

# Climate Resilient Development

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Strategy Paper



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## I. INTRODUCTION

11.1 The vision to become an advanced economy and inclusive nation will be accompanied by a resilient, low carbon, resource efficient and socially inclusive development trajectory. Climate resilient development, which complements and support green growth, is a pathway that combines climate change adaptation and mitigation actions across all sectors. Adaptation measures are crucial to protect development gains and allow the economy and the *rakyat*, especially the vulnerable and poor, to prepare for, cope and recover from the impact of climate change and natural disasters. Whereas mitigation measures are needed for reducing the emission of greenhouse gases (GHGs) to the atmosphere.

11.2 In the Tenth Malaysia Plan, 2011-2015, as a result of mitigation measures, Malaysia has reduced its GHGs emission intensity of gross domestic product (GDP) by 33% of the 40% voluntary target set in 2009. In terms of adapting to climate change impact, nearly a million people have been shielded from the detrimental impact of floods through implementation of 194 flood mitigation projects.

11.3 The Eleventh Malaysia Plan, 2016-2020, will focus on climate resilient development that incorporates climate change and environmental considerations into policy and development planning, evaluation and implementation. Apart from strengthening the resilience of the nation against climate change impact and natural disasters, climate resilience development will also ensure that economic growth is decoupled from high resource use and environmental degradation. This will protect the *rakyat* and development gains, strengthen water, food and energy security, ensure sustainability of natural resources, increase productivity and drive innovation as well as improve wellbeing and quality of life.

## II. TENTH MALAYSIA PLAN, 2011-2015: PROGRESS

11.4 During the Tenth Plan period, focus was given on addressing the issues of climate change by undertaking mitigation and adaptation measures. In achieving the voluntary target of reducing GHGs emission intensity of GDP by up to 40% by 2020, compared to 2005 levels, various mitigation measures were carried out in several areas such as energy, transportation, waste and forestry. As of 2013, implementation of mitigation measures in these areas resulted in reduction of GHGs emission intensity of its GDP by 33%. Among measures undertaken include enforcement of the Renewable Energy Act, 2011, implementation of the Feed-in Tariff (FiT) mechanism, gazetting of EURO 4M fuel standards,

introduction of the biodiesel B7 programme, conversion of empty palm oil fruit bunches to energy and gazettement of Permanent Reserved Forests.

11.5 In terms of adapting to climate change impact, several measures were undertaken with respect to water resources and the agriculture sector. Flood mitigation and coastal erosion prevention programmes were implemented to reduce the impact of floods and sea level rise. Flood hazard maps were also developed to facilitate disaster prevention and development planning in major high risk areas. In the agriculture sector, a new aerobic paddy variant known as MR1A1, which is resistant to heat and water scarcity, was launched. In addition, new policy frameworks, guidelines and standards as well as communication mechanisms were introduced to support efforts in addressing climate change. The details of key achievements during the Tenth Plan period are shown in *Exhibit 11-1*.

*Exhibit 11-1*

**Key Achievements in the Tenth Malaysia Plan, 2011-2015**

Focus Area	Initiative	Achievement
Mitigation	Energy efficiency for buildings	<ul style="list-style-type: none"> <li>Retrofitting of four existing government buildings resulted in reduction of electricity use ranging from 4% to 19% monthly, equivalent to RM7,000 to RM130,000 savings</li> </ul>
	Energy efficiency for electrical appliances	<ul style="list-style-type: none"> <li>The Minimum Energy Performance Standards (MEPS) for domestic electrical appliances, namely bulb, fan, refrigerator, television and air-conditioner, gazetted in 2013, resulted in reduced electricity consumption and savings</li> </ul>
		<ul style="list-style-type: none"> <li>Implementation of the Sustainability Achieved via Energy Efficiency (SAVE) Programme, 2011-2013 resulted in: <ul style="list-style-type: none"> <li>reduction of domestic electricity consumption of 306.9 gigawatt hour</li> <li>savings of RM78.4 million</li> <li>GHGs emission reduction of 208,705 tonnes carbon dioxide equivalent (tCO<sub>2</sub>eq)</li> </ul> </li> </ul>
Renewable energy through Feed-in Tariff (FiT)		<ul style="list-style-type: none"> <li>As of 2013, GHGs emission reduction through FiT was 432,161 tCO<sub>2</sub>eq</li> </ul>
		<ul style="list-style-type: none"> <li>The total installed capacity increased from 53 megawatts in 2009 to 243 megawatts in 2014</li> </ul>

Focus Area	Initiative	Achievement
Mitigation	Green Technology Financing Scheme (GTFS)	<ul style="list-style-type: none"> <li>As of 2013, GHGs emission reduction through implementation of projects under GTFS was 92,993 tCO<sub>2</sub>eq</li> </ul>
	Fuel standards improvement	<ul style="list-style-type: none"> <li>Gazetting of EURO 4M standards in 2013 and enforcement of its use in RON97 in 2015</li> </ul>
		<ul style="list-style-type: none"> <li>Construction of 35 depots nationwide with in-line blending facilities for the implementation of the B5 programme (5% bio-diesel). As of 2013, GHGs emission reduction through the B5 programme was 1.4 million tCO<sub>2</sub>eq</li> </ul>
		<ul style="list-style-type: none"> <li>Introduction of B7 programme (7% bio-diesel) by end of 2014</li> </ul>
	Land use, land-use change and forestry	<ul style="list-style-type: none"> <li>Gazetting of Permanent Reserved Forest in Pahang, Perak and Selangor. As of 2013, GHGs emission avoidance was 11.8 million tCO<sub>2</sub>eq</li> </ul>
		<ul style="list-style-type: none"> <li>Construction of 137 check dams, 40 water tube wells and three watch towers in hot spot areas to address peatland fires</li> </ul>
	Solid waste management	<ul style="list-style-type: none"> <li>Household recycling rate increased from 5% in 2010 to 10.5% in 2012 and expected to increase to 15% in 2015</li> </ul>
		<ul style="list-style-type: none"> <li>As of 2013, GHGs emission reduction through paper recycling was four million tCO<sub>2</sub>eq</li> </ul>
		<ul style="list-style-type: none"> <li>159 companies, with a total capacity of more than 24,000 metric tonnes per month, were licensed to recover electrical and electronic waste (e-waste)</li> </ul>
		<ul style="list-style-type: none"> <li>The National Biomass Strategy 2020 was formulated in 2013 to promote the use of agricultural biomass waste for high value products</li> </ul>
Adoption of Green Building Index for construction	<ul style="list-style-type: none"> <li>As of 2013, GHGs emission reduction was 475,746 tCO<sub>2</sub>eq</li> </ul>	

Focus Area	Initiative	Achievement
Mitigation	Utilisation of compressed natural gas	<ul style="list-style-type: none"> <li>As of 2013, GHGs emission reduction was 136,415 tCO<sub>2</sub>eq</li> </ul>
	Public transport usage - Light Rail Transit and Monorail	<ul style="list-style-type: none"> <li>As of 2013, GHGs emission reduction was 424,901 tCO<sub>2</sub>eq</li> </ul>
	Methane avoidance from empty palm oil fruit bunches	<ul style="list-style-type: none"> <li>As of 2013, GHGs emission reduction was 33.1 million tCO<sub>2</sub>eq</li> </ul>
	Development of green products	<ul style="list-style-type: none"> <li>73 eco-label licences issued to companies producing green products</li> </ul>
	Roadmaps and guidelines to support low carbon development	<ul style="list-style-type: none"> <li>Low Carbon City Framework developed in 2011</li> </ul>
		<ul style="list-style-type: none"> <li>Green Neighbourhood Guidelines developed in 2011</li> </ul>
		<ul style="list-style-type: none"> <li>A Roadmap of Carbon Intensity Reduction in Malaysia developed in 2013</li> </ul>
		<ul style="list-style-type: none"> <li>Green Technology Master Plan developed in 2015</li> </ul>
	Communications strategy	<ul style="list-style-type: none"> <li>National Sustainable Consumption and Production (SCP) web portal developed in 2014 to enhance knowledge and capacity towards green growth</li> </ul>
	Obligation to the United Nations Framework Convention on Climate Change (UNFCCC)	<ul style="list-style-type: none"> <li>Submission of the Second National Communication to the UNFCCC in 2011</li> </ul>
<ul style="list-style-type: none"> <li>Submission of Biennial Update Report by end of 2015</li> </ul>		
Domestic reporting mechanisms	<ul style="list-style-type: none"> <li>MyCarbon Reporting Programme, launched in 2013 to encourage and facilitate private entities to measure and report their GHGs emission, from which they could identify actions to reduce the emission. As of January 2015, 26 companies volunteered to participate in the programme</li> </ul>	

Focus Area	Initiative	Achievement
Adaptation	Flood mitigation programmes	<ul style="list-style-type: none"> <li>Development of 34 hazard maps to facilitate disaster prevention and development planning</li> </ul>
		<ul style="list-style-type: none"> <li>Implementation of 194 flood mitigation projects, shielded nearly one million people from floods</li> </ul>
	Coastal erosion prevention programme	<ul style="list-style-type: none"> <li>24.4 kilometres of coastal areas in Johor, Kelantan, Pulau Pinang, Sabah, Sarawak, Selangor and Terengganu were rehabilitated</li> </ul>
	New paddy variant	<ul style="list-style-type: none"> <li>New paddy variant known as MR1A1 launched in 2013 - a paddy variant resistant to heat and able to be planted in areas with poor water supply. This aerobic variant will help to increase rice production while adapting to climate change</li> </ul>

### III. ISSUES AND CHALLENGES

11.6 Implementation of the Tenth Plan initiatives has led to some improvements in overall environmental quality but there are still issues and challenges to be addressed in achieving the desired outcomes. This can be divided into two main categories – one, issues related to climate change and environmental degradation; and two, issues related to the governance in addressing issues of climate change and environment.

#### Climate Change and Environmental Degradation

11.7 Climate change is more of a development issue although it is generally linked to environmental degradation. Climate change has increased the frequency and intensity of climate-related disasters such as floods, coastal erosion and landslides. These extreme weather events have affected economic activities as well as the livelihood and safety of the people, especially the poor and vulnerable. In addition, prolonged drought and extreme rainfall have threatened water, food and energy security. For example, the floods that occurred in December 2014 resulted in loss of lives, destroyed property and infrastructure and crippled economic activities. These floods affected 503,302 people, claimed 25 lives and damaged public infrastructure amounting to an estimated RM2.9 billion.

11.8 Among issues that are causing climate change and environmental degradation are indiscriminate land use and land-use change; lack of consideration of social and environmental costs; unsustainable production processes; inefficient energy use and high dependency on fossil fuels; ineffective management of waste; small market size of green products and services; insufficient mitigation and adaptation measures; gaps in disaster risk management; and unsustainable lifestyle.

### ***Indiscriminate Land Use and Land-use Change***

11.9 Changes in land use due to urbanisation, agriculture activities and industrialisation together with population growth and non-compliance to development guidelines have further strained forested areas and caused degradation in ecosystem services<sup>1</sup>. For example, extensive land-use change in water catchment areas of Cameron Highlands over the years has resulted in mud floods, landslides and increase in temperature. In the 2013 landslide incident, seven lives were lost and damages to infrastructure were valued at approximately RM13 million. While, in the landslide incident in 2014, five lives were lost, 177 people displaced and damages to infrastructure were estimated at RM3.5 million. Siltation from upstream activities has also reduced the efficiency of the Sultan Abu Bakar hydroelectric dam. In addition, the increase in temperature has affected the tourism industry in Cameron Highlands and impaired the livelihood of the local community.

### ***Lack of Consideration of Social and Environmental Costs***

11.10 Indirect costs related to climate change, environmental degradation as well as public health and safety are currently not incorporated into overall development costs. The failure to include social and environmental costs has put a strain on rehabilitation efforts and the livelihood of the people. The cost of the impact to the environment, infrastructure and wellbeing of the people is usually borne by the Government as well as the people living within and surrounding the affected areas. For example, the recurring haze every year has affected public health and incurred medical costs especially for those with respiratory problems. Whereas, the average cost borne by the Government to mitigate floods over the past 40 years has risen from about RM3 million per year during the Second Plan period, 1971-1975 to RM1.3 billion per year during the Tenth Plan period, 2011-2015.

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<sup>1</sup> **ecosystem services** include provisioning of services such as food and water; regulating services such as flood and disease control; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth.

Source: United Nations for Environmental Protection

### ***Unsustainable Production Processes***

11.11 Unsustainable production processes relate to the excessive use of resources including raw materials, energy and water; high emission of GHGs and other pollutants; and substantial generation of wastes. A large number of small and medium enterprises in the manufacturing sector continue to practice unsustainable production processes, mainly due to the relatively low tariff rates for energy and water. Low tariffs act as a disincentive for industries to use resources efficiently as well as to invest in green technologies. For example, the Special Industrial Tariff discourages efficient use of energy by the industrial customers. The provision of the energy subsidy also resulted in the low uptake of renewable energy (RE). Nevertheless, there are several industries, such as electronics and food, which have improved their energy efficiency, albeit small.

### ***Inefficient Energy Use and High Dependency on Fossil Fuels***

11.12 The Government and private agencies have undertaken efforts to implement energy efficiency and energy conservation measures. However, a long-term comprehensive policy on demand side management (DSM) to cover the entire energy spectrum including electrical, thermal and transport sector energy usage has yet to be formulated. In terms of RE industry, key challenges are on the reliability of RE plants and problems in securing adequate feedstock for the long term, particularly for biomass. Other challenges include lack of experts in the sector including RE project developers, financial personnel and service providers as well as difficulty in securing financing to develop RE. The current RE resources under the FiT mechanism are from biomass, biogas, mini hydro and solar photovoltaic while new RE resources are not explored intensively.

### ***Ineffective Management of Wastes***

11.13 The management of wastes has not been carried out holistically; different types of waste is managed by different agencies and is confined within the agency's jurisdiction area. This is evidenced in terms of the collection and disposal of electrical and electronic waste (e-waste), which is hazardous. E-waste from industries is regulated under the Environmental Quality Act, 1974 whereas e-waste from households is currently not regulated. This has resulted in e-waste being dumped together with other household wastes and finally disposed in landfills. In addition, the Solid Waste Management and Public Cleansing Act, 2007 is still not fully enforced with only several states having adopted the Act. Lack of coordination among agencies involved in waste management has affected the effective implementation of the Reuse, Reduce and Recycle (3R) programme.

11.14 The amount of solid waste generation continued to increase from 0.9 kilogram per capita per day in 2005 to 1.2 kilogram in 2012, of which 0.6 kilogram was food waste. Out of that amount, 85% was disposed in landfills resulting in existing landfills reaching their maximum capacity at a faster rate.

### ***Small Market Size for Green Products and Services***

11.15 The small market size for green products and services due to the lack of a regulatory framework for local and imported goods as well as the low domestic demand have hindered the growth of local production of green products and services. This discourage local industries from producing products that comply with international standards, thus unable to penetrate markets in developed countries especially the European market. Moreover, there are challenges in development of green buildings due to the lack of national green building performance-based certification, limited availability of green building materials and low demand because of the higher purchasing cost.

### ***Insufficient Mitigation and Adaptation Measures***

11.16 Mitigation and adaptation efforts to address climate change must be undertaken across all sectors including forestry. In adapting to the impact of climate change, vulnerable sectors such as agriculture, energy, health and water resources need to be resilient. For instance, in the agriculture sector, increases in temperature or excessive amounts of water will influence crops yield. Design of buildings and infrastructure has also not taken into account climate change and environmental consideration. This resulted in serious damages during disasters. Due to the lack of a national mitigation plan and national adaptation plan, measures undertaken to address climate change have not been comprehensive and uncoordinated. In addition, research and development (R&D) aspects related to climate change are still lacking.

### ***Gaps in Disaster Risk Management***

11.17 Coordination of disaster risk management (DRM) is still not comprehensive due to the lack of policy and regulatory framework. At the same time, the hazard and risk management as well as vulnerability reduction for disaster is insufficient. Mapping of high risk areas especially for floods, landslides and earthquakes have been undertaken but on an ad-hoc basis; development activities have not taken into account risks of disasters in their planning, evaluation and implementation; communications strategy, particularly early warning systems, have been ineffective; and community and private sector involvement in disaster risk management have been inadequate, thus increasing the risk and degree of damage.

### ***Unsustainable Lifestyle***

11.18 Unsustainable lifestyle relates to daily practices that are wasteful. For instance, driving to a destination that can be easily reached by foot will not only waste fuel but also pollute the air. Wasteful consumption of water and electricity will lead to faster depletion of resources. Lifestyle trends for increased consumption, for example ownership of multiple electronic gadgets with similar functions, will increase energy consumption, produce more waste and in some instances affect human health.

## **Governance in Addressing Issues of Climate Change and Environment**

11.19 Challenges related to governance in addressing issues of climate change and environment include uncoordinated planning; constraints in enforcement, monitoring and evaluation; insufficient R&D for innovation and commercialisation of indigenous technologies; inadequate collaboration with stakeholders; and low awareness on environmental and climate change issues.

### ***Uncoordinated Planning***

11.20 Continuous efforts have been made to address environmental problems such as pollution, waste management and climate change. However, measures to address these issues have been uncoordinated and not comprehensive, especially at the federal, state and local levels. This is attributed to the lack of holistic policy planning and absence of regulatory framework. For example, the National Policy on Climate Change formulated in 2009 is yet to be supported with an adaptation and mitigation action plan; and the Environmental Quality Act, 1974 is not comprehensive in terms of regulations for e-waste from households and polluted land. In addition, in certain cases, conflicting priorities between national and state development agenda have affected planning and efforts to address environmental issues.

### ***Constraint in Enforcement, Monitoring and Evaluation***

11.21 Constraint in enforcement of environmental legislations is attributed to limited capacity and capability of enforcement agencies. This has been exacerbated by the non-compliance of certain industries to environmental standards.

11.22 Currently, the monitoring and evaluation of climate change and environmental related policies and programmes are insufficient - data collection is fragmented, not updated and not shared between agencies. Moreover, existing indicators are not

comprehensive as they are developed for specific purposes to serve the needs of different agencies. Hence, the absence of comprehensive evaluation and monitoring mechanisms has thwarted efforts to continuously improve the implementation of initiatives to address environmental issues.

### ***Insufficient Research and Development for Innovation and Commercialisation of Indigenous Technology***

11.23 Currently, there is a lack of indigenous technology to undertake mitigation and adaptation measures as well as improve environmental quality. The lack of indigenous technology can be attributed to inadequate R&D and innovation as well as commercialisation activities. Apart from that, lack of understanding on green development by financial institutions has hampered private sector efforts to develop or utilise green technology. For example, banking institutions have been reluctant to disburse loans under the Green Technology Financing Scheme (GTFS) due to perceived high risks and longer duration for returns on investment, although GTFS is being guaranteed by the Government.

### ***Inadequate Collaboration with Stakeholders***

11.24 Partnership and collaboration among the Government, private sector, civil society organisations, academia and the *rakyat* are currently inadequate or conducted on an ad-hoc basis. Shared responsibility among the stakeholders cannot be nurtured if they are not actively engaged in Government efforts in addressing environmental issues and climate change.

### ***Low Awareness on Environmental and Climate Change Issues***

11.25 Societal awareness on environmental and climate change issues is critical to support and ensure the success of government initiatives. Currently, awareness and understanding among the public is low. In addition, learning and teaching of environment and climate change related issues, including in schools, is yet to integrate theoretical aspects with practical skills, which are imperative to change the mindset and behaviour of the *rakyat* towards green lifestyles.

## IV. ELEVENTH PLAN, 2016-2020: WAY FORWARD

11.26 For the Eleventh Plan, two overarching targets are set – firstly, reducing GHGs emission intensity of GDP by up to 40% compared to 2005 levels by 2020, in line with the voluntary target announced by the YAB Prime Minister at the 15<sup>th</sup> Conference of the Parties to the United Nations Framework Convention of Climate Change in 2009; and secondly, improving Malaysia’s ranking to top 20 in the Environmental Performance Index (EPI). An elaboration of the EPI is in *Box 11-1*.

11.27 Climate resilient development ensures socio-economic development is achieved in a sustainable manner while its gains are protected from the impact of climate change and natural disasters. In this regard, three key strategies, namely, strengthening the enabling environment for climate resilient development, strengthening resilience against climate change and natural disasters and harnessing economic value through sustainable consumption and production practices, will be implemented to achieve development that is resilient, clean and efficient. Implementation of these strategies will reduce the risks and impact of climate change and natural disasters as well as address the issues of environmental degradation and mitigate climate change. These key strategies will be supported by a number of initiatives as shown in *Exhibit 11-2*.

### *Box 11-1*

#### **Environmental Performance Index**

##### **Background**

The Environmental Performance Index (EPI) was developed by the Yale University and Colombia University to rank countries performance on addressing high-priority environmental issues. Two objectives that provide the overarching structure of the EPI are Environmental Health and Ecosystem Vitality. Environmental health measures the protection of human health from environmental harm. Ecosystem vitality measures ecosystem protection and resource management. These two objectives are further divided into nine issue categories that span on high-priority environmental policy issues. The EPI is constructed through the calculation and aggregation of 20 indicators reflecting national-level environmental data. The issue categories are:

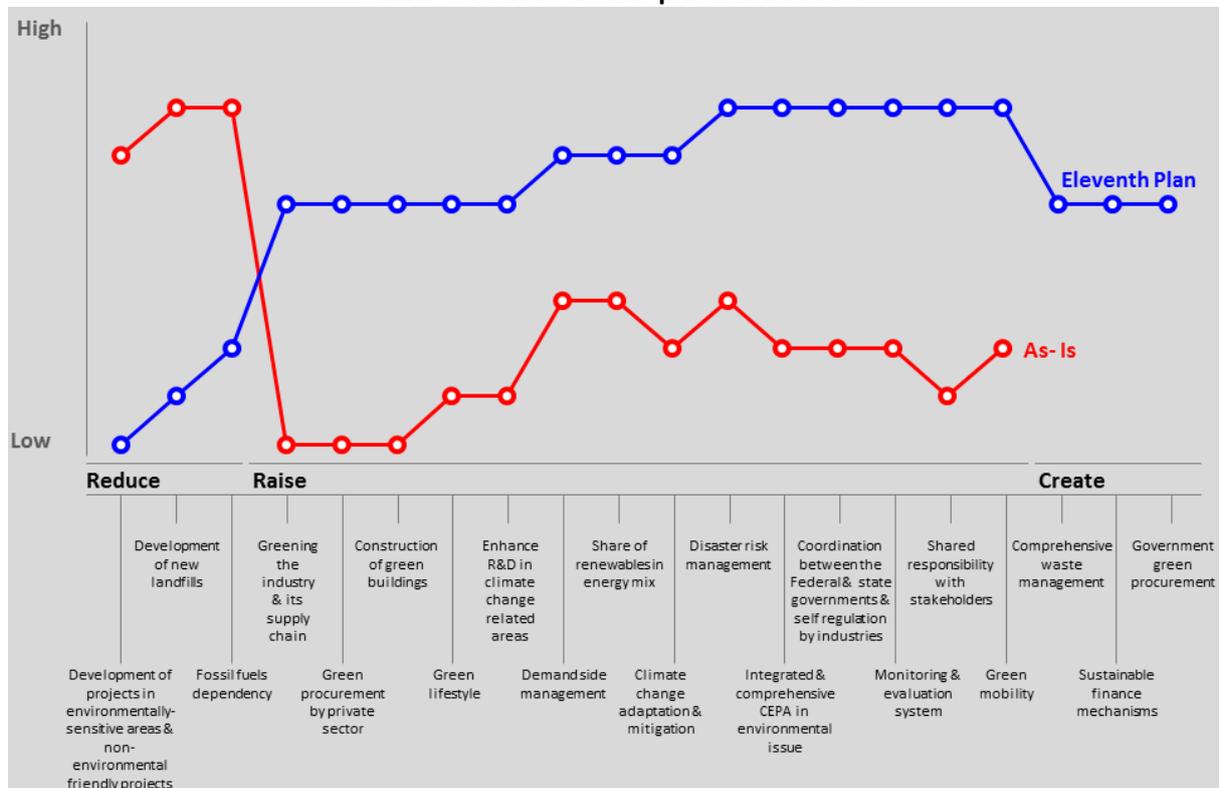
- |                               |                          |
|-------------------------------|--------------------------|
| i. Health impacts             | ii. Air quality          |
| iii. Water and sanitation     | iv. Agriculture          |
| v. Forests                    | vi. Fisheries            |
| vii. Biodiversity and habitat | viii. Climate and energy |
| ix. Water resources           |                          |

The EPI is an essential tool to policy makers as it can help direct attention to vital data gaps, which can help generate better data for the future. The transparency with which the EPI is constructed and the open nature of the underlying data make the EPI a starting point for countries to take further action. Ideally, these actions would involve:

- development of better measurement and monitoring systems to improve environmental data collection
- creation of relevant policies, particularly to address weak areas
- communication and reporting of national-level data and statistics to international agencies such as the United Nations
- delineation of sub-national metrics and targets for improved environmental performance

Source: <http://epi.yale.edu>

Exhibit 11-2  
Climate Resilient Development Initiatives



## Strengthening the Enabling Environment for Climate Resilient Development

11.28 The enabling environment for climate resilient development will be strengthened to enable effective implementation of related initiatives and programmes. The implementation of climate resilient development requires robust governance to strengthen planning, enforcement, monitoring and evaluation; sustainable financing mechanisms; research and development; and comprehensive communications, education and public awareness programmes (CEPA).

### ***Enhancing Governance to Strengthen Planning, Enforcement, Monitoring and Evaluation***

11.29 Governance, which encompasses policy, regulatory and institutional framework, capacity and capability of institutions as well as monitoring and evaluation mechanisms, will be enhanced to enable holistic planning, better enforcement and coordinated management. The efforts to be undertaken will include:

- formulation of new policies including a national disaster risk management policy, national policy on geospatial information management, sustainable consumption and production (SCP) blueprint, sustainable development blueprint, national mitigation plan and national adaptation plan
- formulation of new legislations such as disaster risk management bill, national water resources bill and geospatial information management bill
- revision of the existing policies and legislations such as the Environmental Quality Act, 1974, Solid Waste and Public Cleansing Management Act, 2007 and National Policy on Climate Change, 2009
- development and implementation of a Strategic Environmental Assessment guideline and revision of the Environmental Impact Assessment to ensure climate change and environmental considerations are given due importance in development planning, evaluation and implementation stages

11.30 In order to facilitate the implementation of climate resilient strategies, the institutional framework will be strengthened to ensure better coordination among relevant ministries and agencies at federal, state and local levels. This will include the establishment of a national committee on sustainable waste management, national chemical management board, national climate change centre and national crisis and disaster management centre through restructuring and deployment of talents from existing agencies. Coordination and collaboration among relevant ministries and agencies, particularly at the federal and state levels will also be strengthened for a better management and implementation of climate resilient strategies.

11.31 The capacity and capability of human resources in all relevant agencies will be enhanced by developing the required capacities, capabilities and skills to enable effective implementation of climate resilient strategies. This will be undertaken by the relevant ministries and agencies by:

- identifying new competencies and skills needed, especially in areas such as RE, energy efficiency, green buildings, waste to energy, climate modelling and environmental economics
- scaling up training programmes and enhancing their effectiveness through certification by relevant authorities

11.32 A monitoring and evaluation system encompassing indicators and databases will be established to assess the effectiveness and success of climate resilient development strategies and its initiatives. This will support decision-making process at the planning and implementation stages as well as allow continuous improvement of initiatives undertaken. A one-stop centre will be established to provide access and linkage to all data in the country, including data that are housed in relevant agencies. In this regard, the Department of Statistics Malaysia will take the lead to establish an appropriate mechanism and coordinate with relevant ministries and agencies. Concurrently, new indicators and databases such as geospatial information management; national GHGs inventory; integrated chemical inventory; shoreline data; and environmental indicators, namely green GDP, green economy and SCP will be developed to complement existing ones, making them more comprehensive in reflecting the current situation.

### ***Establishing Sustainable Financing Mechanisms***

11.33 Sustainable financing mechanisms will be established to support implementation efforts to address climate change and environmental-related issues. This is crucial due to the high cost of adaptation and mitigation measures including acquisition of related technologies. Collaboration with the private sector and organisations from within and outside the country will be established to finance related initiatives such as the implementation of the REDD+, a mechanism for reducing emissions from deforestation and forest degradation. In addition, risk transfer schemes through insurance for climate disasters will be introduced as part of climate adaptation measures. Government agencies who are custodians of information and data will be encouraged to develop a model to generate revenue. The revenue will be channelled back into the system to ensure continuous updates of information and data. In addition, mechanisms that impute the cost of carbon emissions and environmental degradation will be explored while the implementation of green taxes, Polluter Pays Principle and the Take Back System will be expanded.

### ***Intensifying research and development***

11.34 Fundamental and applied research related to environment and climate change will be intensified to better understand the socio-economic impact of climate change as well as identify and develop indigenous technology and solutions. Development and application of indigenous technology will help reduce the cost of climate adaptation and mitigation as well as enhance disaster risk management. Among the areas where R&D will be undertaken include climate modelling to enable better forecast in terms of weather and climate extremes; vulnerability and adaptation assessment to strengthen resilience in key sectors; and development of indigenous technologies. At the same time, the dissemination of research findings will be undertaken to enable commercialisation of indigenous technology.

### ***Enhancing Awareness to Create Shared Responsibility***

11.35 Communication, education and public awareness (CEPA) programmes engaging all levels of society will be enhanced to increase awareness, particularly on the role of climate resilient development in addressing environmental and climate change issues. Effective CEPA programmes will instil a sense of shared responsibility among all stakeholders including private sector, academia, civil society organisations and the *rakyat* to complement and support Government's efforts. In addition, platforms will be created for sharing of best practices, knowledge and expertise as well as collaborations on relevant areas.

11.36 The Ministry of Natural Resources and Environment (NRE) will lead and coordinate the effort develop a comprehensive CEPA programme to inculcate sustainable lifestyle as well as increase awareness of societal role in addressing climate change and environmental issues. The CEPA programme will coordinate and integrate key messages on different themes undertaken by different public sector agencies such as green products, low carbon mobility, waste recycling and recovery, sustainable use of resources including energy, forest and water as well as climate change and its impact to enhance public awareness. A consistent and coordinated CEPA will be introduced in schools and Institutions of Higher Learning including technical and vocational education and training institutes covering elements of SCP and sustainable lifestyles to inculcate a change, particularly in mindset and behaviour. It will also be mainstreamed in training programmes for professionals and skilled workers through continuous engagement with relevant parties.

## Strengthening Resilience against Climate Change and Natural Disasters

11.37 Two key initiatives, namely enhancing adaptation measures including flood mitigation and strengthening disaster risk management will be undertaken to increase the nation's resilience against the impact of climate change and natural disasters. Its implementation will enable the protection of lives, natural resources and development gains.

### *Enhancing Adaptation Measures*

11.38 Climate change adaptation measures will be enhanced to reduce the impact of and adapt to the increasingly extreme weather events. Implementation of adaptation measures will moderate the impact of climate change, thus reducing risks, and ultimately securing water, food and energy needs. In this regard, the NRE will develop a national climate change adaptation plan to identify adaptation measures as well as coordinate and synergise efforts among all relevant agencies. Other efforts that will be undertaken by NRE as well as relevant ministries and agencies at the federal, state and local levels include:

- improving flood mitigation, taking into account the intensity and frequency of extreme weather events, through:
  - innovative solutions, especially those that have multifunctional purposes such as retention ponds that can also be used as artificial wetlands, habitat grounds for wildlife and recreational parks, and dams that can also be used for power generation, irrigation and water supply
  - strengthen long-term solutions to address floods through the implementation of Integrated Water Resource Management, Integrated River Basin Management and Integrated Flood Management plans
  - review and assess existing flood mitigation measures such as bund and flood levee to cope with a higher flood levels including raising the average recurrence interval in high risk locations
  - integrated solutions using a combination of structural components such as retention ponds and diversion, and non-structural components such as flood hazard maps and flood warning system
  - improve flood and weather forecasting by upgrading the numerical weather prediction and flood warning system
- strengthen resilience of infrastructure, especially energy-related infrastructure through the incorporation of climate change and environmental considerations into their development planning, evaluation and implementation

- enhance the terrestrial and marine biodiversity as natural buffer through protection and conservation measures
- improve the management of rivers and coastal areas by strengthening the implementation of water management guidelines including conservation of mangrove forests and other suitable coastal forest species
- explore alternative sources of water such as water recycling, groundwater, lake and reservoir to enhance water security
- strengthen resilience of agriculture sector by intensifying R&D, especially in agriculture-climate modelling, and expansion of good agricultural practices
- enhance public awareness on climate-related diseases to improve public health, particularly on vector borne diseases as well as air-and water-borne diseases

### ***Strengthening Disaster Risk Management***

11.39 Disaster risk management (DRM) will be strengthened to arrest and reduce the impact of disaster on people and infrastructure. A comprehensive DRM strategy encompassing hazard and risk management, vulnerability reduction and preparedness as well as response and recovery, will be implemented to ensure more effective and faster response time. Among measures that will be undertaken by relevant ministries and agencies at federal, state and local levels as follows:

- improving governance, particularly the institutional, policy and regulatory framework of DRM under the Majlis Keselamatan Negara through the establishment of a national crisis and disaster management centre, formulation of disaster risk management policy and its related legislation as well as revision of the relevant standard operating procedures
- ensuring compliance to existing environmental standards and development guidelines as well as incorporation of climate change considerations into development planning, evaluation and implementation
- implementing hazard and risk assessment to facilitate development planning and decision making
- strengthening coordination and collaboration among disaster-related agencies at the federal, state and district levels including resources and assets deployment
- enhancing capacity and capability of all parties involved in disaster preparedness, response and recovery
- improving disaster detection capability and early warning system by upgrading detection technology and forecasting system
- mapping of major hazard and high-risk areas jointly by relevant agencies such as Department of Irrigation and Drainage Malaysia, Mineral and Geoscience Department Malaysia (JMG), Malaysian Remote Sensing Agency and Department of Survey and Mapping Malaysia

- improving communication strategies and platforms among disaster-related agencies, and between government and the people
- enhancing awareness, building capacity and empowering local communities to enable them to take initial response measures in a disaster through regular training programmes and scheduled drills
- making DRM a basic requirement for all cities in attracting business investments

## **Harnessing Economic Value through Sustainable Consumption and Production Practices**

11.40 In the Eleventh Plan, continuous efforts will be undertaken to harness economic value through eco-efficiency, which ensure a more sustainable economy with environment and natural resources sustainability. Decoupling economic growth from environmental degradation is vital to achieve green growth. Through eco-efficiency, the value of resources like energy, water, mineral, land and forests will be given due recognition while wastage is reduced. This can be achieved through adoption of sustainable consumption and production (SCP) practices across all sectors of the economy including society. In this regard, five key initiatives will be undertaken namely, creating green markets; increasing share of renewables in energy mix, enhancing demand side management (DSM), encouraging low carbon mobility and managing wastes holistically.

### ***Creating Green Markets***

11.41 The development of domestic markets for green products and services will be championed by the Ministry of Energy, Green Technology and Water and supported by the relevant ministries and agencies. Creation of domestic green market will be undertaken through, among others, green procurement, development of green buildings and greening of industries. The Government will be the catalyst to spur green growth in Malaysia. The Government green procurement (GGP), which takes into account environmental criteria and life-cycle costing analysis, will be implemented to encourage public sector to purchase environment-friendly products and services. The GGP will create demand for green products and services, and industries will have to raise the standard and quality of their products to meet green requirements. The GGP will complement the existing eco-labelling scheme in the country for green product certification. By 2020, it is targeted that at least 20% of all government procurement will be green. Meanwhile, the private sector will also be encouraged to emulate government efforts in green procurement.

11.42 New government buildings will adopt green features and designs, and use green building materials as per the *Skim Penarafan Hijau Jabatan Kerja Raya Malaysia*. Existing government buildings will be gradually retrofitted. Industry players will be encouraged to obtain green certification for private buildings such as GreenPASS and the Green Building Index. Apart from ensuring efficient use of resources, particularly energy and water use, green buildings will also reduce GHGs emission.

11.43 The Government will introduce green rating system and green standards, which is aligned to international standards, to promote the greening of industry and its supply chain. This will enable local industries to become more competitive and access the global market. Industries will also be encouraged to meet international environmental commitments by undertaking energy audit, measuring carbon footprint and water footprint as well as quantifying GHGs emission. At the same time, the MyHijau Mark and the Minimum Energy Performance Standards (MEPS) will be expanded to other household products as well as electric and electronic appliances apart from the existing television, fan, refrigerator, air-conditioner and bulb. In addition, the Department of Environment (DOE) will expand self-regulation among industries to mitigate pollution at source, and cover new aspects such as noise and soil pollution, in addition to hazardous waste, water and air pollution.

### ***Increasing Share of Renewables in Energy Mix***

11.44 Renewable energy (RE) contribution in energy mix will be increased through:

- exploring new RE sources and enhancing capacity of RE personnel
- implementing net energy metering

### ***Enhancing Demand Side Management***

11.45 Demand Side Management (DSM) will be emphasised as a way to reduce energy consumption and manage energy resources efficiently through:

- formulating a comprehensive DSM master plan that covers the whole spectrum of the energy sector including electrical, thermal and transport
- expanding DSM measures for building, industrial and households

### ***Encourage Low Carbon Mobility***

11.46 Low carbon mobility emphasises the usage of public transport to meet the dual objectives of reducing congestion and minimising environmental pollution. The use of public transport will also reduce over-dependency on private vehicles. Apart from public transport, reducing energy consumption and emission of harmful gases including black smoke of the transport sector will also support low carbon mobility. In this regard, among measures that will be undertaken to encourage low carbon mobility include:

- increasing the use of public transportation as the preferred mode by providing a seamless and reliable modal mix of transportation
- encouraging usage of energy efficient vehicles
- increasing the use of biofuels and compressed natural gas
- placing higher fuel standards to reduce air pollution

### ***Managing Waste Holistically***

11.47 All seven types of waste – solid, agricultural, construction, scheduled, radioactive, mining and sewage, will be managed in a holistic manner based on the life-cycle approach. This approach will increase recycling and recovery rate as well as improve the management of landfill to reduce amount of waste and pollution. By 2020, the household recycling rate will be increased to 22%. The National Solid Waste Management Department and the Solid Waste Management and Public Cleansing Corporation (SWCorp) together with other relevant agencies such as the DOE, JMG, Suruhanjaya Perkhidmatan Air Negara (SPAN), Atomic Energy Licensing Board and Department of Agriculture will undertake the following efforts to holistically manage waste and evaluate its potential as resources:

- establish a platform that will meet regularly to coordinate matters on sustainable and holistic waste management
- implement separation of waste at source from household and premise level to increase the rate of waste recovery
- scale up the implementation of 3R programmes to improve the whole cycle of waste handling, recovery and disposal
- increase the diversion of waste away from landfills to other uses such as conversion of waste to energy, waste to wealth and food waste treatment
- expand the implementation of the Polluter Pays Principle and Take Back system

## V. CONCLUSION

11.48 Climate change continues to be a major threat as it adversely impacts economic and social development gains. Implementation of climate resilient development in the Eleventh Plan will increase the nation's resilience against the impact of climate change and natural disasters, thus ensuring protection of development gains, sustainability of natural resources and security of water, food and energy. A resilient socio-economic development will not only ensure continuous growth but will also benefit the *rakyat*, particularly their safety, health and wellbeing. Adoption of sustainable consumption and production practices across all sectors of the economy will increase their efficiency and competitiveness as well as reduce pollution and dependency on natural resources. Shared responsibility and support from all levels of society, including individuals, will ensure the success and effectiveness of climate resilient development.