rapid rate than carbon emissions (Figures 4 and 5; Ministry of Natural Resources and the Environment, 2015).

<table>
<thead>
<tr>
<th>Sector</th>
<th>Emissions (Mt CO2 eq)</th>
<th>Sink (Mt CO2 eq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>218.914</td>
<td>0</td>
</tr>
<tr>
<td>Industrial Processes</td>
<td>18.166</td>
<td>0</td>
</tr>
<tr>
<td>Agriculture</td>
<td>15.775</td>
<td>0</td>
</tr>
<tr>
<td>LULUCF</td>
<td>2.49</td>
<td>-262.946</td>
</tr>
<tr>
<td>Waste</td>
<td>34.885</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>290.23</td>
<td>-262.946</td>
</tr>
<tr>
<td>Net Totals (including sinks)</td>
<td>27.284</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: 2011 Malaysian emissions and withdrawals by sector. Data reported in the BUR by the NRE.

![2011 GHG Emission Contributions by Sector](image)

Figure 2: 2011 Malaysian emissions as a percentage by sector. Data reported in the BUR by the NRE.
Figure 3: Changes in Malaysian emissions by sector from 2000-2011. Data reported in the BUR by the NRE.

Figure 4: 2011 Malaysian emissions by GHG type. Data reported in the BUR by the NRE.
Introduction to INDC Carbon Mitigation Strategies

Malaysia’s INDC largely focuses on highlighting the role of existing policies and plans in mitigating GHG emissions. The INDC particularly highlights: the 2006 National Biofuel Policy, which encourages a higher biofuel blend, as well as the end of fuel subsidies automobile gas and diesel in 2014; the 2010 National Renewable Energy Policy and Action Plan that aims to increase the renewable blend in the energy mix through Feed in Tariffs (FiT); and the Eleventh Malaysia plan (Ministry of Natural Resources and the Environment, 2015; Fulton et. al., 2017). The Eleventh Malaysia Plan lays out four areas for green growth and increased sustainability. The plan promotes a green enabling environment, promotes improved public transportation, and encourages conservation of natural resources (Economic Planning Unit, 2016).

Chapter Three will discuss Malaysia’s decarbonization strategies, successes, and challenges in greater detail. In short, many observers of Malaysia’s carbon mitigation efforts applaud the

Figure 5: 2011 Malaysian emissions increases from 2000 to 2011 by GHG type. Data reported in the BUR by the NRE.
country’s planning efforts but point to a gap between its aspirations and what it has been able to implement. Successfully decreasing Malaysia's CO2 emissions will largely hinge on lowering its dependence on fossil fuels for electricity generation, given the predominance of the energy sector in overall emissions (Economist Intelligence Unit, 2017). Natural gas accounts for 48% of the energy mix and coal for 36%, a percentage expected to increase to 53% by 2020 (Ministry of Natural Resources and the Environment, 2015). Renewable energy sources, account for only 2.5% of Malaysia’s energy mix (22.4% with the inclusion of large hydropower) (BP, 2017; Economist Intelligence Unit, 2017; Ujang, 2018). While Malaysia reduces energy sector emissions, it will also have to maintain the substantial sink capacity of its forests.
Chapter 2 – Decarbonization Pathways

Overview of Pathways Literature

A growing body of research conceptualizes transitions to carbon free economies as decarbonization pathways. Several studies synthesize, analyze, and actionize much of the existing literature on pathways both broadly and in the context of specific countries (Araújo, 2017; Bataille et al., 2016; Grubler, 2012; Meckling, Sterner, & Wagner, 2017; Pye et al., 2016; Rockström et al., 2017; Rosenbloom, 2017; Seto et al., 2016; Sovacool, 2016; Wieczorek, 2018; Wise et al., 2014). This chapter introduces the pathways framework as a metaphor for carbon mitigation processes; highlights its drivers and barriers, particularly its connection to the idea of lock-in; and briefly discusses Malaysia within this literature.

The world must take dramatic, collective actions to forestall catastrophic impacts from climate change. To ensure mean global temperature does not increase by more than two degrees Celsius, the threshold for significant negative effects, nations will need to halve GHG emissions by 2050 and transition to carbon neutrality by 2100 (Bataille et al., 2016). Nonrenewable energy sources comprise approximately 85% of the global supply, and thus, without a technical revolution or a global pricing scheme, countries will need to pursue a complex network of process, policies, and actions over the next decades to mitigate emissions through transitioning to renewable energy (RE) sources and other means.
The pathways concept attempts to encompass this range of actions over time in the midst of physical, economic, social, and political influences. Wise et. al 2014 highlight the need for a “paradigmatic shift” in which transitions are conceptualized as “an element of pathways of interacting global changes and societal responses” (Wise et al., 2014, p. 332). The pathways metaphor recognizes decarbonization as both temporal and intertemporal processes, influenced by a variety of competing and collaborating stakeholders with evolving power, objectives, methods, and decision making frameworks (Bataille et al., 2016; Sovacool, 2016; Wise et al., 2014). The concept also emphasizes the diversity and instability of feedback networks among actors and institutions within pathways (Geels, Schwanen, Sorrell, Jenkins, & Sovacool, 2018; Susskind et al., 2018; Wise et al., 2014). The pathways framework seeks to understand the mix of variables within carbon transitions and recognizes the variability of approaches among countries that arise from these unique mixes of factors. The flexible architecture of the Paris Agreement exemplifies the range of pathways countries can take to reach carbon mitigation targets (Susskind et al., 2018).

Rosenblum 2014 further refines the pathways concept by separating out inherent processes into three interconnected component parts: biophysical pathways entail the scientific means to stabilize temperature and emission; techno-economic pathways include the “technical and economic processes of technology change within energy-related societal sectors… and examines how these sequences of change may lead to low-carbon configurations;” and socio-technical pathways encompass the factors at the intersection of technology and society, exploring how politics, institutions, cultures, and behavioral elements foster lasting societal shifts (Rosenbloom, 2017, p. 41).
The Deep Decarbonization Pathways Project (DDPD) acts as a global consortium for actors working to build decarbonization pathways to limit global warming to 2 degrees Celsius (DDPP, 2018).

Pathways and Policymaking

While non-insubstantial barriers exist with both biophysical and techno-economic pathways, obstacles within the socio-technical pathway may present the strongest challenge to decarbonization (Wieczorek, 2018). Thus, actionizing knowledge derived from the socio-technical pathway idea is particularly important. Socio-technical pathways theory can be better translated into implementable lessons through the examination of case studies that highlight variables both enabling and inhibiting decarbonization within the socio-technical realm. Through examination of this intersection, Rosenblum seeks to develop tools that “link present circumstances to long-run decarbonized futures in the context of deep uncertainty and complexity, while mediating among priorities and attending to the consequences of choices” (Rosenbloom, 2017, p. 46). While emphasizing their untested nature, Rosenblum offers five core functions the pathways literature offers policymakers:

- Mapping involves exploring a range of possible futures; planning relates to more concrete decisions involved in identifying suitable responses and plotting a course toward desirable futures; learning is primarily concerned with drawing lessons about change processes; bridging… involves bringing together the diverse perspectives needed to gain traction on uncertainty and complexity; whereas,
communicating involves mobilizing knowledge and encouraging the open flow of intelligible information about low-carbon possibilities, choices, and tradeoffs among broad constituencies… (Rosenbloom, 2017, p. 46)

Chapter Five analyzes the dynamics and policies within Malaysia’s carbon ecosystem experience to distill lessons germane to future learning, planning, mapping, communicating, and bridging in other countries (Susskind et al., 2018).

Pathway Drivers

Within socio-technical pathways, forces both drive forward and slow decarbonization. Interactions, relationships, and dynamics among a network of actors have emerged as drivers of the policy environment. Bataille et. al raise the importance of conversations among a multitude of stakeholders, especially those that result in mutual learning, and Seto et. al highlight actor cooperation as a necessary enabler of decarbonization (Bataille et al., 2016; Seto et al., 2016). Araujo shows this dynamic in Iceland, where a coalition of businesses, NGOs, government, and academic stakeholders unified to drive clean energy innovation (Araújo, 2017; Susskind et al., 2018). Furthermore, interactions between technology, market, and state actors appear to create conditions for green transformations (Scoones, Leach, & Newell, 2015).

A 2017 International Energy Agency report raises the need for countries to move beyond using single mitigation policies and implement a broad suite of approaches to limit warming to under two degrees. These include near term removals of fossil fuel subsidies, introduction of carbon pricing, energy market reforms, and energy efficiency requirements (OECD/IEA & IRENA,
Recent pathways literature recognizes the importance of multi-prong approaches. Grubler emphasizes the need for constant alignment and balancing of approaches within carbon transitions to ensure enabling and productive pathways (Grubler, 2012). Work from the transportation sector further demonstrates how reinforcing sets of policies improve outcomes and chances of implementation by boosting public and political support (Givoni, Macmillen, Banister, & Feitelson, 2013).

**Carbon Lock-In**

The pathways concept centers on the dynamics and sources of change. Conversely, literature on path dependence focuses on barriers to change. The idea of path dependence suggests that previous actions and decisions that shift a process in a specific direction influence future actions and decisions to proceed in that same direction (Pierson, 2000). Political scientist Margaret Levi details:

> Path dependence has to mean, if it is to mean anything, that once a country or region has started down a track, the costs of reversal are very high. There will be other choice points, but the entrenchments of certain institutional arrangements obstruct an easy reversal of the initial choice. Perhaps the better metaphor is a tree, rather than a path. From the same trunk, there are many different branches and smaller branches. Although it is possible to turn around or to clamber from one to the other-and essential if the chosen branch dies-the branch on which a climber begins is the one she tends to follow (Lichbach & Zuckerman, 2009, p. 28).
Within the decarbonization framework, carbon lock-in acts as a specific sub type of path dependent barrier, inhibiting “technological, economic, political, and social efforts to reduce carbon emissions” (Seto et al., 2016, p. 427). Momentum of existing structures, technologies, and behaviors generate economic efficiencies through scale up of current carbon intensive infrastructures and engender social and behavioral channels that limit the attractiveness of RE. Industrial countries’ need for consistent, low priced energy to drive development acts as a central lock-in (Seto et al., 2016).

Seto et al propose three distinct types of carbon lock-in - infrastructural and technological, institutional, and behavioral - that inhibit pathways’ progress. They also suggest ways to overcome their distinct challenges. Infrastructural and technological lock-in focuses on the role of infrastructure and technologies connected directly or indirectly to energy production or consumption. Given the long-life cycles of infrastructure and technologies, the choices of decision makers at the time of implementation are particularly significant. Infrastructural and technological lock-in disincentivizes change for carbon-emitting infrastructure, such as coal fired power plants; carbon emissions–supporting infrastructure, such as oil pipelines; and energy-demanding infrastructure, such as energy inefficient buildings.

Institutional lock-in centers on constrains to low carbon shifts caused by organizations and governance structures (Seto et al., 2016). Institutional actors, such as oil companies, that benefit from infrastructural and technological lock-in seek to reinforce these systems to maintain their economic rent in pernicious positive feedback loops (Meckling et al., 2017; Seto et al., 2016). Finally, behavioral lock-in focuses on the norms, habits, and social actions created through
consumption of energy-intensive products. Behavioral lock-in acts both on individuals and social structures. At the individual level, it forms and maintains personal carbon intensive habits, such as choices to drive over taking public transportation or use air conditioning. At the structural level, it explains larger constrictive norms, practices, and perceptions, such as status associated with using different forms of transportation or safety perceptions about biking in urban settings.

Seto. *Et. al* note that these three pathways are interdependent and mutually responsive. They cite the rise of the car as an example:

> The lock-in of gasoline-powered automobiles reflects development, introduction, and marketing by automobile companies that also lobbied for transportation policies and subsidies for relevant highway and energy infrastructures that both created and responded to social and cultural preferences for individual transportation. The dominance of automobile transportation further enabled rural, suburban, and urban development patterns that, once established, reinforced the need to maintain and expand automobile-oriented infrastructures, creating resistance and obstacles to government efforts to install mass transit systems and personal preferences against using them (Seto et al., 2016, p. 442)

Furthermore, the social, environmental, political, economic, and development contexts influence carbon lock-in. Seto et. al highlight the greater plasticity of energy systems in developing countries as an example, as they have more opportunity to develop low carbon systems given less existing energy infrastructure (Seto et al., 2016).
Seto et al. also explore the feasibility of and means to escape from the three types of carbon lock-in. The estimated lifespans and continued economic success of existing systems, the availability of alternatives, and financial consequences of transitioning to these alternatives all affect the ease of breaking out of infrastructural and technological lock-in. Stakeholders can attempt to break institutional lock-in through both pushing for more flexible systems and advocating for institutional change (Seto et al., 2016). Seto et al. also note the importance of “planting the seeds of transitions” to later capitalize on exogenous shocks (i.e. windows of opportunity) that disrupt institutional systems and allow for moments of change (Kingdon, 2011; Seto et al., 2016, p. 435). Path dependency itself is a normatively neutral idea, and thus, actors can also foster positive institutional lock-in of low carbon systems by “constrain[ing] future behavior to achieve desirable longer-term social benefits.” (Levin, Cashore, Bernstein, & Auld, 2012, p. 129; Meckling et al., 2017; Seto et al., 2016). Fostering such stickiness can be accomplished by setting up process that automatically scale up, have no defined sunset period, and are difficult to dismantle. Finally, there is less literature highlighting successful approaches to overcome behavioral lock-in, though Seto et al. suggest targeting the practices and elements that underly behavioral trends as well as bringing in new perspectives and disrupting prior ones (Seto et al., 2016).
Gaps in the Theory

The concepts of pathways and path dependency still suffer from theoretical gaps. Notably, the theories require additional case studies in which they are mapped to global examples of decarbonization status quos, evolutions, and outcomes. Further development of such case studies would allow for better evaluation of the scope and precision of the theories across a range of circumstances. In addition, this exercise would enable better translation of these concepts into on the ground implementation. For example, Seto. Et al. raise the lack of literature detailing how to break free from behavioral lock-in, and development of case studies could explore how this can be achieved.

While connecting more real world cases to these concepts, will refine the ideas and their application, the nascency of global decarbonization transitions presents another, less fixable hurdle. Though decarbonization pathways seek to understand the complete transitions of countries to low carbon economies, the infancy of global mitigation efforts necessarily limits the theory to drawing from early stage efforts. This also makes it impossible to gauge the accuracy of the ideas to later stages of decarbonization. Thus, these theories will need to respond and adapt as mitigation efforts advance globally.

Malaysian Pathways and Lock-In and Connection to Broader Questions

Several studies of carbon mitigation in Malaysia have raised the spector of carbon lock-in, particularly in the energy sector. Hezri and Hasan highlight path dependent institulization of
sustainability norms and practices. Government ministeries, particularly those managing forests and energy, have developed norms around sustainability that treat it as a second-tier issue. However, given the general infancy of sustainability in Malaysia, an opportunity may exist to defy these conventions and even create positive institutional lock-ins (Hezri & Nordin Hasan, 2006). Others emphasize the need to avoid path dependencies in the energy sector by diversifying and scaling up RE sources in the energy mixes and note that growing use of coal and natural gas could create carbon lock-in (Mekhilef, Barimani, Safari, & Salam, 2014; Oh, Hasanuzzaman, Selvaraj, Teo, & Chua, 2018; Safaai, Noor, Hashim, Ujang, & Talib, 2011).

By mapping the interview information to the Malaysia case, I will further explore the applicability of the concepts of pathways, carbon lock-in, and carbon lock-in escape as influencers within Malaysia’s carbon mitigation policy ecosystem. Specifically, I will seek to understand whether Malaysia faces Seto et. al’s three types of carbon lock-in, and if so, how – if at all – it is working to use carbon lock-in escape tools to break free (Seto et al., 2016). Moreover, I will see if Malaysia is building positive lock-ins to reinforce decarbonization successes and if the decarbonization drivers highlighted in the pathways theory effectively operate in the Malaysian ecosystem. Finally, I will link the Malaysia case to Rosenbloom’s five tools for actionizing the pathways idea, exploring their relevancy and potential to affect positive change (Rosenbloom, 2017). These theories and explorations will inform the analysis of the interview data.
Conclusion

The pathways framework offers an approach for understanding low carbon transitions as well as actionizing them. The theory highlights both drivers, accelerating decarbonization, and carbon lock-ins, preventing escape from carbon intensive modes. This chapter briefly introduces the connection of this framework to Malaysia’s carbon policy ecosystem, and Chapter Five will further explore Malaysia’s drivers and lock-ins and seek implementable lessons.
Chapter 3 – Malaysian Carbon Mitigation Tools: Origin, Strategies, Successes, Challenges, and Forecasts

Introduction

This chapter explores the policy, political, social, and technical aspects of Malaysia’s carbon mitigation policies in greater depth. I first review the methodology used to collect the interview data from Malaysian stakeholders in the carbon sector. I then draw from the interviews to revisit the origin of Malaysia’s carbon mitigation goal, explore a selection of carbon mitigation strategies and their success and challenges, and use insights from these strategies to evaluate Malaysia’s likely success in reaching its 2020 carbon targets from individual mitigation approaches. Chapter Four will highlight major themes across interviews, analyze the connection between these themes and the key carbon mitigation strategies as well as to decarbonization pathways.

Interview Methodology

While numerous government reports outline Malaysia’s main carbon mitigation strategies and their quantitative effect on GHG emissions, I focused on conducting qualitative interviews to explore the holistic policy ecosystems underlying these carbon mitigation approaches. I sought to understand central drivers, challenges, successes, and lessons that would allow for transferable knowledge to other developing countries (Knox-Hayes, 2016).
To understand the central Malaysian carbon mitigation strategies, successes, challenges, themes, and recommendations for improvement. Three other graduate students and I interviewed experts and Malaysian stakeholders connected to carbon mitigation. We conducted twenty-four interviews with approximately eighty-five individuals between December 2017 to January 2018 (Figures 6 and 7). We selected interviewees on the basis of topic area expertise, snowball sampling, representativeness of sector and institutional areas, and previous work together. As we relied upon senior government members focused on energy and green technology to connect us with other public officials and private corporations, we interviewed more individuals in certain sectors (i.e. energy) and fewer in other areas (i.e. transportation and waste management).

Interviewees primarily represented Malaysian stakeholders, though some international funding agencies and academics were included as well. Interviewees included: three government agencies that deal primarily with energy and environmental issues; six corporations representing the energy, forestry, and finance industries; five environmental non-governmental organizations based in Malaysia; representatives from three international development organizations; five academics; Malaysia’s major opposition political party, a Malaysian foundation, and one local stakeholder (some interviews focused on multiple perspectives). Interviews lasted for 75 minutes on average and ranged from one to two and half hours. We asked certain interview questions in every interview but tailored most questions for the individual interview (Knox-Hayes, 2016).

We took written notes in every interview. We also recorded the interviews, when given permission, and produced transcriptions. We coded interview notes through a four step, hybrid process. In the first step, we employed an open review process to separate relevant climate mitigation information from non-germane material for each interview. Four individuals
conducted this process separately to reduce the risk of bypassing significant interview data. In the second step, we analyzed this distilled information in an open coding process to develop six cross-cutting categories, consistent among the interviews: barriers, successes, status, recommendations, and themes. Using these pre-set categories, we then coded the information in each interview by these categories. We finished with a coding process to group the individual interview themes into several cross cutting themes (Tables 11 and 12) (Knox-Hayes, 2016).

<table>
<thead>
<tr>
<th>Sector</th>
<th>No. Individuals Contacted</th>
<th>No. Individuals Responded</th>
<th>No. Individuals Interviewed</th>
<th>No. Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>19</td>
<td>6</td>
<td>~30</td>
<td>4</td>
</tr>
<tr>
<td>Private</td>
<td>8</td>
<td>3</td>
<td>~40</td>
<td>5</td>
</tr>
<tr>
<td>NGO</td>
<td>16</td>
<td>11</td>
<td>~10</td>
<td>9</td>
</tr>
<tr>
<td>Academia</td>
<td>9</td>
<td>7</td>
<td>~5</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>27</td>
<td>~85</td>
<td>24</td>
</tr>
</tbody>
</table>

Table 6: Overview of Interviewees Contacted and Interviewed by Sector (from Susskind et. al 2018)

<table>
<thead>
<tr>
<th>Number</th>
<th>Main Interviewee(s)</th>
<th>Organization(s)</th>
<th>Role/Sector</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bill Hyde</td>
<td>Duke (retired)</td>
<td>Forestry academic</td>
<td>Two interviewees present</td>
</tr>
<tr>
<td>2</td>
<td>Confidential</td>
<td>Confidential</td>
<td>International resilience funder</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Confidential</td>
<td>Confidential</td>
<td>Malaysian environmental advocacy NGO</td>
<td>Two separate interviews</td>
</tr>
<tr>
<td>4</td>
<td>Ernest Navartatnam</td>
<td>Cenergei and</td>
<td>Renewable energy and finance firms</td>
<td>Two interviewees present</td>
</tr>
<tr>
<td></td>
<td>and confidential</td>
<td>confidential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ivy Wong</td>
<td>Yayasan Hasanah</td>
<td>Malaysian Foundation with environmental division</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Horizon Gitano-Briggs</td>
<td>Universiti Sains</td>
<td>Malaysian environmental consultant/ academic, international development funder, and Malaysian environmental/wildlife NGO</td>
<td>Three interviewees present</td>
</tr>
<tr>
<td></td>
<td>Briggs and confidential</td>
<td>Malaysia/Focused</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applied Technologies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>and confidential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Horizon Gitano-Briggs</td>
<td>Universiti Sains</td>
<td>Malaysian environmental consultant/ academic</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Malaysia/Focused</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applied Technologies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>and confidential</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Main Interviewee(s)</td>
<td>Organization(s)</td>
<td>Sector and Role</td>
<td>Number of Interviewees Present</td>
</tr>
<tr>
<td>---</td>
<td>---------------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Thirupathi Rao</td>
<td>UNITEN</td>
<td>Malaysian climate change and energy academic</td>
<td>Eleven interviewees present</td>
</tr>
<tr>
<td>9</td>
<td>Juan Harris</td>
<td>Former Khazanah</td>
<td>Environmental finance</td>
<td>Four interviewees present</td>
</tr>
<tr>
<td>10</td>
<td>Confidential</td>
<td>Confidential</td>
<td>Malaysian environmental NGO</td>
<td>Multiple interviewees present</td>
</tr>
<tr>
<td>11</td>
<td>Confidential</td>
<td>Confidential</td>
<td>Malaysian banking</td>
<td>Multiple interviewees present</td>
</tr>
<tr>
<td>12</td>
<td>Confidential</td>
<td>Confidential</td>
<td>Malaysian environmental government department</td>
<td>Multiple interviewees present</td>
</tr>
<tr>
<td>13</td>
<td>Ong Kian Ming and Dashun</td>
<td>Democratic Action Party/ Penang Institute</td>
<td>Opposition politician/environmental think tank</td>
<td>Multiple interviewees present</td>
</tr>
<tr>
<td>14</td>
<td>Confidential</td>
<td>Confidential</td>
<td>Malaysian oil and gas company</td>
<td>Multiple interviewees present</td>
</tr>
<tr>
<td>15</td>
<td>Confidential</td>
<td>Confidential</td>
<td>Malaysian government sustainable energy department</td>
<td>Multiple interviewees present</td>
</tr>
<tr>
<td>16</td>
<td>Confidential</td>
<td>Sime Darby Plantation</td>
<td>Palm oil producer</td>
<td>Multiple interviewees present</td>
</tr>
<tr>
<td>17</td>
<td>Confidential</td>
<td>Confidential</td>
<td>Malaysian electricity company</td>
<td>Multiple interviewees present</td>
</tr>
<tr>
<td>18</td>
<td>Tajang Jinggut and Dzaeman Dzulkifli</td>
<td>Tropical Rainforest Research Center</td>
<td>Malaysian environmental NGO</td>
<td>Three Interviewees Present</td>
</tr>
<tr>
<td>19</td>
<td>Rashawn Ara Begum</td>
<td>Institute of Climate Change, UKM</td>
<td>Academia</td>
<td>Two interviewees present</td>
</tr>
<tr>
<td>20</td>
<td>Ahmad Aldrie Amir</td>
<td>Institute of Development &amp; Environment, UKM</td>
<td>Academia</td>
<td>Two interviewees present</td>
</tr>
<tr>
<td>21</td>
<td>Confidential</td>
<td>Confidential</td>
<td>International development organization</td>
<td>Multiple interviewees present</td>
</tr>
<tr>
<td>22</td>
<td>Zaini Ujang</td>
<td>Ministry of Energy, Green Technology and Water</td>
<td>Government environmental ministry</td>
<td>Multiple interviewees present</td>
</tr>
<tr>
<td>23</td>
<td>Confidential</td>
<td>Confidential</td>
<td>Mangrove reserve official</td>
<td>Multiple interviewees present</td>
</tr>
</tbody>
</table>

Table 7: List of interviews by main interviewee(s), their organization(s), and its sector and role. Interviews are number to cite interviewees who preferred to remain unnamed.

**Origin of Plan**

Malaysia’s INDC development is told as two competing stories. In one, a groundswell of bottom up pressure, plans, and processes catalyzed the strong INDC and accompanying public
announcement. In the other, high level political actors unexpectedly pushed for an aggressive INDC to gain international recognition. In reality these realities may not be mutually exclusive, with both ground up and top down forces leading to the INDC.

Malaysia’s made its first major international carbon mitigation commitment at the 2009 COP 15 in Copenhagen, committing to a 40% carbon intensity reduction compared to 2005 levels by 2020 (Razak, 2009). In the bottom up telling, pressure from the public, academics, and government agencies drove this target. Growing public awareness about the threats of climate change combined with prominent natural disasters focused public attention on the issue of climate change, creating a public desire for government action (Confidential, 2018b, I.11; Economist Intelligence Unit, 2017; Gitano-Briggs et. al 2018, I.6). At the same time, an epistemic community of Malaysian and Japanese academics, supported through Japan’s Joint Crediting Mechanism, were developing the Low Carbon Society Blueprint for Iskandar, a rapidly growing economic region in Malaysia’s Johor state. The well-resourced planning process and its members generated regional awareness and demonstrated domestic planning capacity, further influencing the prime minister to develop the INDC (Gordon, 2016; Japanese Ministry of the Environment, 2014; Wong, 2018). Moreover, government agencies, with the help of nonprofits, were also in the process of drafting several sustainability-related plans, most notably a Green Technology Master Plan and the Second National Communication on Climate Change. In addition, the government had recently released the Green Technology Policy, which included an energy audit program for government buildings that had succeeded in increasing building energy efficiency (Gitano-Briggs et al., 2018, I6). Moreover, the government was creating a feed-in-tariff (FiT) scheme for renewable energy (Rashid et al., 2011; Gitano-Briggs et al., 2018, p. 6;
The INDC itself highlights how the document resulted from a collaboration among various Malaysian stakeholders (INDC, 2016). While most interviewees expressed strong skepticism or denied that any meaningful collaboration occurred with the public, some did point to collaborations between the government, private sector actors, and donors around carbon mitigation strategies (Wong, 2018). Finally, government officials underscored that Malaysia has long acted as an international environmental leader, serving as a “key negotiator” at the 1992 Earth Summit in Rio de Janeiro (Confidential, 2018d, I. 12).

In the top down telling, Prime Minister Razak attended a conference before COP 15 with other regional leaders. Singapore had recently made a carbon intensity reduction commitment, and while at the conference, Prime Minister Razak learned his Thai counterpart was planning on committing to a 30-40% intensity reduction before Copenhagen. “To keep up with Jones,” the Prime Minister asked his close advisors to study the intensity reduction Malaysia could achieve. He subsequently gave a speech, announcing the 40% reduction goal, driven by peer pressure and a desire for international recognition (Confidential, 2018a, I. 2, 2018e, Confidential, 2018, I. 21, Confidential, 2018d, I. 15; Gitano-Briggs et al., 2018, I. 6; Thirupathi, 2018). The 40% target came as a surprise to both the Sustainable Energy Development Authority (SEDA) and the Ministry of Green Energy, Technology and Water (KeTTHA), requiring revision of sustainability plans and programs under development (Gitano-Briggs et al., 2018, I6; Thirupathi, 2018).
Both accounts explain part of the story; the creation of the 40% carbon intensity goal appears to exemplify Kingdon’s streams model of policy making, whereby multiple independent policy, political, and problem streams converge, creating a window of opportunity (Kingdon, 2011). In the Malaysia case, bottom up planning projects and sustainable plans enabled a policy stream, demonstrating that Malaysia had the capacity to achieve a 40% carbon intensity reduction. Concurrently, commitments by other regional leaders and public concerns established a political steam, while high media coverage of recent natural disasters and the upcoming Copenhagen COP created a problem stream. While Malaysian leadership unexpectedly created a carbon mitigation goal, the previous bottom up work and the success of new sustainability projects demonstrated the feasibility of the 40% target. The subsequent 35-45% target before the Paris COP appears to have evolved from the initial 40% goal, with an understanding that the 35% unconditional target was “virtually guaranteed” based on projections of carbon mitigation efforts (Thirupathi, 2018)

Selected Carbon Mitigation Strategies

Plans and Documents

The INDC lays out the end point for Malaysia’s carbon mitigation strategies. The 2009 National Policy on Climate Change connects the INDC’s goals with government implementation by outlining key goals and process practices, which include: conservation of the environment and natural resources, coordinated implementation, effective participation, and common but differentiated responsibilities and respective capabilities (Ministry of Natural Resources and the Environment, 2015). The 2010 Roadmap of Emissions Intensity study actionizes the overall
reduction target through sector specific pathways to reach the carbon intensity reduction goal. Unfortunately, the government has not made this study available to the public (Confidential, 2018c, I. 12).

In addition, four other, larger scale Malaysian plan also influence carbon mitigation efforts. The New Economic Model and Transformation Programmes report serves as the government’s coordinating document to achieve high-income status by 2020 and includes several provisions encouraging sustainable practices, green technology, and the internalization of externalities. The National Green Technology Policy charts a path forward on development of the green tech sector. Malaysia also creates five-year holistic development plans. Both the Tenth (2010-2015) and Eleventh Malaysia Plans (2015-2020) emphasize the importance of protecting the environment and building resilience; the Eleventh Malaysia Plans also promotes the role of sustainable development within the national economy (Economic Planning Unit, 2016). Multiple sectoral level plans, such as the Renewable Energy Policy and Action Plan, National Biofuel Policy, and the Central Forest Spine Plan, chart out sectoral level actions, many of which related to carbon mitigation (Ministry of Natural Resources and the Environment, 2015; INDC, 2016).

Malaysia has an encompassing range of plans and strategies related to carbon mitigation. These efforts demonstrate both strategic capacity as well as a commitment to exploring solutions. While implementation barriers exist, the government has actionized much of this planning effort, as demonstrated from projects ranging from improved energy efficiency of government buildings to the expansion of public transit in Kuala Lumpur.
Overall Mitigation Policies

Stemming from these planning efforts, Malaysian government ministries are pursuing multiple concurrent carbon mitigation policies (see Table 1 in Appendix for full government list of carbon mitigation activities, emission reduction effect as of 2013, and predicted reduction effect as of 2020).

In 2013, Malaysia’s mitigation policies reduced overall emissions by 18,578.80 kt CO2eq, and by 2020, Malaysia is targeting reductions of 32,178.99 kt CO2eq. Malaysia is employing several main policy approaches across sectors to achieve these reductions. Figure 8 shows the percent of reductions achieved through each tool in 2013 of the total 18,578.80 kt CO2eq and Figure 9 the percent of reductions estimated to be achieved through each tool in 2020 of the total 32,178.99 kt CO2eq. Figure 10 highlights the absolute change emissions reductions for each policy tool between 2013 and 2020 (Ministry of Natural Resources and the Environment, 2015).

Figures 8 and 9 demonstrate that forest gazetting achieved the vast majority, 74.3%, of these emissions reductions. Gazetting of forest is primarily enacted through reclassification of existing forests from production to conservation areas. Therefore, while gazetting represents an important and laudable policy tool that maintains significant sink capacity, it is not a reduction of carbon emissions per se. Thus, Malaysia’s other mitigation policies, while less significant in terms of carbon intensity reductions, are important in terms of their role in reducing current and future emissions.
Figure 8: Percent reductions achieved through carbon mitigation tool in 2013 of the total 18,578.80 kt CO2eq

Figure 9: Percent reductions achieved through carbon mitigation tool in 2020 of the total 32,178.99 kt CO2eq
<table>
<thead>
<tr>
<th>Sector</th>
<th>Absolute Change 2013-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIT</td>
<td>5205.31</td>
</tr>
<tr>
<td>RE</td>
<td>1230.52</td>
</tr>
<tr>
<td>Biodiesel</td>
<td>1082.75</td>
</tr>
<tr>
<td>Green Technology</td>
<td>1331.54</td>
</tr>
<tr>
<td>Green Building Rating Scheme</td>
<td>798</td>
</tr>
<tr>
<td>Federal Government Building Efficiency</td>
<td>98.21</td>
</tr>
<tr>
<td>EEVs</td>
<td>158.78</td>
</tr>
<tr>
<td>CNG in Motor Vehicles</td>
<td>62.95</td>
</tr>
<tr>
<td>Rail Based Public Transport</td>
<td>762.58</td>
</tr>
<tr>
<td>LULUCF Gazetting</td>
<td>2.63</td>
</tr>
<tr>
<td>Waste Paper Recycling</td>
<td>165.98</td>
</tr>
<tr>
<td>Biogas Capture from Palm Oil Mill Effluent</td>
<td>2700.94</td>
</tr>
<tr>
<td>Total</td>
<td>13600.19</td>
</tr>
</tbody>
</table>

In the following section, I overview three policy sectors and approaches employed within each sector, which I refer to as policy toolkits. These polices are included due to their prominence in multiple interviews, connection with major themes frequency of mention during interviews, and their significant potential to reduce GHG emissions. Furthermore, discussion of these three policy ecosystems allows for general evaluation of the potential for Malaysia to scale up the mitigation policies highlighted in Figures 8-10.

**Renewable Energy**

Including large hydropower, Malaysia currently produces 22.4% of its energy from renewable sources (RE sources make up 2.5% of the energy mix without the inclusion of large hydro) and aims to hit 30% by 2030 (Ministry of Energy, Green Technology and Water, 2017; Ujang, 2018).
Multiple interviewees highlight the Feed in Tariff (FiT), Net Energy Metering (NEM), and Green Technology Financing Scheme (GTFS) as key policies driving the switch to renewable energy (RE) (Confidential, 2018c, I. 11, 2018e, I. 14, 2018f, I. 15, 2018h, I. 17; Harris, 2017; Ming & Dashun, 2018, I. 13; Thirupathi, 2018, I. 8; Ujang, 2018). The FiT, established through the Renewable energy Act of 2011, supports RE projects up to 30 MW by mandating that energy utilities purchase produced power at a “premium” price for a period of up to 21 years. A 1.6% tax levied on consumers’ electricity bills who use over 300 kWh/month of electricity builds the Renewable Energy Fund that supports payments to RE producers. The FiT covers biomass, biogas, small hydro, and solar projects. NEM is intended to compliment and eventually replace the FiT for solar energy. Through NEM, a capped number of domestic, commercial, and industrial electricity consumers can install solar panels for internal electricity use and sell surplus electricity back to the grid at market price. Grid sales are deducted from consumers’ subsequent electricity bill (Confidential, 2018f, I. 15, 2018h, I 17; SEDA, 2018). Green Tech Malaysia, which sits within KeTTHA, has managed the GTFS since its launch in 2009. Producers and users of green technology can apply for government certification. Approved applicants apply for loans from private banks, termed Participating Financial Institutions’ (PFIs). The government provides a 60% guarantee on the financed amount as well as a 2% rebate on the PFI’s interest rate (Confidential, 2018c, I.11; Green Tech Malaysia, 2016).

Interviewees highlighted several renewable energy successes. The GTFS and the solar FiT are well managed, easy to use programs. Both programs have allocated the entirety of their funds due to high use (Confidential, 2018c, I. 11, 2018d, I. 12, 2018f, I. 15, 2018h, I. 17; Ming & Dashun, 2018). And while the solar FiT fund has limited available funds for new projects,
observation of the problems facing similar international programs lead to the incorporation of a “short-circuit mechanism” to ensure existing projects do not lose funding at the expense of new applicants (Confidential, 2018f, I. 15). Interviewees pointed to the 21-year contracts allowed under the FiT as key to encouraging RE project development by providing stability and ensuring cost recuperation (Confidential, 2018c, I. 11, 2018d, I. 12; Ming & Dashun, 2018, I. 13; Confidential, 2018f, I. 15, 2018h, I. 17; Ujang, 2018). Interviewees also praised SEDA’s\(^1\) overall efforts in rolling out the FiT. SEDA has succeeded in demonstrating the profit potential of RE and translating awareness into action. SEDA has also worked closely with PFIs under the GTFS to help them learn more about RE to bolster their confidence in investing in new technologies (Confidential, 2018c, I. 11, 2018f, I. 15; Ming & Dashun, 2018). Certain states, particularly Sarawak, Penang, and Sabah, have used these programs more than others to become leaders in RE (Navartatnam & Confidential, 2018, I.11).

Despite these successes, there are still multiple programmatic, economic, physical, and socio-political barriers to transitioning to RE. The FiT has faced accusations of nontransparent allocation of quotas, and while SEDA has taken steps to create an open tender process, this new process only applies to projects less than 1 MW (Ming & Dashun, 2018). In addition, decreased FiT solar funding for new projects has made the program less appealing, decreasing uptake. Similarly, the NEM program has attracted fewer users than expected since its launch, primarily due to low tariff payments, caps on sales back to the grid, and provisions restricting third party solar panel installation\(^2\) (Confidential, 2018e, I. 14, 2018f, I. 15, 2018h, I. 17; Ming & Dashun,

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\(^1\) SEDA, created through the 2011 Sustainable Energy Development Authority Act 2011 advocates for the uptake of RE and manages RE programs, primarily the FiT and NEM.
2018; Navartatnam & Confidential, 2018, I.11). Some interviewees also commented that the programs hurt Tenaga Nasional Berhad’s (TNB) - the sole electrical provider on Peninsular Malaysia - bottom line as they are forced to accept RE at a high price without sufficient compensation (Confidential, 2018h, I. 17). Others worried that TNB outcompetes smaller bidders in auctions to develop RE projects. As only TNB is tasked with providing of transmission infrastructure, programs could incentivize them to develop additional grid infrastructure rather than produce RE. As of now, there are no incentives for TNB to connect the grid to RE production sites, requiring producers to sometimes develop their own grids (Navartatnam & Confidential, 2018, I.11).

Economic challenges, driven primarily by the low coast of coal and wary investors, have also stifled the development of RE. Coal power allows for maintenance of cheap baseload electricity. Reduced coal power dependency in developed countries has further lowered coal prices, making it more difficult for renewable sources and natural gas to compete. Government fossil fuel subsidies, though declining, create an even less level playing field (Gitano-Briggs et al., 2018, I. 6; Confidential, 2018e, I. 14, 2018f, I. 15, 2018h, I. 17; Navartatnam & Confidential, 2018; Thirupathi, 2018, I. 8). In addition, banks remain skeptical of the viability of RE projects due to uncertainties about their cost effectiveness, profitability, scalability, and high development costs. (Confidential, 2018c, I. 11, 2018f, I. 15, 2018h, I. 17; Ming & Dashun, 2018; Navartatnam & Confidential, 2018, I.4).

Malaysia also faces physical barriers to the spread of renewable energy. Cloud cover and heat reduce the efficiency of photovoltaic panels. Limited availability of vacant land parcels also
drive up prices and creates concern that solar panels may compete with agricultural land, entailing food security concerns (Confidential, 2018d, I. 12, 2018h, I. 17; Gitano-Briggs et al., 2018). The availability of palm biogas and biomass is limited by seasonal production tied to the fruit cycles and the distance between the rural supply and urban demand. More research is also needed to spur the commercialization of palm based biofuels (Confidential, 2018h, I. 17; Gitano-Briggs et al., 2018; Harris, 2017, p. 9). Both wind and large-scale hydropower are scarce and limited primarily to Eastern Malaysian, away from major population centers. Indonesia has also refused to allow power to pass out of East Malaysia to the peninsula through its territorial waters that separate Malaysia’s land masses (Confidential, 2018c, I. 11, 2018d, I. 12, 2018f, I. 15, 2018h, I. 17; Gitano-Briggs et al., 2018).

Political leaders have proven unwilling to levy the necessary taxes to fully fund RE programs. While the FiT’s authorizing legislation allows for a 2% tax on consumers’ electricity use, the current tax is only 1.6%. Politicians were especially wary of raising the tax before the major election in May 2016 (Confidential, 2018f, I. 15, 2018h, I. 17; Navartatnam & Confidential, 2018, I.4). Pollution intensive industries also buoy Malaysia’s goal to reach high income developed status by 2020, and economic development take precedence of environmental priorities. Malaysia’s energy policies prioritize affordability, reliability, and sustainability in that order (Confidential, 2018h, I. 17, 2018e, I. 14; Ujang, 2018; Wong, 2018). Furthermore, public social awareness about the benefits of RE is still nascent. Many Malaysians, particularly older generations, worry that RE adoption will increase their electricity rates and are adverse to paying more for power (Confidential, 2018f, I. 15, 2018h, I. 17; Gitano-Briggs et al., 2018; Navartatnam & Confidential, I.4, 2018; Ujang, 2018).
Urban Planning and Transportation

Malaysia’s transportation sector is the country’s second most GHG intensive subsector after electric power generation. Road vehicles produce 85.2% of sector emissions, with 59% of these emissions due to personal vehicles, a product of Malaysia’s high car ownership rate (Briggs & Leong, 2016; Gitano-Briggs, 2017; Gitano-Briggs et al., 2018). Multiple interviewees focused specifically on improved urban design and rail-based transport as key mitigation tools within the transportation sector. Modal shift in the Klang Valley region, which contains Kuala Lumpur and neighboring communities, is particularly important as it contains half of Malaysia’s personal cars (Gitano-Briggs, 2017; Confidential, 2018b, 2018a, I. 2; Gitano-Briggs et al., 2018; Jinggut & Dzulkifli, 2018; Ming & Dashun, 2018; Thirupathi, 2018). These policy tools play a key part of the government’s efforts to reduce GHG emissions. While limited data exists to model the effect of urban design on emissions, as of 2013, rail-based mitigation actions alone have reduced emissions by 215 ktCO$_2$eq. By 2020, expansions and improvements in rail service could more than quadruple emissions reductions to 978 ktCO$_2$eq, accounting for over 3% of total national reductions (Ministry of Natural Resources and the Environment, 2015).

The Klang Valley region has seen the most dramatic improvements in urban planning and transport connectivity over the past decade. The government completed a new bus rapid transit line in 2015 and a mass rapid transit (MRT) in 2017 and is currently building another two MRT lines. The government has also improved physical and electronic infrastructure to better connect the multiple forms of public transport. Projects include covered walkways, street over paths, and development of single payment systems for multiple transit modes. Improved public transit
options around Kuala Lumpur (combined with road vehicle congestion) have bolstered ridership. (Briggs & Leong, 2016; Gitano-Briggs, 2017; Confidential, 2018a, I. 2; Gitano-Briggs et al., 2018; Ming & Dashun, 2018). The federal government has also signed an agreement with Singapore to construct a high-speed rail connection between Kuala Lumpur and Singapore. The project has the potential to reduce vehicle (and air) traffic in Malaysia’s major North-South corridor upon scheduled completion in 2026 (Gitano-Briggs et al., 2018).

Despite improved urban planning and public transport around Kuala Lumpur, the rest of the country has lagged behind. There is often limited connectivity and last mile gaps among the transit options that do exist. Multiple cities have rail stations outside of the city center that are not served by the bus system, making it difficult to travel without a car (Briggs & Leong, 2016; Confidential, 2018a, I. 2; Gitano-Briggs et al., 2018). Moreover, improved transit systems with the Klang Valley has not translated to expected ridership increases, with the government no longer reporting ridership figures after missing modal share shift goals. The lack of monthly travel passes and hesitancy to switch from personal vehicles have contributed to this problem. Malaysia’s domestic car companies, particularly Proton, and oil company, Petronas, have instilled a particularly strong sense of national car pride, making it difficult to shift riders to public transport (Confidential, 2018a, I. 2; Ming & Dashun, 2018; Thirupathi, 2018;Zhao & Zhao, n.d.). Furthermore, building new infrastructure systems can be difficult. Land reclamation projects are popular in Malaysia, in part, due to the difficulty of improving existing infrastructure; it is seen as an “opportunity to build new system rather than fix old messy systems… it’s easier to build from scratch” (Confidential, 2018a, I. 2).
The proposed high-speed rail line has also stoked substantial political and environmental controversy. Some environmental groups oppose the line as it would cut through two protected forest areas (Confidential, 2018b, I. 3). There is also uncertainty about whether social norms around rail travel can be adjusted to generate adequate ridership (Confidential, 2018a, I2; Ming & Dashun, 2018; Thirupathi, 2018).

Forest Management

Malaysia has extensive forests in both the Peninsula and East, with the majority of forest, 86%, in Sarawak and Sabah (Yankel, 2014). Malaysian government and NGO figures differ on the exact extent of forest land, which stands between 16.8 to 19.3 million hectares (Ministry of Natural Resources and Environment, 2014; World Resources Institute & Global Forest Watch, 2018). These vast areas of forest serve as a substantial carbon sink, offsetting more than 90% of Malaysia’s annual emissions (Ministry of Natural Resources and the Environment, 2015). Deforestation, driven primarily from logging and palm oil expansion, threatens the future of Malaysia’s forests. Malaysia has lost 23.1% of its tree cover since 2000, equal to 732 Mt of CO₂ emissions (World Resources Institute & Global Forest Watch, 2018).

Malaysia has primarily responded to deforestation by creating plans that encourage permanent gazetting of forests to encourage future protection from logging and land use change (Ministry of Natural Resources and the Environment, 2015; Confidential, 2018b, I. 3; Gitano-Briggs et al., 2018, I. 6; Confidential, 2017, I. 10; Jinggut & Dzulkifli, 2018). Malaysian states, which control forests, have gazetted more state land forests in the last five years and reduced incidences of
illegal logging. Sabah and Sarawak have more powerful and environmentally oriented forestry ministries and have led the way in forest protection. Sabah’s ministry has proven particularly proactive, passing more stringent protection goals. NGOs have worked closely with Sabah, which treats them as “near government organizations,” to conserve forest. Throughout Malaysia, NGOs have acted as a link between federal and state governments to push for the implementation of federal conservation lands at the state level (Confidential, 2017, I. 10; Jinggut & Dzulkifli, 2018, I. 18).

Private industry has also supported forest conversation efforts. Sime Darby, the largest palm oil producer in Malaysia, has a no new deforestation policy and has not developed on greenfield since 2005 and on peatland since 2010. Malaysia’s increased exposure to global markets has made corporations more responsive to international consumers who motivate sustainable behavior (Confidential, 2017, I. 10, 2018, I. 16).

Domestic environmentalism is also on the rise, with Malaysians particularly focused on biodiversity preservation. NGOs and the federal government have used this more attention-grabbing issue to highlight forest protection. The Malaysian government and public also increasingly recognize other ecosystem services offered by intact forests. The recent series of damaging floods as well as increased water scarcity have placed particular focus on the role of intact forests’ in protecting watersheds. The Central Forest Spine Plan was motivated, in part, by a push to preserve forests to protect watersheds (Wong, 2018, I. 5). Malaysians are also starting to capitalize on the commercial economic benefits of intact forests, operating a growing number of ecotourism operations for domestic and international visitors (Confidential, 2017, I. 10,
Interviewees also raised numerous challenges to gazetting forests. Those interviewed expressed disagreement over the extent of illegal logging and clearing of forest for farms, though most noted this as a minor problem. Several highlighted legal logging, Eastern Malaysia’s largest industry, as more problematic with timber companies frequently harvesting more than allotted to them and expelling local citizens within concessions (Amir, 2018, I. 20; Confidential, 2018b, I. 3, 2017, I. 10; Gitano-Briggs et al., 2018; Jinggut & Dzulkifli, 2018, I. 18; Thirupathi, 2018, I. 8; Wong, 2018). Interviewees underscored the difficulty of gazetting forests compared to the ease of degazetting forests, which requires no public notice, making it difficult for the public and NGOs to mobilize against (Jinggut & Dzulkifli, 2018). The federal government’s urban location also makes it difficult to enforce quotas, catch falsified documents, and monitor local graft. State governments may also lack the capacity to sufficiently protect forests. Others lauded current efforts to gazette forests but commented on the irreversible loss of many pristine areas and the ongoing agricultural use on or adjacent to forests (Confidential, 2018b, I. 3, 2017, I. 10; Jinggut & Dzulkifli, 2018).

Some interviewees critiqued the protection plans themselves, arguing that the government’s goal of preserving 50% canopy cover means that it “can just sit back and wait” since current cover is roughly 59%. The government also promised to limit palm oil plantations to six million hectares but has become silent on the matter since this limit was exceeded. Others pointed to the destruction of supposedly protected forests to develop new transportation infrastructure projects
In addition, ambiguity around data and land type classifications also pose challenges. There is widespread uncertainty, even among environmental NGOs, over what type of plantation land counts as forest. There are also discrepancies between government statistics on the amount of protected land and smaller figures cited by non-governmental groups.

Moreover, several people commented on the difficulty of accurately gauging true increases in forest canopy area, as reclassification of land type, without any physical change, affects these figures. In most cases, “increases” in forest areas, and claiming of accompanying mitigation credit, results from such reclassification. While the government receives credit for this action, there is no real guarantee that these forests will be protected in perpetuity; though, the government will likely have long since claimed the credit when a forest is later destroyed (Amir, 2018; Confidential, 2018b, I. 3, 2017, I. 10, 2018j, I. 23; Gitano-Briggs et al., 2018; Jinggut & Dzulkifli, 2018; Thirupathi, 2018, I. 8; Wong, 2018). Finally, the international community is unwilling to pay a sufficient price through avoided conservation programs\(^3\), such as REDD, to economically incentivize the protection of forests, with some estimating that developed countries would need to increase the price of carbon offsets by tenfold to halt deforestation in Malaysia (Confidential, 2017, I. 10, 2018d, I. 12; Yankel, 2014).

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\(^3\) Through avoided conservation programs, countries or organizations pay for the conservation of forests at high risk of destruction. These payments often are used to offset emissions. The preserved forest, by not being converted into agriculture or other use will continue to act as a carbon sink (Yankel, 2014).
Evaluation of Broader Mitigation Potential

Figures 7 through 9 highlight the relative impact and change in impact of Malaysia’s mitigation policies in and between 2013 and 2020. The above toolkits help evaluate the likely success of scaling up mitigation policies to achieve targeted reductions by 2020. The government aims to reduce an additional 5205 kt CO2eq through the FiT by 2020 (compared to 2013), scaling up the program to account for 17% of reductions from 1.4%. Insights from the toolkit discussion suggest that this target may prove ambitious. Despite strong program management and uptake of the solar FiT, the government has not raised the electricity tax rates sufficiently to fully fund the program, significantly reducing available funds for new projects and making a large programmatic scale up difficult. The 1231 kt CO2eq reduction increase targeted through non-FiT RE adoption may prove more achievable. The launch of the NEM, along with other government fiscal incentives for RE, may prove sufficient to reach the targeted reduction. To ensure success, the government may need to adjust the NEM to increase uptake, potentially by opening the program to third party solar installers; reduce barriers to RE grid connectivity; and assuage public and investor concern about the additional costs of RE.

By increasing the overall use and blend percentage of palm-based biodiesel, Malaysia plans to reduce an additional 1083 kt CO2eq. As this is only a relative contribution increase of 1.7%, this target may prove achievable. Use of palm biodiesel has rapidly increased in recent years, expected to rise by 180 million liters from 2016 to 2018 to reach 400 million liters of annual consumption. However, Malaysia currently uses a B7 (7%) biodiesel blend. The government attempted to increase this to B10 by July 2016 but missed this goal, in part due to national
carmakers’ inability to transition to the higher blend, and as a result, postponed this objective. A new target date has not been set. Malaysia is, therefore, unlikely to achieve this B10 target in the near future as well as a more ambitious B15 target by 2020 (Confidential, 2018e, I. 14; Wahab, 2017).

The government aims to reduce a further 1332 kt CO2eq through increased uptake of green technology, primarily though the GTFS. This is a substantial scale up green technology emissions from 2013. However, the GTFS has succeeded in supporting increased uptake of green tech in Malaysia and has been extended twice past its planned expiration in 2015 due to its popularity. While the GTFS has no available funds as of May 2018, planned appropriations should reactivate the program and attain the reduction goal. Malaysia is also projecting a further 158.78 kt CO2eq reduction through increased use of Energy Efficient vehicle (EEV), and the government also has a more ambitious goal of 100% EEV adoption by 2030 (Ministry of Energy, Green Technology and Water, 2017). Though the emissions reduction goal is modest, Malaysia will likely struggle to reach it given a lack of infrastructure to support EEV vehicles and slow uptake of EEV technology by Malaysian carmakers (Confidential, 2018e, I. 14, 2018f, I. 15, 2018h, I. 17). The goal to increase reductions from rail travel by 762.58 kt CO2eq is also fairly modest; it should be reachable given expansion of transit systems with the Klang Valley region.

Relative to other mitigation policies, the government plans to achieve less emission reductions through forest gazetting, targeting a reduction increase of only 2.63 kt CO2eq. This goal should be easily achieved, despite the decrease in easily protectable areas. Finally, Malaysia intends to substantially scale up its biogas capture program at palm oil effluent mills by 2700.94 kt CO2eq,
a 7.7% increase relative to other policies. Captured biogas will either be flared off or used for transport methane (Ministry of Natural Resources and the Environment, 2015). While Malaysia should be able to install flare systems at mills, technology delays may limit use of methane in the transport sector and make it more difficult to achieve the ambitious reduction.

Conclusion

Malaysia has a range of ambitious plans directly and indirectly related to carbon mitigation and decarbonization of its economy. Guided by these planning efforts, Malaysia has introduced policy toolkits in several sectors and aims to scale up these approaches to reach its 45% carbon intensity reduction goal. Interviewees highlighted renewable energy, urban planning and transportation, and forestry in particular, detailing the primary approaches, success, and challenges of each policy space. Chapter Four will highlight and synthesize cross-cutting themes impacting these policy toolkits. These toolkit descriptions add color, context, and immediacy to the government’s most recent mitigation statistics highlighted in the Biennial Update Report (Ministry of Natural Resources and the Environment, 2015).
Chapter 4 – Core Carbon Ecosystem Themes

This chapter focuses on main themes synthesized from the interview data. Throughout the interviews, multiple stakeholders raised similar cross-cutting themes that describe the functioning (or lack thereof) of Malaysia’s carbon mitigation ecosystem. I highlight the key themes in Tables 11 and 12 (Tables 2 and 3 in the Appendix shows the full list of themes with following full descriptions of those themes). Table 11 focuses on themes that constrain decarbonization pathways and Table 12 on those that enable them and can allow for escape from negative path dependencies. I then describe the themes more fully and connect the themes to the three main policy toolkits – forestry, renewable energy, and urban planning and transportation - discussed in Chapter 3.

Inhibiting Themes

<table>
<thead>
<tr>
<th>Constraining Factors</th>
<th>Description</th>
<th>Illustrative Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal-State Friction</td>
<td>Policies enacted by the federal government are not always implemented by the state governments. This results from differences in political aims, revenue streams, capacity, language, and jurisdiction.</td>
<td>There may be a federal push for things to happen, but it gets little support. The federal government has no authority over land… Federal policies can be set but won’t translate into state action if they don’t buy in… There’s a huge lag between passage and implementation. – Tajang Jinggut, Tropical Rainforest Research Center</td>
</tr>
<tr>
<td>Limited Government Enforcement, Capacity, &amp; Regulation</td>
<td>Malaysia has set ambitious environmental goals but struggles with enforcement. This is both a result of capacity limitations, especially at the state level, and lack of political will. The urban-centered seat of the federal government further limits its ability to oversee and enforce mitigation projects outside major urban areas.</td>
<td>“[The government implemented] this scheme to ensure everybody actually buckles up in the backs of cars by 2016… But we don’t actually have seatbelts in the back of all cars. But the police were going to start issuing summons… For the early part of the year, the police said, ‘We’re issuing summons.’ But then, our government got a lot of complaints because we have the national carmaker, and some of those are probably the most affordable car,” – Anonymous Police Officer</td>
</tr>
</tbody>
</table>
including Proton's cheapest model. So then, the government said, ‘Okay, just send in your car and we'll... put it in. And then you'll all be able to comply.’ But a lot of people could not even afford to take in their cars, so enforcement is now ignored.” – Senior energy sector government official.

| Absence of Climate Control Center | Challenges related to collecting data from and coordinating action among different federal agencies and the state governments arise, in part, due to the absence of an agency dedicated to overseeing the transition to a low-carbon development pathway. | “A national climate change research center [would be a useful structural change] but very difficult to put together what appears to be a cost center. It would make some of the relationships slightly less ad hoc, part of the institutional framework that is so important.” – Senior environmental sector government official. |
| Sustainability & Development Aspirations & Constraints | On one hand, Malaysia wants to become a high-income country by 2020 and stand out on the world stage, and as a result, prioritizes mitigation policies reflective of these ambitions. However, in many ways, Malaysia is still a developing country. The tensions between aspirations and constraints affect the policy mix and implementation success. | “It's not just climate change, but I will say for the past 15 years - almost 15 years - we have been strong in terms of advocating for environmental sustainability and simply because Malaysian is becoming a much stronger upper middle-income country. You can look at the data - how much it's changing. So, Malaysia is getting sophisticated, smarter. They know how other countries are behaving, are performing, so they want to beat other countries as much as possible. You can see KLCC, that is a manifestation of the leaders' vision... to make Malaysia known in the world, and there are many other things that Malaysia has been doing.” – Senior international development official |

Table 11: Interview themes exemplifying factors inhibiting decarbonization and carbon mitigation in Malaysia.

**Enabling Themes**

<table>
<thead>
<tr>
<th>Supportive Factors</th>
<th>Description</th>
<th>Illustrative Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on Sustainability Planning &amp; Action</td>
<td>Malaysia’s range of plans and strategies related to carbon mitigation demonstrate both strategic capacity as well as a commitment to exploring solutions.</td>
<td>“On a positive note, as I say to you, the government is fully aware of how and where they want to go. The best example is the 11th Malaysia Plan. If you go into Chapter 6, Green Growth, green growth was not there [before].” - Senior international development official</td>
</tr>
</tbody>
</table>
Internalization of Exogenous Drivers

Exogenous factors - including global environmental standards, consumer preferences, and best practices - drive transitions to low-carbon practices, arguably more so than endogenous factors, such as federal policies. If you ask me, awareness-wise is a [corporate] internal awareness… for the palm oil industry because of the pressure from the customers… We deal with quite a number of big players from Europe… so there’s pressure… that’s actually driven into awareness. [It’s not] regulation itself, not the government itself… If I were to sell my product to Europe, … I have to commit to these things. – Sime Darby Manager

State Transfer Pathways

In certain cases, the success of state-level carbon sector policies and actions translate into responsive action and/or emulation by the federal government or other state governments. “Malacca has a view of itself as being at the forefront of innovation in Malaysia, in competition with Penang [for being the most sustainable].” – Senior international resilience funder

Diversity of Actors

A diverse set of actors have worked in tangent within Malaysia's carbon policy ecosystem to shape the current landscape and future policies and priorities. The federal government, state governments, international organizations, NGOs, corporations, and a rising youth all play key roles within and add strength to this system. Industry is a main actor and has influenced government thought. Civil servants are also on top of issues… The Youth are getting a stronger voice to push for this type of issue; they have more international awareness. - Senior international development official

Table 12: Interview themes exemplifying factors enabling decarbonization and carbon mitigation in Malaysia.

**Theme Discussion**

**Constraining Themes**

*Federal-State Friction*

The interview data highlights clear intergovernmental relations challenges, particularly a gap between federal level policy creation and state level policy implementation; policies enacted by
the federal government are not always carried out by the state governments. This results from differences in political aims, revenue streams, capacity, language, and jurisdiction. This is most prominent in the forestry sector as well as for other natural resources, control of which falls within state government jurisdiction.

While the federal government sets the majority of forest protection targets and creates conservation plans, such as the Central Forest Spine and Heart of Borneo Plans, the state governments have the final implementation and enforcement authority over forests. State governments gain substantial revenue from fees associated from the extraction of natural resources and cannot collect taxes or fees from non-exploitative uses, such as income or sales taxes, without special exemptions. Thus, state governments have limited financial incentive to adopt federal plans.

This is further compounded by limited capacities of state governments, which frequently do not have the expertise, available staff, or financial resources to carry out federal plans and policies without attached funding. Communication barriers also complicate the translation of federal plans into state action. The federal government operates primarily in English and uses it for majority of its plans. State governments primarily operate in Bahasa Melayu, with many state level staff unable to read English proficiently. While intergovernmental challenges occur most prominently in the area of natural resources, interviewees pointed to other impacts as well. For example, the federal government is making relatively rapid progress implementing electricity policies, while there is “slower action” around water policies, controlled at the federal and state levels respectively (Ujang, 2018).
Limited Government Enforcement, Capacity, and Regulation

Interviewees raised many variations of “Malaysia has great plans, little action” (Confidential, 2018b, I. 3). Malaysia has good rules on the books but poor enforcement. This results both from capacity limitations, especially at the state level, and lack of political will. The urban-centered seat and focus of the federal government further limits its ability to oversee and enforce mitigation projects outside of major urban areas. “The government doesn’t have enough soldiers to enforce the forest boundaries,” as evidenced by the frequent problem of logging operators harvesting above their approved allocations (Hyde, 2017).

In addition, Malaysian politicians are hesitant to enact policies that could slow economic growth or create ill will among established interests. For example, the government set a cap to limit palm oil plantations to six million hectares but has allowed expansion above this threshold to support palm producers. One interviewee told a story that demonstrates this point well when asked about the likely success of the 100% EEV adoption goal by 2030. The federal government passed a police-enforced law requiring all drivers and passengers to wear seatbelts in 2016. Many Malaysians complained as the cheapest Proton car model was not produced with rear seatbelts installed. The government responded by offering free seat belt installation. However, many Malaysians still struggled to afford the time or financial cost of bringing in their vehicles. Today, while the seatbelt law still exists, it is no longer enforced.

Along with barriers to enforcing existing policies, the federal government favors creating incentive-focused policies over regulatory ones. Thus, policies like the FiT that incentivize users
have gained more traction than mandates (and the itself FiT is underfunded as the government is wary of levying the full tax authorized to fund the program). Finally, existing federal protections are often ignored or “lost in translation” when the federal or state governments embark on new initiatives (Confidential, 2018b, I. 3). For example, the government will designate a forest as protected but will subsequently ignore this status if it wants to develop a road or rail project through the area.

**Absence of Climate Control Center**

The Environmental Management and Climate Change Division within the NRE leads climate change planning efforts and carbon accounting. However, this body has no enforcement authority and only fully oversees certain areas within the NRE's mandate. Different groups manage forestry, transportation, energy, and biofuel related carbon mitigation programs. The lack of a "central command tower" and resulting diffusion of authority and responsibility creates challenges to enacting a cohesive policy response.

Exchange of data among government agencies also proves challenging. Flow of information and collaboration is hindered by a “chief centered” hierarchy, with employees often requiring their supervisor to talk with someone else's supervisor to obtain needed information (Confidential, 2017, I. 10). In many cases, data simply does not exist for a certain metric or is more than five years old, making it difficult to accurately model climate change policies and impacts. In addition, stakeholders often hold different views on the assumptions underlying this data. For example, there is widespread disagreement over whether palm oil plantations are included in
forest cover calculations. Such disagreements extend to the assumptions supporting the claimed 32% carbon intensity reduction milestone, creating uncertainty and political conflict over its accuracy.

The lack of centralization also leads to project disconnect. Many Malaysian climate projects are designed to attract international attention and market the country. Malaysia has constructed a growing number of green buildings and low carbon infrastructure projects. However, many of these projects are "one-offs" and do not connect to broader mitigation or resilience plans that allow for synergies through integration.

**Sustainability and Development Aspirations and Constraints**

Malaysia is working to establish itself as a high-income country by 2020, and its INDC is driven in part by a desire to stand out on the international stage and compete with regional neighbors, particularly Singapore. The branding of carbon mitigation as an international goal drives certain high attention approaches over less attention grabbing, low hanging fruit approaches, such as pushing for increased installation of housing insulation. At the same time, Malaysia is still a developing country in many ways, and wealth is concentrated in urban centers, especially the Klang Valley. The government is highly averse to any mitigation measure that could potentially slow the growth of Malaysia’s economy, limiting the policies it is willing to consider. The still significant low-income population also makes it more difficult to pass the cost of adopting greener technology, methods, and sources onto individuals. This tension is reflected in the Malaysian public as well. Citizens are focused on using their increased wealth to achieve higher
social status through consumption and are unwilling to sacrifice this by paying more for sustainable products and programs.

Supportive Themes

Focus on Sustainability Planning and Action

Malaysia has developed an encompassing range of plans and strategies related to carbon mitigation. These efforts demonstrate both strategic capacity as well as a commitment to exploring solutions. While implementation barriers exist, the government has actionized much of its planning effort, as evidenced by projects ranging from improved energy efficiency of government buildings to the expansion of public transit in Kuala Lumpur. Moreover, there is an increased understanding within the government that: “Leaving no one behind and sustainability is not an either or, [it’s] both.” The government’s highly public carbon mitigation announcements further showcase a credible desire to gain international recognition as a global environmental leader and tie the country’s rapid economic development to improved sustainability.

Internalization of Exogenous Drivers

Exogenous factors strongly drive Malaysia’s transition to low-carbon practices, arguably more so than endogenous factors, such as federal policies. Exogenous forces - including global environmental standards and best practices, regional and global competition for status, consumer
preferences for “green” products, and foreign media - have exposed Malaysia’s government, corporations, and public to more stringent environmental norms and practices and pushed internal action. Singapore’s proximity acts as an especially powerful catalyzer. Malaysians and the Malaysian government frequently compare themselves to and compete with their Singaporean counterparts. Singapore’s wealth has allowed it to take significant progressive sustainability actions, which have motivated responsive sustainability policies and programs in Malaysia.

*State Transfer Pathways*

In certain cases, the success of state-level carbon sector policies and actions translates into responsive federal level action and emulation of state level programs. This process is analogous to the "laboratories of democracy" concept in the United States, in which the states function as the proving grounds to test policies and programs before precipitating federal action. The development of the Iskandar Low Carbon Society Blueprint building momentum for the INDC exemplifies this pathway.

Competition and knowledge exchange among Malaysia’s cities and states also drives sustainability improvements. In particular, rivalry between the cities (and states) of Malacca and Penang, which see themselves as competitors to be Malaysia’s “third city” (after Kuala Lumpur and Johor Bahru), spurs sustainability in both. Malacca markets itself as a green city and views itself at the “forefront of innovation in Malaysia,” and Penang sees itself as a progressive champion within Malaysia (Confidential, 2018a, I. 2). Each hope to be viewed as Malaysia’s
premier green city. The relationship between the Eastern Malaysian states of Sarawak and Sabah exemplifies a knowledge transfer relationship. Both states have relatively progressive forestry departments and have learned from each other in developing forestry conservation and management programs and forming partnerships with NGOs.

*Diversity of Actors*

A diverse set of actors have worked in tangent within Malaysia's carbon policy ecosystem to shape the current landscape and future policies and priorities. The federal government, state governments, international organizations, NGOs, corporations, and a rising youth all play key roles within Malaysia’s carbon policy ecosystem. Through playing distinctive yet complimentary roles, these groups all add strength to the system and support Malaysia’s decarbonization efforts.

*Broader Patterns*

Synthesizing these themes suggests several broader patterns within Malaysia’s policy environment. The root issue for the inhibiting themes is that the scope of the mitigation problem far exceeds the government’s capacity to address it while still focusing on its other priorities. This showcases, that while advanced by regional standards, the Malaysian government must still build its own management capacity if it seeks to fully confront and address complex, wicked problems, such as climate change (World Bank, 2014). Politics of control also explain much of the inhibiting themes, with progress blocked because actors are unwilling to share information coordinate projects, or launch pilots, as actors within the Malaysian political system seek to gain
and maintain power and deploy this power to enact their ends. New collaborations and programs could undermine established patronage and power networks. Similarly, the inhibiting themes hint that Malaysian politicians have made a deal with their public analogous to that between the Chinese government and its citizens, in which the public tolerates one-party rule and lack of an environmental focus if incomes steadily rise (This also underscores the likely role of slowing economic growth in bringing in Malaysia’s new government). Thus, any program that could stifle the economic growth of Malaysia is politically untouchable.

The concept of face-saving underlies the enabling themes. Malaysian governments, companies, NGOs, and the public all seek to maintain a respectable reputation and use reputation as a basis for competition. This norm accounts for competition among states, internalization of exogenous standards, the government’s focus on creating an array of attention-grabbing plans, as well as a variety of other actions by actors within the carbon mitigation ecosystem.
Theme to Toolkit Linkages

The themes explain much of the success and failures of the highlighted policy toolkits discussed in Chapter 3. They also suggest how these policy areas may evolve in the future and contribute to Malaysia’s larger carbon intensity reduction goals. The connections between the themes and the policy toolkits are fully articulated and analyzed in the following section. Figure 13 displays the connection among all themes and policy toolkits (Figure 4 in the Appendix shows the linkages between the policy toolkits and all themes).

Figure 13: Main linkages between interview themes and highlighted policy toolkits
The forestry toolkit has the most direct connections to the themes, linked to all four enabling and inhibiting themes. A diversity of actors drives forest gazetting. The federal government, with its focus on sustainability planning, primarily develops protection plans. Domestic NGOs encourage implementation by the states, in part by activating the public and bringing in donor funding. International organizations provide further funding, capacity building, and technical expertise. Finally, corporations, motivated by exogenous forces, including international consumers, sustainability-based competition, and international environmental standards and norms are adopting more sustainable forestry practices and showcasing corporate social responsibility and sector leadership. Through state transfer pathways, the resulting improved practices and institutional knowledge developed by the states is shared among them as well as the federal government.

Forest protection is constrained by Malaysia’s sustainability and development constraints. Malaysians, particularly outside of Kuala Lumpur, simply cannot afford to spend time and money protecting the forests given more pressing concerns, such as feeding their families or pushing for clean drinking water. In addition, absence of a climate control center; limited government enforcement, capacity, and regulation; and federal-state fiction all hinder the government’s protective efforts. The federal government unit charged with monitoring and mitigating climate change has no authority over the forestry division, which in turn has no authority to enforce the federal government’s protective plans at the state level. Moreover, the
federal government has proven hesitant to enact more stringent mandates that could threaten the palm oil and logging industries.

**Renewable Energy**

The RE toolkit strongly links to one enabling and three inhibiting themes. The federal government’s focus on sustainability planning and action has resulted in the development of numerous energy sector plans. Many of these plans have resulted in implemented policies, including the FiT and NEM. While far from perfect, these polices have encouraged increased adoption of RE technologies and raised the public and the government’s awareness towards their potential.

Conversely, due to development constraints, the government and the public are still focused on ensuring an affordable and reliable electrical supply, with sustainability a distinctly third concern. As a result, the government will not set aggressive mandates pushing for RE increases, implementing incentivizing approaches instead. While less of a problem than in the forestry sector, the absence of a climate control sector also stymies government efforts. Climate change focused staff within the NRE face bureaucratic and hierarchical hurdles when working on energy topics, overseen by KeTTHA, which slows and complicates energy-based carbon mitigation efforts and tracking. Finally, financial barriers to RE slow new investments by producers and uptake by consumers, and Malaysia’s substantial physical barriers to RE substantially complicate RE-rooted decarbonization strategies compared to other countries.
Urban Planning and Transportation

The highlighted urban planning and transportation approaches most directly connect with one enabling and three inhibiting themes. The focus on sustainability planning and action has catalyzed improved transit connections and expansions in the transit systems, particularly in the Klang Valley. However, the urban planning and transportation sector exemplifies problems associated with lack of centralized planning and authority. Despite increased transit connectivity near Kuala Lumpur, flagship transit projects in the rest of the country often are not integrated into larger transportation systems. Lack of climate control hub and limited government enforcement and regulation has also resulted in transportation plans directly at odds with forest conservation goals.

Conclusion

The eight themes raised in this section help uncover and the explain the roles of central issues, actors, and dynamics within Malaysia’s carbon mitigation policy ecosystem. Certain themes act as accelerants to decarbonization pathways within Malaysia while others hinder this progress. Most of these themes also connect to the policy toolkits previously discussed, with this linkage providing another lens of analysis for exploring their success and challenges. Chapter Five will place these themes and policy toolkits within the context of the decarbonization theories raised in Chapter Two.
Chapter 5 – Policies to Pathways

This section places the themes and toolkits synthesized from the interviews within the pathways and path dependencies framework. I first explore connections between the interview information and Seto et. al’s categories of carbon lock-in to understand how policy problems and inhibiting themes stem, in part, from lock in (Seto et al., 2016). I then discuss links between the Malaysia case and the concepts of carbon lock-in escape, positive path dependency, and pathway drivers, highlighting how these forces drive mitigation successes in Malaysia. I conclude the chapter by taking up Rosenblum’s challenge to move from theory centered discussions implementation by suggesting ways to actionize these linkages for policymakers (Rosenbloom, 2017).

Connections to Carbon Lock-In

Theme Linkages

Seto et. al define three main carbon lock-ins: infrastructure and technological (IT), institutional, and behavioral (Seto et al., 2016). Many of the inhibiting themes raised by interviewees relate to these carbon lock-in mechanisms. While some themes link most closely with one category, most of the themes straddle two lock-in types. (More linkages are discussed after Table 4 in the Appendix).
**IT and Behavioral Lock-In**

The sustainability and development aspirations and constraints theme connects with IT and a behavioral lock-in. Malaysian energy consumers have come to expect cheap electricity, which they associate with coal. They perceive RE sources as costlier, and thus, resist transitioning to a greater RE mix. The infrastructural lock-in of fossil fuel sources contributes to this cost differential.

**IT and Institutional Lock-In**

Both IT and institutional lock-in connect to sustainability and development aspirations and constraints. Institutional lock-in reinforces aspiration driven programs spearheaded by certain actors within the Malaysian government. These actors benefit from focusing on attention grabbing projects and initiatives that sometimes come at the expense of more feasible or impactful alternatives. IT lock-in, created by development constraints, limits more ambitious sustainability projects and shifts the focus to cheap and quick development over sustainable development. However, this theme also highlights the crucial decision point Malaysia faces. As it seeks to become a high-income country and improve the lives of its poorest citizens, the government will need to build substantial amounts of new infrastructure. It must decide whether this infrastructure will lock the country into a carbon intensive path, allow escape from the current high carbon trajectory, or even lock-in a low carbon pathway.
Institutional and Behavioral Lock-In

Several themes link to both institutional and behavioral lock-in. Institutional lock-in contributes to limited government enforcement, capacity, and regulation. Many private actors benefit under the loose regulatory regime and would resist greater regulation and enforcement. For example, lax protection of forests allows palm oil producers to more easily expand plantation acreage and loggers to extract timber above their legal allocations. The absence of a climate control center similarly results from a combination of institutional and behavioral lock-in. Actors within government ministries seek to reinforce their own power by maintaining control over a greater share of work. In addition, behavioral norms around hierarchy further contain transfer of information and inhibit collaboration among government ministries.

Behavioral Lock-In

Behavioral lock-in maps most closely with federal-station friction, with tensions between governments and a traditional lack of partnership further inhibiting implementation of federal policies at the state level.

Policy Toolkit Linkages

Renewable Energy

All three categories of carbon lock-in influence the renewable energy policy toolkit. IT lock-in challenges the efforts of the FIT, NEM, and GTFS programs. Between 2000 to 2020, the percentage of coal and coke in Malaysia’s energy mix is expected to increase from 5% to 53%, largely due to the drop in international coal prices. The expansion of coal plants makes it more difficult for RE sources, and even natural gas, to gain a foothold in the market. Furthermore,
electrical grid connectivity gaps make it challenging for RE producers using the FiT to integrate their power with the grid. This is compounded by TNB’s institutional lock-in. As TNB operates many of the coal plants, it benefits from the current system and has limited incentives to expand the grid to RE producers. In addition, Malaysian oil firms, such as Petronas, benefit from Malaysian’s high car ownership rates and supportive infrastructure and have little reason to support biofuels, which could eventually compete with petroleum. Moreover, the government receives substantial revenue from oil extraction and refinement, and thus, also has significant disincentives to take actions that could threaten the industry’s financial health. Behavioral lock-in also builds demand for cheap oil. Many Malaysians view car ownership and travel as a status symbol. Furthermore, as mentioned earlier, opposition to RE stems from public perceptions about losing access to low priced electricity. Banks also perceive RE projects as riskier, discouraging investment. Finally, the government’s hesitation to raise the FiT tax stems both from behavioral lock-in, with Malaysians accustomed to a low tax state, and institutional lock-in, with the UNMO wary of jeopardizing its hold power by shifting to the higher tax rate.

Urban Planning and Transportation

The urban planning and transport policy environment also connects to all categories of carbon lock-in. Malaysian’s car pride, a behavioral lock-in, has resulted in automobile centered transport infrastructure, creating IT lock-in. This makes it more difficult for public transit modes to gain ridership and contributes to the country’s lackluster mode shift thus far even within the Klang Valley. The low quality of existing infrastructure also makes it more expensive and complicated to put in less carbon intensive replacements. As highlighted above, fossil firms, and the revenue
dependent government, experience institutional lock-in, further inhibiting programs that encourage mode shift from private vehicles to public transit.

Forestry

Mitigation efforts in the forestry sector link to institutional and behavioral lock-in. Agricultural and logging interests benefit from the loose regulatory and enforcement regime of state and federal governments and have incentives to lock-in the current system, ensuring continued rent capture. In addition, Malaysian behavioral norms primarily treat the country’s forests as a commodity, primarily valuable for extraction and sale. This perception has contributed to the high level of deforestation.

Connection to Lock-in Escape

Despite these constraints, Malaysia has made a concerted effort to transition to a low carbon economy. Individually, these efforts appear insufficient, but in concert, they create enabling conditions needed to ‘break-out’ of carbon lock-in. Both the interviewee’s enabling themes and elements of the policy toolkits connect with lock-in escape mechanisms highlighted by Seto et. al. (More theme connections detailed in after Table 4 in the Appendix).

IT, Institutional, and Behavioral Escape

The government’s focus on sustainability planning and action helps counter IT, institutional, and behavioral lock-in. Boosting the availability and cost of low carbon alternatives is key to
escaping IT lock-in. Malaysia’s mitigation planning and action work to both provide these alternatives and lower their costs. In the transport sector, expansion of public transit systems represents a direct alternative to more carbon intensive modes of transportation. Moreover, within the RE policy space, the FiT, NEM, and GTFS all increase the availability of RE alternatives and bring down their costs through subsidies, incentives, or risk reduction. In addition, government sustainability planning and action also allows for escape from institutional lock-in. Even planning efforts that are not immediately implemented may plant “seeds of transition” by proactively creating programs that could quickly come into force if a window of opportunity arises (Seto et al., 2016, p. 435). Finally, this planning effort may gradually push against behavioral lock-in by elevating the visibility and importance of sustainability programs among government officials and the public.

**Institutional and Behavioral Escape**

The internalization of exogenous factors, theme demonstrates escape from institutional and behavioral lock-in. Exogenous factors can operate as the systemic shocks that allow for major institutional shifts. Furthermore, exogenous norms and standards introduce new perspective that disrupt behavioral lock-in and shift the public discourse. For example, certain Malaysian cities have created and implemented climate change programs to achieve global norms and standards. Melaka’s Green City Action Plan stems from a push to ensure it maintains its UNESCO cultural heritage status (Susskind et al., 2018).
Behavioral Escape

State transfer pathways allow for escape from behavioral lock-in. State transfer pathways allow for knowledge exchange and copying of practices and programs among Malaysia’s state and federal governments. States that act as sustainability leaders have demonstrated the success of their methods, thereby changing perceptions, and resulting behaviors in other Malaysian governments. For example, in the forestry sector, state governments with progressive forest management practices and closer relationships with NGOs have encouraged behavior shifts in other state governments.

Creating Beneficial Lock-in

Malaysian policy approaches also foster beneficial lock-ins that increase the durability of carbon mitigation approaches and encourage subsequent low carbon shifts. In the RE sector, the Fit, NEM, and GTFS create weak beneficial IT lock-in by fostering energy production and consumption systems and infrastructure developed around RE sources.

The government has taken more significant measures to build institutional lock-in within the RE policy sector. The establishment of a dedicated agency, SEDA, to oversee RE adoption is the clearest example of fostering institutional lock-in of a decarbonizing pathway. The government also established the Performance Management and Delivery Unit (PEMANDU) in 2009. PEMANDU aligned Malaysia’s development and carbon mitigation targets. PEMANDU’s seat in the Prime Minister’s office allowed it to exert meaningful institutional pressure and lock-in the
alignment between carbon reduction and development targets as well as press the urgency and importance of mitigation with government ministries (Confidential, 2018d, I. 10; Susskind et al., 2018; World Bank Group, 2017). The decision to create an institutional mechanism with the authority to direct and integrate national development and mitigation targets, highlights the potential of strong coordinating agency to foster beneficial lock-in (Susskind et al., 2018).

Prime Minister Razak’s public announcement of Malaysia’s carbon mitigation target at the 2009 UNFCCC meeting demonstrates one creation of behavioral lock-in through a high level public commitment (Susskind et al., 2018). The government also oversees programs that should create behavioral lock-in around environmental norms for the broader public. A new school curriculum on clean air, clean water, and the environment will be introduced in 2019. The explicit goal is to instill environmental value and civic consciousness and slowly change public awareness by introducing this material at a young age (Gitano-Briggs et al., 2018; Susskind et al., 2018; Ujang, 2018). Similarly, the government has included young Malaysians in a variety of national planning processes, such as the TN50 and specifically solicited their environmental views. This should reinforce behavioral lock-in around environmental issues. In addition, the government’s many planning efforts can also be interpreted as an attempt to foster beneficial lock-in across all three categories.
Connections to Pathway Drivers

Diversity of Actors

The pathways literature emphasizes interactions among actors, particularly collaboration and knowledge exchange, as a key driver of decarbonization pathways (Araújo, 2017; Rasiah, Al-Amin, et al., 2017; Scoones et al., 2015; Seto et al., 2016). Multiple interviews highlight the importance of stakeholder interactions. The diversity of actors theme, emphasized by numerous interviewees, ties directly into the pathways literature. Within the Malaysian policy mitigation ecosystem, a multitude of actors work in tangent and share information to drive decarbonization. Forest protection exemplifies this: the federal government creates protection plans, which require implementation by the state governments. NGOs push and support state governments to implement these gazettement plans. In turn, progressive states adopt new approaches and partnerships that spread to other Malaysian governments. The youth, activated in part by NGOs, further push governments to protect forest reserves. Corporate palm and logging interests, faced with increased international and domestic demand for sustainable products, implement more sustainable forest management practices.

Policy Suite

The pathways framework also recognizes the effect of implementing a broad suite of aligned policies and programs in catalyzing pathways (Givoni et al., 2013; Grubler, 2012). The focus on sustainability planning and action theme demonstrates government effort to create and actionize
a range of carbon mitigation policies across sectors, and Malaysia has implemented policies within and across its five carbon sectors (see Table 1 in Appendix). The energy sector best demonstrates a multipronged policy approach through the FiT, NEM, GTFS, and other policies, such as use of biofuel and EEV incentives. This approach uses reinforcing policies to target a broader range of energy production and demand points to achieve greater carbon reductions. Conversely, the absence of a climate change control center dampens Malaysia’s ability to effectively implement tailored and balanced policy suites, especially across sectors that require action by multiple government agencies. Creating coordinating agencies and structures would allow Malaysia to better advance supportive policies to support decarbonization pathways.

**Actionable Lessons**

Rosenblum lists five key functions of the pathway framework for moving the theory into practice: mapping, planning, learning, bridging, and communicating (Rosenbloom, 2017). The linkages between the interview information and the pathways theory shed light on how these functions could be employed to affect change in Malaysia. The connections between theory and the policy system emphasize key points of learning that Malaysia can draw from to better understand (and shape) pathways of change. In particular, learning highlights the key carbon lock-ins blocking progress in the renewable energy, transportation, and forestry policy spaces. Planning builds from these lessons by suggesting concrete responses Malaysia can undertake to escape from high carbon path dependencies, reinforce positive path dependencies, and catalyze pathway drivers.
Mapping allows for a higher-level view of the range of possible futures facing Malaysia within the three highlighted policy sectors both in the status quo environment and in the case of greater adoption of decarbonization pathways. For example, mapping of the energy sector points to increasingly carbon intensive, coal-based electricity mix over the next few decades if major changes are not undertaken. It also highlights the window of opportunity for Malaysia to build green energy systems to support the country’s rapid growth and develop green economies around these systems.

The linkages also emphasize the value of bridging to build stronger decarbonization pathways in Malaysia. Bridging seeks to better understand uncertainty and complexity by drawing upon and bringing together a multitude of perspectives, and the Malaysia case demonstrates the power of a diverse set of stakeholders to create change. The bridging concept recognizes this value and suggests that even more emphasis should be placed on collaboration and bringing a diverse group of actors to the table. Finally, the communication function recognizes the importance of actionizing and sharing information about the role of lock-in, escape, and driver mechanisms in Malaysia’s carbon mitigation space, especially with the public. Communication and knowledge exchange can assist in escape from behavioral lock-in and build new norms around environmentalism and carbon mitigation.

**Conclusion**

Many of the inhibiting themes brought up by interviews result, in part, from IT, institutional, and behavioral lock in. Carbon lock-in also accounts for many of the challenges in the RE,
transportation, and forestry policy spaces. Conversely, many of the enabling themes showcase escape mechanisms, pathway drivers, and reinforcement of positive path dependencies that support successes in Malaysia’s carbon mitigation environment. Connections between pathways and lock-in theory and the Malaysia case also point to actionable lessons. Chapter Six will build upon this by offering broader recommendations for driving mitigation in Malaysia.
Chapter 6 – Recommendations and Conclusion

The previous chapters introduce Malaysia’s carbon mitigation policy ecosystem, highlight the success and challenges of policy toolkits, explore enabling and inhibiting themes, and draw connections between the Malaysian policy ecosystem and pathways and path dependency theory. In this chapter, I pull from these toolkits, themes, and linkages to develop recommendations for improving the functioning of the mitigation ecosystem. I start by overviewing and explaining the consequences of the May 9, 2018 election in which UNMO lost control of the parliament after 61 years of one-party rule. I focus on offering six main recommendations for the new government that support continued economic growth while increasing carbon mitigation. Table 14 lists these five core recommendations. I conclude by briefly synthesizing key findings, speaking to the broader implications of this work, and exploring what Malaysia’s experience offers the rest of the world.

Political Transition

As noted in Chapter One, in a shocking upset, UNMO lost its majority in the House of Representatives to the PH coalition on May 9, 2018. While UNMO’s popularity had declined since 2015, largely stemming from corruption allegations around missing funds from 1Malaysia Development Berhad, observers widely expected a UNMO victory. UNMO redrew electoral districts in its favor, jailed political opponents, and increased handouts to potential voters before the election. However, PH and its political allies claimed 121 of the 222 House seats (Aw, 2018; Election Commission of Malaysia, 2018). Mahathir Mohamad led the PH coalition and serves as
the new Prime Minister. Mahathir is no stranger to Malaysian politics, formerly serving as the Prime Minister, for UMMO, from 1981 to 2002 (Au, 2016; J. Hamid, 2008). He also acted as a mentor to Najib Razak (BBC, 2016, 2018).

During the campaign, Mahathir and PH pledged to crack down on corruption, improve civil rights, and revive the flagging economy (Leng, 2018; Ruxyn, 2018; Smith-Spark, 2018). Mahathir, 92, also promised to secure the release of Anwar Ibrahim to eventually serve as Prime Minister. Anwar, Mahathir’s original mentee, was pushed out of UNMO and jailed under sodomy charges. Many perceive Mahathir as orchestrating the original jailing of Anwar to solidify his own political control. Thus, Mahathir’s pledge and the cooperation between him and Anwar throughout the election cycle represent a remarkable turnaround for both men. Mahathir has announced that Anwar could succeed him within two years if Anwar wins election as a minister (BBC, 2016, 2018).

The end of 61 years of one-party political control represents a unique window of opportunity for PH to change Malaysia’s course and strengthen its carbon mitigation approach. However, the new government could also reverse Malaysia’s current progress and set a worrying precedent for other developing countries. Initial signs are troubling. Throughout the election, PH pledged to lower and phase out taxes, including the Goods and Service Tax, and reintroduce automobile fuel subsidies (Ruxyn, 2018). In addition, during his prior time as Prime Minister, Mahathir was perceived as centralizing power around the Prime Minister’s office and developing the government architecture that enabled Najib’s authoritarianism. He also emphasized economic growth over other priorities (Au, 2016; J. Hamid, 2008). The focus on revising the economy
during the campaign suggests that the environment will receive scant attention, and in troubling move, Mahathir has suggested abolishment of certain ministries and has not included the Ministry of Natural Resources and Environment as one of the initial ten he plans to keep in place (Leong, 2018; Siew, 2018).

**Carbon Mitigation Recommendations**

The recommendations are targeted at the new PH governing coalition. Drawing from the toolkits, themes, theories, and linkages, the recommendations primarily focus on low cost or costless ways to increase the efficacy of mitigation programs while supporting continued economic growth and building increased economic activity around green technology, renewable energy, ecotourism, and other sustainable programs. I highlight six main policy areas with targeted sub-policies for achieving progress within these sectors (Table 5 in the Appendix highlights additional policy options).

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<th>Policy Focus</th>
<th>Description</th>
<th>Sub-Policies</th>
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<td>Improve Public Transportation</td>
<td>Malaysia has the beginnings of a national public transportation system. While significant steps remain to creating an integrated system with high ridership, the government can take relatively cheap and quickly implementable steps to make better use of existing public transit systems.</td>
<td>Improve Physical Transit Connectivity outside KL</td>
<td>Outside of KL, there are many gaps in public transit systems that complicate travel and incentivize use of personal vehicles. While additional transit infrastructure is needed, better connecting existing options provides a high impact and low cost first step.</td>
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<td>Connectivity</td>
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<td>Improve Nonphysical Transit Connectivity &amp; Experience within KL</td>
<td>Lack of a monthly pass option and use of different card and fair systems among public transit lines constraints ridership in KL. Making a more convenient and integrated pass system is a simple step to boost ridership.</td>
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<td>Include Mitigation &amp; Environmental Impacts in Evaluation of the</td>
<td>As the new government reviews large infrastructure projects, including the rail line, it should add environmental and GHG</td>
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<td><strong>Maximize Efficacy of Existing Renewable Energy Policies</strong></td>
<td><strong>KL-Singapore High Speed Rail</strong></td>
<td>eission impacts as part of its evaluation criteria.</td>
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<td>Malaysia has a range of successful RE policies. Small and fairly simple changes, including better aligning incentives, increasing funding, removing regulatory barriers, and limiting politics, could unleash their full potential.</td>
<td><strong>Incentivize TNB to Accept &amp; Connect with RE Sources</strong></td>
<td>The government should ensure RE programs sufficiently reward TNB at the margin for accepting RE sources into the grid. RE programs should also be expanded to incentivize TNB to connect to RE producers (within reason).</td>
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<td><strong>Increase Funding for the FiT, NEM, &amp; GTFS &amp; Remove Quotas</strong></td>
<td>Insufficient funding to meet demand and quotas on annual uptake both limit the potential of the FiT, NEM, and GTFS. Increased funding and removal of the quotas would increase RE production.</td>
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<td><strong>Increase &amp; Depoliticize the FiT Tax through Empowerment of SEDA</strong></td>
<td>As a first step, the FiT tax should be increased to the maximum allowed 2% level. In addition, the government should attempt to remove the FiT tax as a political issue by creating automatic rate hikes. As a next step, SEDA should be given more independence by distancing it from political actors and be allowed to implement energy-based taxes, within constraints, to fund RE programs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Allow Third Party Solar Installation under the FiT &amp; NEM</strong></td>
<td>The inability of third parties to install solar panels on domestic and commercial properties inhibits the uptake of solar programs. Malaysia should adopt approaches that incentivize third party installation by allowing both installers and property owners to profit from panel installation.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Shift Energy System</strong></th>
<th><strong>Develop Concrete Vision for Gradual, Sustained Transition to Renewable Production</strong></th>
<th>As of now, the government has no strategy for decreasing the use of coal and scaling up RE as a significant alternative. The government must develop a comprehensive, realistic, and implementable approach to significantly move from coal to RE sources.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaysia currently energy policies are locking it into a carbon intense trajectory for the foreseeable future. The new government has a unique opportunity to reimagine the future by redirecting funds supporting fossil fuels to generating economic growth build around green technology and renewable energy.</td>
<td><strong>Dedicate Revenue from Petronas to Green Trust Fund &amp; Build out Petronas' Service Sector</strong></td>
<td>To free the government from institutional lock-in and decouple its revenues from the success of the oil industry, it should make a plan to gradually redirect the revenue it receives from Petronas to a Trust Fund directed towards green growth, technology, and energy. It should also focus on developing Petronas' non-exploitative, services.</td>
</tr>
<tr>
<td></td>
<td><strong>Shift Fossil Fuel Subsidies to RE</strong></td>
<td>The government should remove all fossil fuel subsidies except those reducing the cost of electricity for the poorest Malaysians. The funds currently used for fossil fuel subsidies should be direct to RE research and incentive programs.</td>
</tr>
<tr>
<td>Action Area</td>
<td>Proposed Action</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Invest in Palm Biomass Research</td>
<td>Given Malaysia's vast palm oil acreage, it has the potential to generate a significant amount of electricity from palm biomass byproducts if it invests in development of the technology. The new government should make this investment a top priority.</td>
<td></td>
</tr>
<tr>
<td>Align Federal &amp; State Incentives around Forest Protection</td>
<td>As of now, the federal and state governments primarily work against each other’s interests on forest protection. The new government can put in place measures that align their interests and allow for better forest protection through collaboration.</td>
<td>The federal and state governments should jointly discuss and adjust tax policies that financially reward states for unsustainable exploitation of their natural resources but do not allow states to keep tax revenues from income generated through service-based activities, such as ecotourism.</td>
</tr>
<tr>
<td>Allow States to Collect Revenue from Non-Exploitative Forest Use</td>
<td>The federal government cannot expect states to implement unfunded plans in the forestry (or any) sector. The federal government needs forestry policies that include funding and capacity building to meaningfully affect protection.</td>
<td>The state and federal governments should build programs to jointly development ecotourism programs and infrastructure based in the country's forests and create accompanying marketing campaigns.</td>
</tr>
<tr>
<td>Pair Federal Government Plans with Funding &amp; Capacity Building</td>
<td>Concern for biodiversity loss is a more tangible starting point for Malaysian eco-activism. The government should continue to focus on holistic forest plans that include carbon sequestration but emphasize the protection of biodiversity to attract public attention.</td>
<td>The government should create a climate control hub that has power to collect data, evaluate progress, and implement and enforce policies across Malaysia's carbon sectors at the state and federal level. The agency would also work to promote environmental education and values. In addition, the federal government should set state mitigation targets for sectors primarily under state control and allow states to flexibility develop mitigation plans, in consultation with the public, for achieving these goals. The control hub would monitor these efforts and work with states to reach reduction targets.</td>
</tr>
<tr>
<td>Focus on Holistic Forest Plans that Trumpet Biodiversity</td>
<td>Improve Government's Internal Program Management</td>
<td>Through internal adjustments of its climate change program management, the new government can better coordinate carbon mitigation across sectors, implement more cost-effective policies, increase implementation of its plans, and improve all of the above with more accurate and timely data.</td>
</tr>
</tbody>
</table>
Do Not Ignore Low Hanging Fruits

The government should not ignore opportunities to implement high impact, low cost carbon mitigation approaches (e.g. incentivizing/requiring improved housing insulation) simply because they do not attract media attention.

Release Plans in English, Malay, Cantonese, & Tamil

All plans developed by the federal government should be released in English, Malay, Cantonese, and Tamil. This will ensure that language barriers do not hinder state's ability to implement federal plans and represents a more inclusive approach to better ensure all Malaysia's ethnic groups can read and interact with these plans.

Start Adaptation Efforts Now

While these recommendations, and this thesis, focus on mitigation, Malaysia is vulnerable to a wide range of harmful climate change impacts, and has few adaptation efforts. As climate change accelerates, all sectors of society need to prepare and build resilience for the changing climate and its accompanying dangers.

To be determined

Table 14: List of six principle focus areas with sub-policies for implementation, including descriptions for principle and sub-policies. The sub-policies are coded by the theme they most connect with: light green for sustainability and development aspirations and constraints; light blue for limited government enforcement, capacity, and regulation; light orange for focus on sustainability planning and action; light pink for federal-state friction; grey for absence of a climate control center; and light yellow for additional themes discussed only in the Appendix (tables 2 and 3).

Recommendation Descriptions

Improve Public Transportation Connectivity

*Improve Physical Transit Connectivity outside KL*

Outside of KL, there are many gaps in public transit systems that complicate travel. These gaps reduce economic productivity, limit mode shift to public transportation, and incentivize use of
personal vehicles. While more overall transit infrastructure is needed, better connecting existing options provides a high impact and low cost first step that the new government could take to increase the accessibility and resulting appeal of public transportation.

*Improve Nonphysical Transit Connectivity and Experience within KL*

Riders within the Klang Valley find the lack of monthly pass options and use of different card systems among public transit lines an inconvenience. This constraints ridership in the Kuala Lumpur region. Developing a more convenient and integrated pass system represents another fast and relatively cheap solution. While the introduction of a monthly pass could decrease public transit revenue, the economic gains from decreased traffic congestion from increased public transit ridership could offset this cost.

*Include Mitigation and Environmental Impacts in Evaluation of the KL-Singapore High Speed Rail*

As the new government reviews large infrastructure projects, including the rail line, it should add environmental and GHG emission impacts as part of its evaluation criteria. The government needs a strong case for constructing the new rail and must ensure that it advances the public’s, rather than political, interests.
Maximize Efficacy of Existing Renewable Energy Policies

Incentivize TNB to Accept and Connect with Renewable Energy Sources

As of now, some TNB officials see accepting RE sources into the grid as an expense. The government must ensure RE programs sufficiently reward TNB at the margin for accepting RE sources into the grid. RE programs should also include funds to incentivize TNB to connect to RE producers by reimbursing it for losses from grid connections. (Such an incentive would need to include restrictions to define “reasonable” and “profitable” connections to the grid). Better aligning TNB’s incentives with increasing RE is a crucial step.

Increase Funding for the FiT, NEM, and GTFS and Remove Quotas

Insufficient funding to meet demand and quotas on annual uptake both limit the potential of the FiT, NEM, and GTFS. Additional funding and removal of the quotas would increase uptake of the programs and RE production. Such a change could entail a significant increase in annual program expenditure but could help establish the foundation for sustainable economic growth by delinking development and fossil fuel consumption and driving economic growth around RE development and production.
Increase and Depoliticize the FiT Tax through Empowerment of SEDA

As a first step, the FiT tax should be increased from 1.6% to the maximum allowed 2% level. The government should also study the economic feasibility of raising the FiT tax above 2%. Further raising the tax would require isolating it from political forces. The government should attempt to remove the FiT tax as a political issue by setting automatic rate hikes, and as a next step, allowing SEDA more independence, such as authority to implement energy-based taxes, within limits, to fund RE programs.

Allow Third Party Solar Installation under the FiT and NEM

The inability of third parties to install solar panels on domestic and commercial properties inhibits the uptake of solar programs. Malaysia should adopt approaches that incentivize third party installation by allowing both installers and property owners to profit from panel installation. Allowing third party installation could also spur development of a national RE industry, especially as installation employs local workers.

Shift Energy System

Develop Concrete Vision for Gradual, Sustained Transition to Renewable Production

As of now, the government has no in-depth strategy for decreasing the use of coal and scaling up RE as a significant portion of the energy mix. The government must develop a comprehensive,
realistic, and implementable approach to significantly transition from coal to RE sources. Without such a blueprint for moving forward, coal use will likely continue to increase over the coming decades, missing an opportunity to build economic growth through the adoption of RE sources.

*Dedicate Revenue from Petronas to a Green Trust Fund and Build out Petronas' Service Sector*

To weaken the effect of institutional lock-in on the government, government revenues need to be decoupled from Petronas’ profits. The government should make a plan to gradually redirect, over a number of years, the revenue it receives from Petronas to a “Green Trust Fund” used for green growth, technology, and energy. The plan could link shifts in revenue from Petronas to tax increases from other sources to ensure that real government revenues never decline. The fund, which could operate similarly to Khazanah, could serve as catalyst for Malaysia’s green economy, making it a regional, or even global, leader. Furthermore, the government should encourage the continued expansion of Petronas’ non-exploitative downstream services, such as delivering technical capacity to other nations (Petronas, 2011).

*Shift Fossil Fuel Subsidies to Renewable Energy*

The government should remove all fossil fuel subsidies except those reducing the cost of electricity for the poorest Malaysians. The funds currently used for fossil fuel subsidies as well as the funds proposed for the reintroduction of automobile fuel subsidies should be direct to RE research and incentive programs and could feed into the “Green Trust Fund.” Instead of
reversing progress, the new government has an opportunity to build momentum around a new economic sector while cutting emissions.

**Invest in Palm Biomass Research**

Given Malaysia’s vast palm oil acreage, it has the potential to generate a significant amount of electricity from palm biomass byproducts. The technology requires further development to make it a viable and profitable RE source. The new government should heavily invest in the technology, which could serve as a cornerstone of Malaysia’s green economy and allow Malaysia to sell this developed expertise to other countries. Malaysia could model parts of its effort off Brazil’s investment in sugar cane ethanol research and rapid scale up of production, which has allowed it to reduce carbon emissions and develop an industry around biofuel (Araújo, 2017; Barros, 2017; The Economist, 2008).

**Align Federal and State Incentives around Forest Protection**

**Allow States to Collect Revenue from Non-Exploitative Forest Use**

The federal and state government leaders should meet in a formalized process to discuss revisions to the tax code with the goal of changing tax policies that financially reward states for unsustainable exploitation of their natural resources but do not allow states to keep tax revenues from income generated through service-based activities, such as ecotourism. The current situation will lead to long-term environmental, and eventually economic, damage by encouraging
heavy, exploitative use of states’ natural resources. States should be financially rewarded for moving their economies towards less extractive intensive industries.

Pair Federal Government Plans with Funding and Capacity Building

The federal government cannot expect states to implement unfunded plans in the forestry (or any) sector. The federal government needs to attach funding and training to its forest protection plans. This would ensure states have both the technical capacity and financial resources to implement federal plans as well as having an incentive to do so. Such a measure would make the federal plans relevant on the ground and ensure they are actionized.

Build Ecotourism Infrastructure and Provide Marketing

The Malaysian forests have vast, unexploited potential to serve as an anchor for increased ecotourism. Increased ecotourism would allow for substantial growth of a now nascent sector and represent a non-exploitative method to monetize Malaysia’s forests. The state and federal governments should collaborate to develop an approach for jointly growing the forest-based ecotourism sector, building supportive infrastructure, and running accompanying marketing campaigns.
Focus on Holistic Forest Plans that Trumpet Biodiversity

Concern for biodiversity loss is a more tangible starting point for the Malaysian public’s environmental activism. The government should continue to focus on holistic forest plans that include carbon sequestration but emphasize the protection of biodiversity. Putting biodiversity protection front and center is more likely to build public support for protection of forests.

Improve Government's Internal Program Management

Establish Federal Climate Control Hub with Enforcement Authority and Allow States to Flexibly Implement Mitigation Measures

The government should create a climate control hub that has power to collect data, evaluate progress, and implement and enforce policies across Malaysia's carbon sectors at the federal and state levels. The agency must also focus on the social aspect of climate change. If Malaysians do not understand or care about the impacts of climate change, they will not value government-led mitigation programs nor strongly support them. Changing public perceptions about climate change and building awareness is key to driving government action. To this end, the hub, in partnership with the Ministry of Education, should work to develop environmental education programming and nurture environmental values.

In addition, the federal government, through the hub, should set specific GHG mitigation targets for each state for sectors primarily under their control but allow the states to flexibility develop
mitigation plans for achieving these goals. The control hub would monitor these efforts and work with states to reach reduction targets. Permitting states to choose their own mitigation approaches allows for a diversity of approaches, best suited for states’ unique circumstances and more responsive to localized public input.

*Improve Data Collection*

Malaysian ministries rely on insufficient and outdated data to model and plan mitigation efforts. The new government should improve capacity around data collection and analysis. This will require funding for implementation of new collection systems and, likely, hiring of additional data scientists. While improving data collection and analysis will require government investment, the outcome should allow ministries to better understand the current state of emissions and plan more efficient and effective mitigation responses.

*Do Not Ignore Low Hanging Fruits*

The new government should take opportunities to implement high impact, low cost carbon mitigation approaches, such as incentivizing or requiring improved housing insulation. The previous administration often focused on one-off projects that would garner significant media without consider of their larger mitigation impacts or integration into existing efforts. By focusing on low hanging fruit approaches, the new government has an opportunity to achieve more mitigation impact at a trivial cost.
Release Plans in English, Malay, Cantonese, and Tamil

All plans developed by the federal government should be released in Malay, English, Cantonese, and Tamil. This represents a more inclusive approach to better ensure Malaysia's Malay, Chinese, and Indian ethnic groups can read and interact with federal plans. This will also ensure that language barriers do not hinder state's ability to implement federal plans.

Start Adaptation Efforts Now

Adaptation is specifically listed last, as it is not the focus of this thesis. However, the government urgently needs to collect the data to better understand the impacts of climate change and begin building resiliency. Malaysia is vulnerable to a number of climate change impacts from flooding to increased mosquito borne diseases. Resiliency efforts must begin as soon as possible to limit the increasing climate danger Malaysia will face in the coming decades.

Concluding Advice to Malaysian Government

Policies

The above recommendations offer a diverse array of pathways for improving Malaysia’s carbon mitigation policy ecosystem, supporting efforts to escape lock-in and enable change through decarbonization pathways. Malaysia deserves credits for its existing efforts. The country employs an impressive range of plans, processes, programs, and policies to mitigate and capture
GHG emissions. Malaysia’s commitment to these approaches as well as its carbon intensity reduction goal are especially notable given its rapid economic growth and development as well as the continued need to alleviate poverty, improve infrastructure, and expand basic services.

However, Malaysia also has substantial room to improve and expand upon its existing approaches as well as strengthen its reduction targets. Many of Malaysians planning efforts and reduction goals result in no subsequent tangible action after an initial media blitz. Furthermore, while decreasing, deforestation of Malaysia’s forests continues to threaten their capacity as carbon sinks, critical to Malaysia’s mitigation efforts. Malaysia’s large and rapid scale up of coal in its energy mix is an equally worrying trend. If the new government does not seriously pursue protection of its forests and greening of its energy mix, no amount of other policies will be sufficient to control its carbon emissions. Malaysia needs to develop robust and enforceable longer-term strategies to decouple development and energy intensity by significantly increasing its RE mix.

The new government has a rare but short-lived window of opportunity to set Malaysia on a course that strengthens carbon mitigation while building an accompanying green economic sector. Economic growth and sustainability are not mutually exclusive and can be mutually reinforcing. By investing in advanced palm biofuel, forest ecotourism, and RE installation and production, the new government can meet its pledge of creating new jobs and creating economic growth while also driving carbon mitigation. In addition, the new government can reduce barriers, such as tax friction between the federal and state governments, that unnecessary constrain carbon mitigation and also dampen Malaysia’s long-term development. Furthermore,
many of the recommendations represent “ow hanging fruit that the new government could easily implement. Scoring the recommendations by impact, cost, stakeholder support, and feasibility of implementation (see policy matrix in Table 6 in the Appendix) shows that the highest scoring recommendations are such low hanging fruit. The two highest ranked recommendations, improvement of nonphysical transit connectivity and experience within Kuala Lumpur and allowing third party solar installation, could both be quickly implemented at little cost. Finally, to support mitigation efforts in the long-term, the government must focus on environmental education and raising public awareness.

Mitigation Goal

While Malaysia’s commitment to any emissions intensity reduction goal is laudable, especially as a developing country, the goal itself is relatively weak, especially in the long-term. The government knew that achieving the 35% intensity reduction target was virtually assured before making its INDC commitment, and by making the 45% intensity reduction contingent upon international aid, crafted an easy out for not undertaking more aggressive mitigation actions after reaching the 35% threshold. The previous government also did not have a longer term vision for moving beyond the 45% reduction if reached, with one government official commenting, “If you’re going on a diet, you can’t set a higher goal” (Confidential, 2018d, I. 12). If Malaysia does reach the 45% intensity reduction target, its absolute emissions will almost certainly continue to rise. While increases of total emissions are the norm for developing countries, left unchecked, this trend paints a worrying picture for the rest of the world. If global temperatures are to be kept under two degrees Celsius, Malaysia and other countries will need to set absolute carbon
reduction goals. The new government should set a date to implement such a goal after it reaches high-income status in the next five years.

**Conclusion**

**Summary of Findings and Broader Implications**

My findings show that Malaysia’s INDC resulted from a combination of top-down pressure by the Prime Minister as well as bottom-up, grassroots forces, including public pressure and sustainability planning. In addition, a focus on three core carbon mitigation policy sectors – transportation and urban planning, renewable energy, and forestry – reveals the government and other actors have implemented a range of mitigation policies and programs. While the government, NGOs, corporations, and the public have achieved some initial successes, many barriers still inhibit mitigation efforts.

Furthermore, cross-cutting themes from the interviews operate within these policy sectors as well as the carbon mitigation policy ecosystem as a whole. These themes both enable and inhibit carbon mitigation. These policy sectors and themes also fit within the theories of decarbonization pathways and carbon lock-in. This thesis answers Rosenbloom’s call to develop more cases to test decarbonization pathway theory (Rosenbloom, 2017). The Malaysia case demonstrates the relevancy of pathway theory and showcases how networks of actors and suites of policy tools act as pathway drivers. Furthermore, many of the obstacles to carbon mitigation highlight examples of carbon lock-in, while certain policies represent lock-in escape.
I also offer six core recommendations to the new Malaysian government that won office on May 9, 2018 that center on driving both carbon mitigation and economic growth. As other literature has demonstrated both the effect of specific country and cultural dynamics to shaping the carbon sector as well as the important of responding to these nuanced dynamics through tailored policies, I focus on policies responsive to the Malaysian environment (Knox-Hayes, 2016).

Some gaps remain in the work. As Malaysia is still in the early stages of its decarbonization efforts, it cannot demonstrate the relevancy of the pathways theory throughout the entirety of the decarbonization process. In addition, my interviews focused on certain sectors more than others, with representatives from state and local government and certain industries, such as waste paper, underrepresented. Furthermore, the new political dynamics post-election will almost certainly shift major elements within Malaysia’s policy ecosystem. Future work could expand upon this thesis by interviewing a broader range of Malaysian stakeholders and conducting new interviews with prior interviewees to ask about policy changes after the election.

Connections to Other Countries

The Malaysian case also offers several main lessons for other developing countries. First, it showcases the relevancy of the pathways and path dependency frameworks to understand real world mitigation systems and contribute actionable steps based on this linkage. Second, many of the challenges and successes within the Malaysian policy ecosystem, particularly the toolkits, are not unique to Malaysia and suggest areas to target in other countries. Similarly, the inhibiting
and enabling themes described here certainly exert influence elsewhere as well. In addition, though my recommendations avoid broad advice (i.e. implementation of a carbon tax), they do respond to issues highlighted by interviewees or theory. Given the broader applicability of the themes, barriers, and successes, many of the recommendations could prove effective in other contexts as well. Finally, Malaysia’s carbon mitigation decisions over the next decade may portend the choices of other developing countries, soon to follow its path.

Malaysia is at a turning point. While it still must develop rapidly to improve the quality of life for its poorest citizens and meet Western standards of living, it also has enough resources to choose a different development pathway. Malaysia can choose to continue driving its development through the commodification and exploitation of its natural resources and a growing reliance on dirty but cheap coal power. Or, it can choose to truly act as a global sustainability leader and drive development through investments around green technologies and renewable power systems that decouple development and energy. The historic change in political rule presents an unprecedented opportunity for Malaysia to change its course. Only Malaysia can choose its path forward, but its choice has ramifications for the rest of the world.
Appendix

Policies Outlined in Malaysia’s Biennial Update Report

<table>
<thead>
<tr>
<th>Sector</th>
<th>Mitigation Action</th>
<th>Emission Reduction Achieved in 2013 (kt CO₂eq)</th>
<th>Potential Emission Reduction in 2020 (kt CO₂eq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>RE Implementation through Feed-in Tariff mechanism</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Biomass</td>
<td>127.89</td>
<td>1,511.19</td>
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<tr>
<td></td>
<td>- Biogas</td>
<td>21.68</td>
<td>906.71</td>
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<tr>
<td></td>
<td>- Small hydropower</td>
<td>63.41</td>
<td>2,507.92</td>
</tr>
<tr>
<td></td>
<td>- Solar photovoltaic</td>
<td>39.80</td>
<td>403.13</td>
</tr>
<tr>
<td></td>
<td>- Geothermal</td>
<td></td>
<td>129.14</td>
</tr>
<tr>
<td></td>
<td>RE electricity generation by non-Feed-in Tariff regulated public and private licenses and other mechanisms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Biomass</td>
<td>822.25</td>
<td>822.25</td>
</tr>
<tr>
<td></td>
<td>- Biogas</td>
<td>17.28</td>
<td>17.28</td>
</tr>
<tr>
<td></td>
<td>- Small hydropower</td>
<td>108.39</td>
<td>108.39</td>
</tr>
<tr>
<td></td>
<td>- Solar photovoltaic</td>
<td>0.85</td>
<td>1,231.37</td>
</tr>
<tr>
<td></td>
<td>Use of palm-based biodiesel in blended petroleum diesel</td>
<td>719.74</td>
<td>1,802.49</td>
</tr>
<tr>
<td></td>
<td>Application of green technology</td>
<td>94.81</td>
<td>1,426.35</td>
</tr>
<tr>
<td></td>
<td>Implementation of green building rating scheme</td>
<td>60.40</td>
<td>858.40</td>
</tr>
<tr>
<td></td>
<td>Efficient electricity consumption in all Federal Government ministry buildings (baseline established in 2013)</td>
<td></td>
<td>98.21</td>
</tr>
<tr>
<td></td>
<td>Reducing emissions through development and usage of energy-efficient vehicles (EEVs)</td>
<td>40.96</td>
<td>199.74</td>
</tr>
<tr>
<td></td>
<td>Use of compressed natural gas (CNG) in motor vehicles</td>
<td>154.62</td>
<td>217.57</td>
</tr>
<tr>
<td></td>
<td>Rail-based public transport</td>
<td>214.93</td>
<td>977.51</td>
</tr>
<tr>
<td>LULUCF</td>
<td>Emissions reduction through sustainable management of forest</td>
<td>6,214.41</td>
<td>13,797.37</td>
</tr>
<tr>
<td></td>
<td>- Gazettement under CFS and HoB</td>
<td>7,582.96</td>
<td>13,800.00</td>
</tr>
<tr>
<td></td>
<td>- Other gazettement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste</td>
<td>Waste paper recycling</td>
<td>1,993.47</td>
<td>2,159.45</td>
</tr>
<tr>
<td></td>
<td>Biogas capture from palm oil mill effluent (POME) treatment</td>
<td>300.95</td>
<td>3,001.89</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>18,578.80</td>
<td>32,178.99</td>
</tr>
</tbody>
</table>

Table 1: From Malaysia Biennial update Report to the UNFCCC, “Table 3.1 Summary of Emissions Reduction Achieved in 2013 and Projections for 2020” (Ministry of Natural Resources and the Environment, 2015, p.57).
## Full List of Inhibiting Themes

<table>
<thead>
<tr>
<th>Constraining Factors</th>
<th>Description</th>
<th>Illustrative Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal-State Friction</td>
<td>Policies enacted by the federal government are not always implemented by the state governments. This results from differences in political aims, revenue streams, capacity, language, and jurisdiction.</td>
<td>There may be a federal push for things to happen, but it gets little support. The federal government has no authority over land… Federal policies can be set but won’t translate into state action if they don’t buy in… There’s a huge lag between passage and implementation. - Tajang Jinggut, Tropical Rainforest Research Center</td>
</tr>
<tr>
<td>Limited Government Enforcement, Capacity, and Regulation</td>
<td>Malaysia has set ambitious environmental goals but struggles with enforcement. This is both a result of capacity limitations, especially at the state level, and lack of political will. The urban-centered seat of the federal government further limits its ability to oversee and enforce mitigation projects outside major urban areas.</td>
<td>“[The government implemented] this scheme to ensure everybody actually buckles up in the backs of cars by 2016... But we don't actually have seatbelts in the back of all cars. But the police were going to start issuing summons... For the early part of the year, the police said, ‘We're issuing summons.’ But then, our government got a lot of complaints because we have the national carmaker, and some of those are probably the most affordable car, including Proton's cheapest model. So then, the government said, ‘Okay, just send in your car and we'll... put it in. And then you'll all be able to comply.’ But a lot of people could not even afford to take in their cars, so enforcement is now ignored.” – Senior energy department official</td>
</tr>
<tr>
<td>Absence of Climate Control Center</td>
<td>Challenges related to collecting data from and coordinating action among different federal agencies and the state governments arise, in part, due to the absence of an agency dedicated to overseeing the transition to a low-carbon development pathway.</td>
<td>“A national climate change research center [would be a useful structural change] but very difficult to put together what appears to be a cost center. It would make some of the relationships slightly less ad hoc, part of the institutional framework that is so important.” – Senior environmental ministry official</td>
</tr>
<tr>
<td>Lack of International Funding and Support</td>
<td>Promises by the developed world to provide Malaysia with significant financial and technological support have not materialized. Malaysia also faces numerous barriers to importing green technologies. For example, more developed countries are...</td>
<td>“Even if you got the full commitment from international community of $100 billion, no one really knows where the money will come from or how it will be disbursed. If you’re a banker, would you put money into something that isn’t going to generate income… there’s no real money in climate change. So, unless...”</td>
</tr>
<tr>
<td>Sustainability and Development Aspirations and Constraints</td>
<td>Malaysia wants to become a high-income country by 2020 and stand out on the world stage, and as a result, prioritizes mitigation policies reflective of these ambitions. However, in many ways, Malaysia is still a developing country. The tensions between aspirations and constraints affect the policy mix and implementation success.</td>
<td>“It's not just climate change, but I will say for the past 15 years - almost 15 years - we have been strong in terms of advocating for environmental sustainability and simply because Malaysian is becoming a much stronger upper middle-income country. You can look at the data - how much it's changing. So, Malaysia is getting sophisticated, smarter. They know how other countries are behaving, are performing, so they want to beat other countries as much as possible. You can see KLCC, that is a manifestation of the leaders' vision... to make Malaysia known in the world, and there are many other things that Malaysia has been doing.” – Senior international development official</td>
</tr>
<tr>
<td>Nascent Environmental Awareness</td>
<td>Malaysia's environmental awareness and activism, particularly around climate change, is still in its infancy. Older generation Malaysians and local and small and medium enterprises are particularly removed from the issue.</td>
<td>Malaysia doesn’t have much environmental awareness, and a lot of what is here is phony. People will drive their cars to an environmental event instead of taking the bus and come back with eco-pins. – Head of environmental NGO and advocate</td>
</tr>
<tr>
<td>Barriers to Renewable Energy Adoption</td>
<td>Malaysia's faces two primary challenges to RE adoption. First, no single clear RE alternative exists. Second, private financing jitters constrain investment.</td>
<td>“Malaysia’s energy priorities are affordable, reliable, and sustainable, in that order.” – Zaini Ujang</td>
</tr>
</tbody>
</table>
## Full List of Enabling Themes

<table>
<thead>
<tr>
<th>Supportive Factors</th>
<th>Description</th>
<th>Illustrative Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on Sustainability Planning and Action</td>
<td>Malaysia’s range of plans and strategies related to carbon mitigation demonstrate both strategic capacity as well as a commitment to exploring solutions.</td>
<td>“On a positive note, as I say to you, the government is fully aware of how and where they want to go. The best example is the 11th Malaysia Plan. If you go into Chapter 6, Green Growth, green growth was not there [before].” – Senior international development official</td>
</tr>
<tr>
<td>Internalization of Exogenous Drivers</td>
<td>Exogenous factors - including global environmental standards, consumer preferences, and best practices - drive transitions to low-carbon practices, arguably more so than endogenous factors, such as federal policies.</td>
<td>If you ask me, awareness-wise is a [corporate] internal awareness… for the palm oil industry because of the pressure from the customers… We deal with quite a number of big players from Europe… so there’s pressure… that’s actually driven into awareness. [It’s not] regulation itself, not the government itself… If I were to sell my product to Europe, … I have to commit to these things. – Senior Sime Darby Official</td>
</tr>
<tr>
<td>State Transfer Pathways</td>
<td>In certain cases, the success of state-level carbon sector policies and actions translate into responsive action and/or emulation by the federal government or other state governments.</td>
<td>“Malacca has a view of itself as being at the forefront of innovation in Malaysia, in competition with Penang [for being the most sustainable].” – Senior international resilience funder</td>
</tr>
<tr>
<td>Rise of the Youth</td>
<td>Malaysia's global, activist, and increasing organized youth point towards stronger national climate action in the future.</td>
<td>“The youth are getting stronger and stronger on [the environment] … The youth provided the most inputs [on the TN50 Plan]. The government asked them - very democratic - asked the youth what they wanted for future of Malaysia. Malaysia is one of the countries of the highest social media use in the world… youth have access to information and are not hesitant to share this information, so awareness is not an issue with the youth.” – Senior international development official</td>
</tr>
<tr>
<td>NGOs as Public Motivators, Government Catalyzers, and Policy Enforcers</td>
<td>Nongovernment organizations, both domestic and international, play a key role in Malaysia's carbon policy ecosystem by building public awareness about climate change and the environment, pushing for</td>
<td>There’s a positive outlook moving forward for the NGO-government relationship. In Sabah, NGOs are treated as near government organizations. Sarawak has an interest in learning from Sabah… there is more willingness to share responsibility, [the government is] realizing it can’t do</td>
</tr>
</tbody>
</table>
government action, and guiding actual implementation of federal policies at the state level. Tajang Jinggut, Tropical Rainforest Research Center

Private Corporate Social Responsibility and Sector Leadership

The past decade, private firms have advanced Malaysian climate mitigation efforts by acting as issue leaders, incorporating sustainability practices from abroad, and motivating sustainability-based competition from their peers. “We identify ourselves as tier one company. Tier one companies want to be drivers and also want to lead signature initiatives. Tier one companies need to be leaders; the world responds to their actions.” – Senior oil and gas company official

Diversity of Actors

A diverse set of actors have worked in tandem within Malaysia’s carbon policy ecosystem to shape the current landscape and future policies and priorities. The federal government, state governments, international organizations, NGOs, corporations, and a rising youth all play key roles within and add strength to this system. Industry is a main actor and has influenced government thought. Civil servants are also on top of issues… The Youth are getting a stronger voice to push for this type of issue; they have more international awareness. – Senior international development official

Table 3: Interview themes exemplifying factors enabling decarbonization and carbon mitigation in Malaysia.

Full Descriptions of Additional Themes

Inhibiting Themes

Lack of International Funding and Support

The developed world promised Malaysia significant financial and technological support that, similarly to other developing countries, has not materialized. As of 2013, the United Nations, through the Global Environment Facility (GEF), had provided approximately $47 million in support managed by the United National Development Program (UNDP) and United Nations.
Industrial Development Organization (UNIDO) (Ministry of Natural Resources and the Environment, 2015). The federal and local governments have also received financial and technical support from other international organizations, including 100 Resilient Cities, and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). Malaysia has also received planning support, technical training, and technology through Japan’s Joint Crediting Mechanism (Asian Development Bank, 2016; Japanese Ministry of the Environment, 2014). International funding has primarily supported capacity building and planning efforts, such as Malaysia’s Biennial Update Report to the UNFCC. However, funding received has not matched funding promised, and this limited international funding has slowed Malaysian’s efforts to mitigate carbon. The international community’s unwillingness to pay a sufficient price for Clean Development Mechanism (CDM) projects and REDD has further stifled the development of carbon mitigating programs and increased the difficulty of protecting natural resources. Malaysia also faces barriers to the import of green technologies. In particular, more developed countries are hesitant to share proprietary technologies, so Malaysia's green technologies lag those used by the Global North.

Nascent Environmental Awareness

Malaysian's environmental awareness and activism, particularly around climate change, is still in its infancy. Older generation Malaysians and local and small and medium enterprises are particularly removed from the issue. Awareness gaps also exist at high levels of government; some officials “just want to use green stuff” to gain global recognition without fully understanding the sector (Confidential, 2018a, I. 2).
Brain drain compounds and regionalizes this awareness gap, with most educated Malaysians moving to urban centers, particularly Kuala Lumpur and Singapore, causing an urban-rural divide in climate change consciousness. In addition, as a limited number of top down stakeholders drive much of the agenda around climate change, many Malaysians feel a limited sense of ownership over the issue. Furthermore, much of the environmental activism that does exist focuses on symbolism and "green washing" over tangible action. One interviewee highlighted this problem when discussing sustainable, RSPO-certified palm oil:

RSPO is actually quite costly because you need to maintain a certificate. You need to do a lot of things… Frankly speaking… with the Malaysians, they don't want to buy it. Because, who cares? What does it mean, RSPO? Well, I'm protecting the environment, I'm going by the rules. But, I think Malaysian will be like, "It's okay, but I'm not going to pay 30% extra." So that's the problem. So Malaysian awareness when it comes to sustainability is just a lip service now.

Barriers to Renewable Energy Adoption

Multiple interviewees noted that challenges to RE adoption, both financial and physical, pose a key challenge to decarbonization in Malaysia. RE developers struggle to secure private financing. Suppliers of finance view RE projects as higher risk and less profitable. Most of the public is also unwilling to pay higher prices for RE. In addition, the net impact of government action to encourage RE adoption is unclear. Regulation that restricts liberalization of the energy
market may hinder the deployment of private capital to new RE projects, but government financial backing also incentivizes private loans to RE development through risk reduction.

Malaysia also faces physical challenges to increasing RE production. Renewable sources are disconnected from demand centers, with major sources of large scale hydropower and wind limited to less populated Eastern Malaysia and biofuel material, mainly from palm oil byproducts, concentrated in rural areas. Furthermore, despite Malaysia's proximity to the equator, heat and cloud cover diminish the efficiency of solar panels.

Supportive Themes

*Rise of the Youth*

Malaysia's global, activist, and increasing organized youth point towards stronger national climate action in the future. The interviews highlighted high social media consumption, as exposing young Malaysians to global environmentalism. The federal government has responded encouragingly by actively engaging young Malaysians in several national planning processes, most notably TN50. Malaysians under thirty-five also make up a growing segment of the workforce and are slowly changing corporate cultures and raising environmental concerns in corporate settings. As young Malaysians transition into leadership roles in the government and private sector, they will continue to bring heightened levels of environmental awareness and a willingness to act with them.
Nongovernment organizations, both domestic and international, play a key role in Malaysia’s carbon policy ecosystem. Numerous domestic NGOs focus on building the public’s awareness around climate change and general environmental challenges in an effort to “put themselves out of business” (Confidential, 2018b, I. 3). By raising public awareness and coordinating grassroots action, NGOs have successfully pushed government response, such as protecting forest reserves, and earned “a seat at the table” in creating new programs, such as the Low Carbon City Framework (Confidential, 2018b, I. 3). International organizations have also successfully partnered with the federal government in development processes that have resulted in the creation of carbon mitigation policies, including the 2011 Renewable Emery Act, leading to the establishment of SEDA and the FiT.

NGOs also work as mediators between the federal and state governments to translate legislated policy into implementation. In the forestry sector, Malaysian nonprofits are driving forward the federal government’s Central Forest Spine conservation plan at the state level. NGOs encouraged state governments to implement and enforce federal plans by providing public pressure but also through bringing in external sources of funding and technical capacity, which states often lack.

Corporate Social Responsibility and Sector Leadership

Over the past decade, private corporations have played a significant role in advancing Malaysia’s climate mitigation efforts. Corporations have often acted as issue leaders, incorporating
sustainable, low carbon practices in response to consumer pressure. International corporations from developed countries have led much of this effort, bringing best practices with them and responding to environmentally conscious consumers outside Malaysia. Interviewees emphasized that “Malaysia is in the business of selling,” with domestic firms, supported by the government, also increasingly adoption sustainable practices to enhance the competitiveness of exported goods (Confidential, 2017, I. 10). Flagship domestic firms have also catalyzed significant change in Malaysia through sustainability leadership. Large firms have often implemented carbon tracking and mitigation programs well ahead of their domestic peers, encouraging responsive action by other Malaysian competitors.

Connection of All Themes to Policy Toolkits

![Diagram](image-url)  
**Figure 4:** Full linkages between interview themes and highlighted policy toolkits
Descriptions of Additional Themes’ Connections to Policy Toolkits

Forestry

Domestic NGOs encourage implementation by the states, in part by activating the public and bringing in donor funding. International organizations provide further funding, capacity building, and technical expertise. Finally, corporations, motivated by exogenous forces, including international consumers, sustainability-based competition, and international environmental standards and norms are adopting more sustainable forestry practices and showcasing corporate social responsibility and sector leadership.

Forest protection is constrained by nascent environmental awareness. Many Malaysians do not realize the unique value and numerous benefits offered by the country’s forests ranging from carbon mitigation, flood control, to potential ecotourism revenue. Lack of international funding and support compounds the issue, with countries who could afford to protect Malaysia’s forests, which provide global benefits, unwilling to do so.

Renewable Energy

Nascent public awareness about the actual benefits and costs of RE causes some public aversion to RE adoption. Lack of international support manifests through Malaysia’s inability to access cutting edge green technologies. Finally, financial barriers to RE slow new investments by producers and uptake by consumers, and Malaysia’s substantial physical barriers to RE substantially complicate RE-rooted decarbonization strategies compared to other countries.
Urban Planning and Transportation

Nascent public awareness and development constraints diminish the appeal of public transport due to limited environmental consciousness and social status concerns.

Connection of Additional Themes to Carbon Lock-In

Theme Linkages

Seto et. al define three main carbon lock-ins: infrastructure and technological (IT), institutional, and behavioral (Seto et al., 2016). Many of the inhibiting themes raised by interviewees relate to these carbon lock-in mechanisms. While some themes link most closely with one category, most of the themes straddle two lock-in types.

IT and Behavioral Lock-In

The financial and physical barriers to renewable energy theme connects with IT and behavioral lock-in. Barriers to RE adoption exemplify the power of past and present choices in complicating the transition to RE, with IT lock-in creating barriers to RE transition. For example, Malaysia’s increased investments in new coal plants and technologies will make future transitions to RE, or even natural gas, more cost prohibitive and complicated. Similarly, potential underinvestment in palm biofuel research could undermine the long-term potential of biomass and biogas to compete with other energy sources in Malaysia and increase the sustainability of the palm oil sector. This
theme also arises from behavioral lock-in. Malaysian energy consumers have come to expect cheap electricity, which they associate with coal. They perceive RE sources as costlier, and thus, resist transitioning to a greater RE mix.

Institutional Lock-In

The lack of international funding and support theme links only to institutional lock-in. Most governments benefit, in the short term, from sending less international assistance and using the revenue for internal programs. In addition, many international corporations, particularly oil and gas companies, benefit under the current global regime and are not eager for their governments to send aid that could threaten the status quo.

Behavioral Lock-In

Behavioral lock-in maps closely with nascent public awareness. Many Malaysians do not hold strong behavioral norms about environmental protection, limiting advocacy. However, certain Malaysian social norms lead to ingrained habits with actively harmful environmental consequences. Malaysian consumerism cultural exemplifies this Most people focus on cost and social status as the basis of purchasing decisions and do not consider the broader environmental costs borne by society for these choices.

Connection of Additional Themes to Lock-in Escape
Institutional and Behavioral Escape

The role of NGOs and private sector leadership themes both demonstrate escape from institutional and behavioral lock-in. NGOs - through collaboration with state governments and the private sector and promoting new approaches - assist in building institutional flexibility and acceptance for these new ideas. NGOs accomplish much of this by changing entrenched perceptions and behaviors. NGOs also motivate behavior change in the public arena, introducing Malaysian’s to environmental and sustainable ideas and norms. Finally, corporations have responded to external pressure by adopting more sustainable and flexible approaches, thereby allowing for institutional escape. In turn, these changes in practice, motivated primarily on economic factors, have exposed private actors to environmental norms, which could help dismantle behavioral processes that discount the value of sustainable practices. Within the RE sector, the GTFS functions as a mechanism for institutional escape. Through increasing the exposure of financial lenders to RE producers and consumers, it may increase these institutions’ flexibility and receptiveness to RE loans in the future.

Behavioral Escape

The rise of the youth theme allows for escape from behavioral lock-in. The rise of a more environmentally conscious youth foreshadows broader changes in sustainability related behavior, norms, and attitudes. This could disrupt prevalent norms (or lack thereof) around the environment and precipitate stronger mitigation action. Changes in behavior have already led to
action in the forestry sector, with the public increasingly seeing forests for their ecosystem service and intrinsic value rather than as purely commercial resources. This has inspired increased advocacy to gazette forest reserves. The emergence of new perspectives also allows for lock-in escape in the RE policy space. Young Malaysians increasingly recognize the externalities associated with cheap fossil fuels and understand the importance of developing greater RE capacity.

**Complete List of Carbon Mitigation Recommendations**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Primary Focus</th>
<th>Implementer</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve Physical Transit Connectivity outside KL</td>
<td>Transportation and Urban Planning</td>
<td>Federal and State Government</td>
<td>Outside of KL, there are many gaps in public transit systems that complicate travel and incentivize use of personal vehicles. While additional transit infrastructure is needed, better connecting existing options provides a high impact and low cost first step.</td>
</tr>
<tr>
<td>Improve Nonphysical Transit Connectivity and Experience within KL</td>
<td>Transportation and Urban Planning</td>
<td>Federal and State Government</td>
<td>Lack of a monthly pass option and use of different card and fair systems among public transit lines constraints ridership in KL. Making a more convenient and integrated pass system is a simple step to boost ridership.</td>
</tr>
<tr>
<td>Include Mitigation and Low Environmental Impact as Goals for the KL-Singapore High Speed Rail</td>
<td>Transportation and Urban Planning</td>
<td>Federal Government</td>
<td>The impact on carbon emissions should be explicitly used as a performance indicator to shape the development of the rail line. In addition, the government should careful consider placement of the route to protect existing forest reserves when at all possible.</td>
</tr>
<tr>
<td>Allow Third Party Solar Installation under the FiT and NEM</td>
<td>Energy</td>
<td>Federal Government</td>
<td>The inability of third parties to install solar panels on domestic and commercial properties inhibits the uptake of solar RE programs. Malaysia should adopt approaches used elsewhere that incentivize third party installation by allowing both them and property owners to profit from panel installation.</td>
</tr>
<tr>
<td>Increase Funding for the FiT, NEM, and GTFS and Remove Quotas</td>
<td>Energy</td>
<td>Federal Government</td>
<td>Insufficient funding to meet demand and quotes on annual uptake both limit the potential of the FiT, NEM, and GTFS. Increased funding and removal of the quotas would increase RE production.</td>
</tr>
<tr>
<td>Increase and Depoliticize the FiT Tax through Empowerment of SEDA</td>
<td>Energy</td>
<td>Federal Government</td>
<td>As a first step, the FiT tax should be increased to the maximum allowed 2% level. In addition, the government should attempt to remove the FiT tax as a political issue by creating automatic rate hikes. As a next step, SEDA should be granted greater independence by distancing it from political actors and be allowed to implement energy-based taxes, within constraints, to fund RE programs.</td>
</tr>
<tr>
<td>Incentivize TBN to Accept and Connect with RE Sources</td>
<td>Energy</td>
<td>Federal Government</td>
<td>The government should ensure RE programs appropriately reward TNB at the margin for accepting RE sources into the grid. RE programs should also be expanded to incentivize TNB to connect to RE producers (within reason).</td>
</tr>
<tr>
<td>Shift Fossil Fuel Subsidies to RE</td>
<td>Energy</td>
<td>Federal Government</td>
<td>The government should remove all fossil fuel subsidies except those reducing the cost of electricity for the poorest Malaysians. The funds currently used for fossil fuel subsidies should be direct to RE research and incentive programs, such as the FiT.</td>
</tr>
<tr>
<td>Dedicate Revenue from Petronas to Green Trust Fund</td>
<td>Energy</td>
<td>Federal Government</td>
<td>To free the government from institutional lock-in and decouple its revenues from the success of the oil industry, it should make a plan to gradually redirect the revenue it receives from Petronas to a Green Trust Fund directed towards green growth, technology, and energy.</td>
</tr>
<tr>
<td>Invest in Biofuel with National Corporate Partners</td>
<td>Energy</td>
<td>Federal Government and Private Sector</td>
<td>Given Malaysia's vast palm oil acreage, it has the potential to generate a significant amount of energy from biomass and biogas if it invests in its development. The government should partner with Petronas and Proton and provide them with a financial stake to ensure they learn to incorporate advanced biofuels into their products, bring more attention and resources to the project, and align their successes with the success of biofuel development.</td>
</tr>
<tr>
<td>Allow No New Coal Plants after 2030</td>
<td>Energy</td>
<td>Federal Government</td>
<td>Malaysia must halt the increased use of coal in its energy mix as soon as possible. While it could be prohibitively costly to stop projects currently under construction and development, Malaysia must set a strict deadline for moving away from coal.</td>
</tr>
<tr>
<td>Resurrect and Fully Fund My Carbons Awards Competition</td>
<td>Energy</td>
<td>Federal Government, Private Sector, and International Organizations</td>
<td>The UNDP-funded MY Carbon Awards recognized industry mitigation leaders. The government, in partnership with UNDP, should resume the program to further build momentum for and competition around corporate sustainability leadership.</td>
</tr>
<tr>
<td>Proposal</td>
<td>Sector</td>
<td>Government Level</td>
<td>Description</td>
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<td>-------------------------------------------------------------------------</td>
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<tr>
<td>Develop Concrete Vision for Gradual, Sustained Transition to Renewable Production</td>
<td>Energy</td>
<td>Federal Government</td>
<td>As of now, the government has no strategy for decreasing the use of coal and scaling up RE as a significant alternative. The government must develop a comprehensive, realistic, and implementable approach to significantly move from coal to RE sources.</td>
</tr>
<tr>
<td>Carrots and Sticks for Sustainable Forest Management</td>
<td>Forestry</td>
<td>Federal Government</td>
<td>The federal government should consider programs that financially reward states for sustainable forest management, implementing federal conservation goal. At the same time, it could reduce funds transfers to state governments for other programs if the states do not implement federal forestry plans.</td>
</tr>
<tr>
<td>Allow States to Collect Revenue from Non-Exploitative Forest Use</td>
<td>Forestry</td>
<td>Federal and State Government</td>
<td>The federal and state governments should jointly discuss and adjust tax policies that financially reward states for unsustainable exploitation of their natural resources but do not allow states to keep tax revenues from income generated through service-based activities, such as ecotourism.</td>
</tr>
<tr>
<td>Mandate Public Comment Prior to Degazettement</td>
<td>Forestry</td>
<td>State and Federal Government</td>
<td>The federal government should work with and incentivize state governments to both make it more difficult to degazette forests and mandate public comment periods prior to degazettement.</td>
</tr>
<tr>
<td>Mandate Consideration of Ecosystem Services within EIAs before Granting Concessions</td>
<td>Forestry</td>
<td>State and Federal Government</td>
<td>Similarly to the above, before granting a concession, the federal government should work with and incentivize state governments to mandate EIAs that estimate the value of a forest parcel's ecosystem services, value of extracting the natural resources, and explicitly compare the two.</td>
</tr>
<tr>
<td>Pair Federal Government Plans with Funding and Capacity Building</td>
<td>Forestry</td>
<td>Federal Government</td>
<td>The federal government cannot expect states to implement unfunded plans in the forestry (or any) sector. The federal government needs to create forestry policies that include funding and capacity building to meaningfully affect protection.</td>
</tr>
<tr>
<td>Provide Federal Funding for State Forest Enforcement</td>
<td>Forestry</td>
<td>Federal Government</td>
<td>The government should provide funds to inspect legal logging operations to reduce overharvesting and review state logging concession documents to prevent graft.</td>
</tr>
<tr>
<td>Implement Forestry Offset Program</td>
<td>Forestry</td>
<td>Federal, State Government, and Private Sector</td>
<td>As many Malaysian industries have already adopted efficiency practices and experience diminishing returns from greater efforts, the federal and state governments should offer an official offset scheme in which companies could protect or restore a section of forest and receive the benefits of their efforts.</td>
</tr>
<tr>
<td>Focus on Holistic Forest Plans that Trumpet Biodiversity</td>
<td>Forestry</td>
<td>Federal Government</td>
<td>official accreditation that could be publicly marketed.</td>
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<td>----------------------------------------------------------</td>
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<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>Build Ecotourism Infrastructure and Provide Marketing</td>
<td>Forestry</td>
<td>State and Federal Government</td>
<td>Concern for biodiversity loss is a more tangible starting point for Malaysian environmental activism. The government should continue to focus on holistic forest plans, which include carbon sequestration, but emphasize the protection of biodiversity to attract public attention.</td>
</tr>
<tr>
<td>Improve Data Collection</td>
<td>Institutional Capacity</td>
<td>Federal Government</td>
<td>The state and federal governments should build programs to jointly development ecotourism programs and infrastructure based in the country's forests and create accompanying marketing campaigns.</td>
</tr>
<tr>
<td>Improve Transparency around Carbon Accounting</td>
<td>Institutional Capacity</td>
<td>Federal Government</td>
<td>The government relies on limited and outdated data to direct its mitigation efforts. The government needs to build capacity around data collection and analysis, hire additional data scientists, and provide funding for these initiatives.</td>
</tr>
<tr>
<td>Allow for Greater Public Engagement in Planning Processes</td>
<td>Institutional Capacity</td>
<td>Federal Government</td>
<td>To enhance the credibility of and accountability around its mitigation efforts, the government needs to share the data and assumptions underlying its carbon intensity reduction figures.</td>
</tr>
<tr>
<td>Release Plans in English, Malay, Cantonese, and Tamil</td>
<td>Institutional Capacity</td>
<td>Federal Government</td>
<td>While the government is increasingly involving the public in certain planning processes, it needs to expand these efforts to ensure that the public feels it has a meaningful role in shaping carbon mitigation efforts, and thus, feels connected to the issue.</td>
</tr>
<tr>
<td>Do Not Ignore Low Hanging Fruits</td>
<td>Institutional Capacity</td>
<td>Federal Government</td>
<td>All plans developed by the federal government should be released in English, Malay, Cantonese, and Tamil. This will not only ensure that language barriers do not hinder state's ability to implement federal plans but also represents a more inclusive approach to better ensure all Malaysia's ethnic groups can read and interact with these plans.</td>
</tr>
<tr>
<td>Establish Climate Control Hub with Enforcement Authority</td>
<td>Institutional Capacity</td>
<td>Federal Government</td>
<td>The government should not ignore opportunities to implement high impact, low cost carbon mitigation approaches (e.g. incentivizing/requiring improved housing insulation) simply because they do not attract substantial media attention.</td>
</tr>
</tbody>
</table>

**Do Not Ignore Low Hanging Fruits**

The government should not ignore opportunities to implement high impact, low cost carbon mitigation approaches (e.g. incentivizing/requiring improved housing insulation) simply because they do not attract substantial media attention.
<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Focus Area</th>
<th>Implementer</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encourage and Incentivize Friendly Competition and Knowledge Exchange Among Cities and States</td>
<td>Institutional Capacity</td>
<td>Federal and State Government</td>
<td>Federal and state governments should create a program to encourage competition and knowledge sharing among cities and states. Such a program could include annual conferences and meetings for state and city leaders with awards and rewards.</td>
</tr>
<tr>
<td>Create Formal Structures to Support Cross-Sector Collaboration</td>
<td>Institutional Capacity</td>
<td>NGOs, Private Sector, the Public, and Government</td>
<td>NGOs, the private sector, the public, and government could create forums to formalize and enhance the beneficial interactions that occur among Malaysia's carbon ecosystem actors. This could also take the form of a series of annual conferences and meetings open to all stakeholders interested in carbon mitigation.</td>
</tr>
<tr>
<td>Hold the Government Accountable for its Commitments Internationally</td>
<td>Advocacy</td>
<td>NGOs and the Public</td>
<td>NGOs should use international venues to hold the government accountable to its carbon mitigation and other environmental commitments. Give that these commitments are largely driven by a desire to gain international recognition, holding the government’s feet to the fire at international meetings through protest, presentations, and the like could promote stronger alignment with its commitments.</td>
</tr>
<tr>
<td>Market Environmentalism as Status Symbol</td>
<td>Advocacy</td>
<td>NGOs, Private Sector, the Government</td>
<td>NGOs, the private sector, and the government should collaborate to push environmentalism and sustainable consumption as a status symbol. As part of this, they could create a program promoting sustainable products and certification. This could increase domestic demand and allow a price premium for sustainably certified products, especially palm oil.</td>
</tr>
<tr>
<td>Start Adaptation Efforts</td>
<td>Multi-Sector</td>
<td>Everyone</td>
<td>While Malaysia, and these recommendations, focus on mitigation, the country is vulnerable to a wide range of harmful climate change impacts. As climate change accelerates, all sectors of society need to prepare and build resilience for the changing climate and its accompanying dangers.</td>
</tr>
</tbody>
</table>

Table 5: List of Recommendations sorted by primary focus area. Includes the primary implementer and a descriptions
## Policy Matrix for All Recommendations

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Impact</th>
<th>Cost</th>
<th>Stakeholder Support</th>
<th>Feasibility</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve Physical Transit Connectivity outside KL</td>
<td>Medium</td>
<td>Medium/High</td>
<td>High</td>
<td>Medium</td>
<td>2.13</td>
</tr>
<tr>
<td>Improve Nonphysical Transit Connectivity and Experience within KL</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>2.75</td>
</tr>
<tr>
<td>Include Mitigation and Low Environmental Impact as Goals for the KL-Singapore</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>2.25</td>
</tr>
<tr>
<td>Allow Third Party Solar Installation under the FiT and NEM</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>2.75</td>
</tr>
<tr>
<td>Increase Funding for the FiT, NEM, and GTFS and Remove Quotas</td>
<td>Medium/High</td>
<td>High/Medium</td>
<td>High</td>
<td>High</td>
<td>2.25</td>
</tr>
<tr>
<td>Increase and Depoliticize the FiT Tax through Empowerment of SEDA</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low/Medium</td>
<td>2.13</td>
</tr>
<tr>
<td>Incentivize TBN to Accept and Connect with RE Sources</td>
<td>Medium/High</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>2.63</td>
</tr>
<tr>
<td>Shift Fossil Fuel Subsidies to RE</td>
<td>High</td>
<td>Low</td>
<td>Low/Medium</td>
<td>Medium/Low</td>
<td>2.25</td>
</tr>
<tr>
<td>Dedicate Revenue from Petronas to Green Trust Fund</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low/Medium</td>
<td>1.63</td>
</tr>
<tr>
<td>Invest in Biofuel with National Corporate Partners</td>
<td>High (uncertain prospect)</td>
<td>Medium/High</td>
<td>Medium/High</td>
<td>Medium</td>
<td>2.25</td>
</tr>
<tr>
<td>Allow No New Coal Plants after 2030</td>
<td>High</td>
<td>High</td>
<td>Low/Medium</td>
<td>Low</td>
<td>1.63</td>
</tr>
<tr>
<td>Resurrect and Fully Fund My Carbons Awards Competition</td>
<td>Low</td>
<td>Low</td>
<td>High/Medium</td>
<td>High</td>
<td>2.38</td>
</tr>
<tr>
<td>Develop Concrete Vision for Gradual, Sustained Transition to Renewable Production</td>
<td>Low</td>
<td>Low</td>
<td>High/Medium</td>
<td>High</td>
<td>2.38</td>
</tr>
<tr>
<td>carrots and Sticks for Sustainable Forest Management</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>High/Medium</td>
<td>2.63</td>
</tr>
<tr>
<td>Allow States to Collect Revenue from Non-Exploitative Forest Use</td>
<td>Medium/High</td>
<td>Medium</td>
<td>Medium/Low</td>
<td>Medium</td>
<td>2.00</td>
</tr>
<tr>
<td>Mandate Public Comment Prior to Degazettement</td>
<td>Medium/Low</td>
<td>Low</td>
<td>Medium/Low</td>
<td>Medium/Low</td>
<td>1.88</td>
</tr>
<tr>
<td>Mandate Consideration of Ecosystem Services within EIAs before Granting Concessions</td>
<td>Medium/Low</td>
<td>Low</td>
<td>Medium/Low</td>
<td>Medium/Low</td>
<td>2.00</td>
</tr>
<tr>
<td>Pair Federal Government Plans with Funding and Capacity Building</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>2.00</td>
</tr>
<tr>
<td>Provide Federal Funding for State Forest Enforcement</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>2.25</td>
</tr>
<tr>
<td>Implement Forestry Offset Program</td>
<td>Low</td>
<td>Low/Medium</td>
<td>High</td>
<td>High</td>
<td>2.38</td>
</tr>
<tr>
<td>Focus on Holistic Forest Plans that Trumpet Biodiversity</td>
<td>Medium/Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>2.63</td>
</tr>
</tbody>
</table>
Table 6 shows a simple policy matrix, which scores the recommendations by estimated carbon mitigation impact, program cost, cross sector stakeholder support, and feasibility of implementation. The scored categories are split into thirds and color coded by score rank. While detailed analysis of the implementation of these recommendations is beyond the scope of this thesis, the matrix points to two general themes. Most of the highest scoring recommendations represent “low hanging fruit” that could be easily implemented and have nontrivial impacts. The two highest ranked recommendations, improvement of nonphysical transit connectivity and experience within Kuala Lumpur and allowing third part solar installation, could both be quickly implemented at low or no cost. Conversely, most of the policies with the largest potential carbon
mitigation impacts - including establishment of a climate change control tower, allowing no new coal plants after 2030, and redirecting Petronas revenue to a green fund - score the lowest. This results from substantial stakeholder reticence - stemming in part from lock-in, - high costs of change, and the difficulty of enacting such substantial systemic shifts. Effecting significant change requires significant effort and fortunate timing.
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