

Pursuing green growth for sustainability and resilience



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Overview

Malaysia has set a target to become an advanced economy by 2020. This will be achieved in a resilient, low-carbon, resource-efficient, and socially-inclusive manner. The intention is to shift from the conventional and costly 'grow first, clean-up later' path to a more greener trajectory – Green Growth – which will ensure that socio-economic development is pursued more sustainably, beginning at the planning stage, and continuing throughout the implementation and evaluation stages. Socio-economic development is vital in raising the quality of lives of Malaysians, but if limited natural resources are not used efficiently, it will result in irreversible damage and put Malaysia's development at risk. Green growth is therefore a game changer because it is not just a stand-alone strategic thrust, but a development trajectory that considers all three pillars of sustainable development – economic, social, and environment, and better prepares the nation for future challenges. If carried out successfully, it will increase economic growth, change mindsets and behaviour at all levels of the society, as well as influence policy decisions in government, production decisions in industries, and consumption decisions by individuals. This in turn will correct the perception of green growth – from a high cost to a long-term investment.

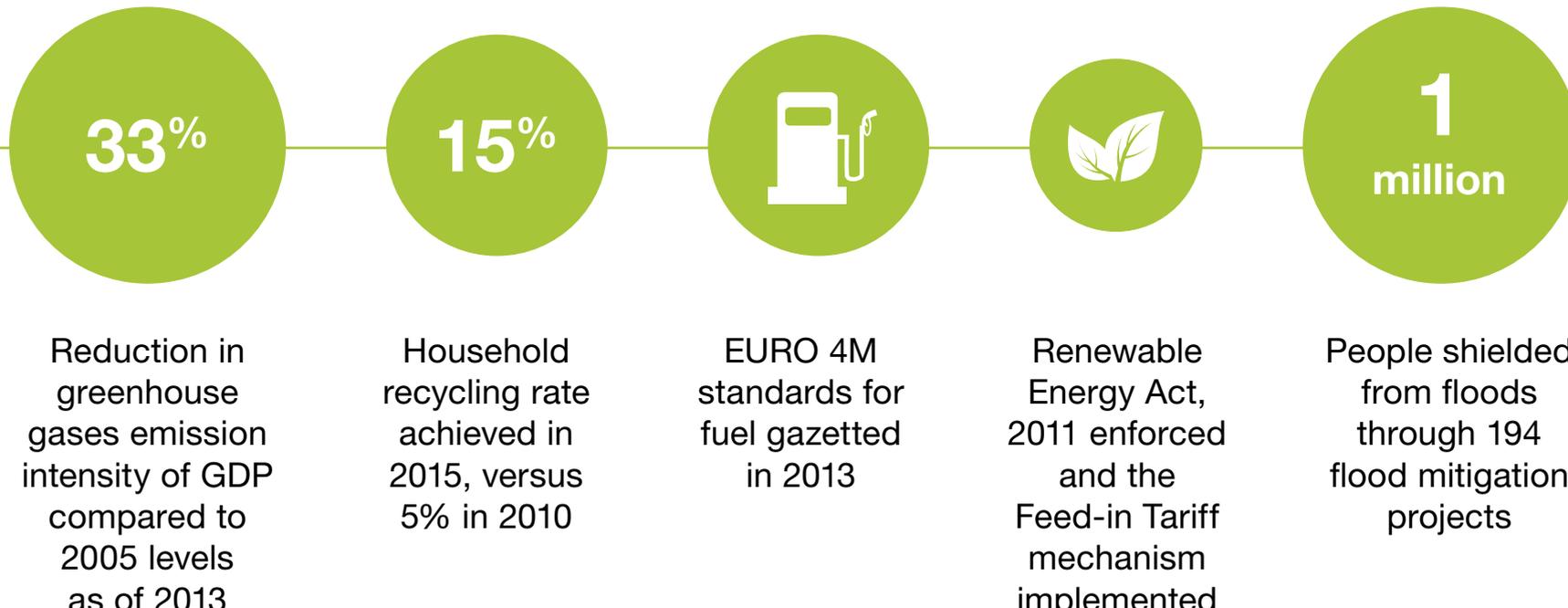
The Tenth Malaysia Plan, 2011-2015, recognised the importance of environmental sustainability as part of a comprehensive socio-economic development plan. Measures to address the issues of climate change, environmental degradation, and sustainable utilisation of Malaysia's natural endowment were therefore featured in the Tenth Plan. In 2009, Malaysia set a voluntary target of reducing the greenhouse gases (GHGs) emission intensity of its Gross Domestic Product (GDP) by up to 40% compared to 2005 levels by 2020. Under the Tenth Plan, by the end of 2013, Malaysia had already achieved a 33% reduction. Energy sector, which is a major

contributor to national GHGs emission, has undertaken steps to increase the use of clean and environmentally friendly sources. The Renewable Energy Act, 2011 implemented the Feed-in Tariff (FiT) mechanism to accelerate renewable energy (RE) growth in Malaysia, and since then RE installed capacity has grown from 53 megawatts (MW) in 2009 to 243 MW in 2014. In adapting to climate change, nearly a million people have been shielded from the detrimental impact of floods through the implementation of 194 flood mitigation projects. 23,264 hectares of forested areas have been declared as Permanent Reserved Forest under the Central Forest Spine initiative, helping to sustain Malaysia's natural endowment.

In the Eleventh Malaysia Plan, 2016-2020, green growth will be a fundamental shift in how Malaysia sees the role of natural resources and the environment in its socio-economic development, protecting both development gains and biodiversity at the same time. Building a socio-economic development strategy that will increase the resilience to climate change and natural disasters remains critical. To pursue green growth, the enabling environment will be strengthened — particularly in terms of policy and regulatory framework, human capital, green technology investment, and financial instruments. This enabling environment will facilitate a shift in the economy, particularly in the private sector, towards more sustainable patterns of consumption and production. This transformation will ensure sustainability of the nation's natural resources, minimise pollution, and strengthen energy, food and water security. By conserving biodiversity, the continuity of their function as a natural buffer against climate change and natural disaster can be strengthened. This buffer, complemented by structural approaches such as innovative flood mitigation and green infrastructure, as well as non-structural approaches like hazard risk maps and warning system, will strengthen disaster risk management and ultimately improve the wellbeing and quality of life of the *rakyat*.

Highlights

Tenth Malaysia Plan, 2011-2015: Achievements



33%

Reduction in greenhouse gases emission intensity of GDP compared to 2005 levels as of 2013

15%

Household recycling rate achieved in 2015, versus 5% in 2010



EURO 4M standards for fuel gazetted in 2013



Renewable Energy Act, 2011 enforced and the Feed-in Tariff mechanism implemented

1
million

People shielded from floods through 194 flood mitigation projects

**Climate mitigation:
reducing Malaysia's carbon footprint**

34

Flood hazard maps developed



MRIA1 aerobic paddy variant launched in 2013

61%

Forest cover in 2014, up from 56.4% in 2010

23,264

Hectares of forest gazetted as Permanent Reserved Forest under the Central Forest Spine



Crocker Range Park in Sabah listed as Man and Biosphere Reserves by UNESCO

**Climate adaptation:
protecting the nation from
the impact of climate change**

**Enhancing conservation of the nation's
ecological assets**

Looking back

Tenth Malaysia Plan, 2011-2015: Progress

Natural assets, particularly forests, are critical to ensure sustainability of Malaysia's growth and to act as defenses against natural disasters. Therefore, conservation of natural endowment to reverse natural resource depletion is essential.

The Tenth Malaysia Plan focused on improving environmental quality by undertaking climate change mitigation, adapting to its impact, and increasing efforts to conserve ecological assets.

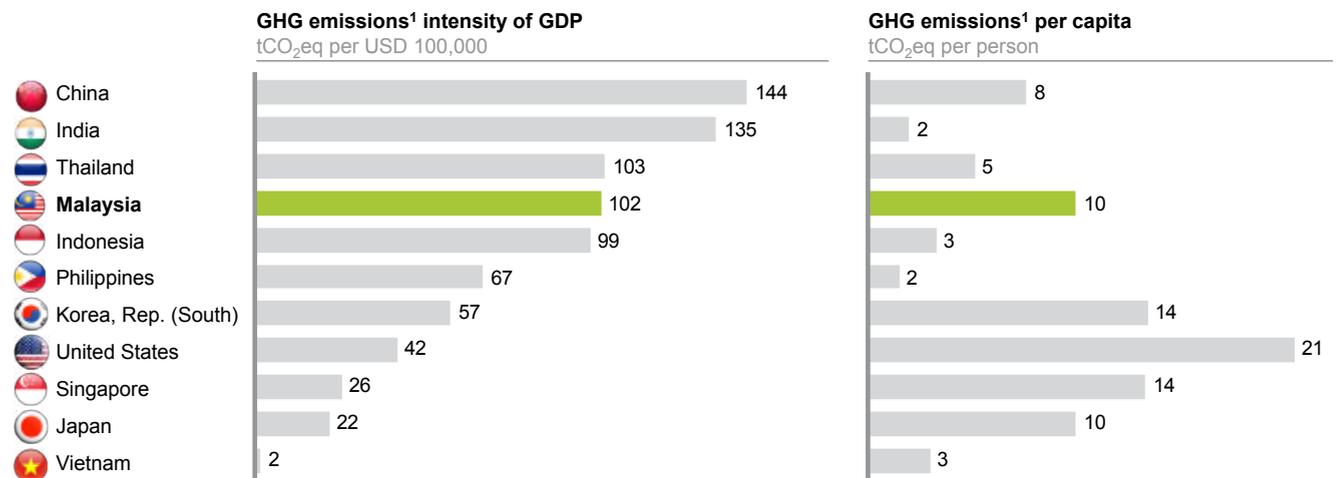
Climate mitigation: reducing Malaysia's carbon footprint

To achieve the voluntary target of reducing greenhouse gases (GHGs) emission intensity of GDP by up to 40% in the year 2020, compared to 2005 levels, various mitigation measures were undertaken during the Tenth Plan. Exhibit 6-1 shows Malaysia's GHGs emission intensity of GDP and per capita in 2011.

The Renewable Energy Act was enforced in 2011 to accelerate contribution from green energy such as solar photovoltaic (PV), biomass, biogas and mini hydro in Malaysia's electricity generation mix. The Act, which enabled the introduction of FiT for RE, has increased installed capacity between 2009 and 2014 fivefold to 243 MW. As of 2013, this initiative reduced GHGs emission by 432,000 tonnes of carbon dioxide equivalent (tCO₂eq). At the same time, energy demand management through the Minimum Energy Performance Standard (MEPS) for domestic appliances was gazetted in 2013. The implementation of the Sustainability Achieved via Energy Efficiency (SAVE) Programme (2011-2013) had reduced

Exhibit 6-1

Comparison of emissions intensity of GDP and per capita in 2011



¹ Excluding land use change and forestry

Source: World Resources Institute – Climate Analysis Indicator Tools (WRI CAIT) and the World Bank

energy consumption by 306.9 gigawatt hour (GWh), as shown in Exhibit 6-2. This has resulted in GHGs avoidance amounting to 208,705 tCO₂eq. The retrofitting of four government buildings had reduced electricity use ranging from 4% to 19% monthly, equivalent to RM7,000 to RM130,000 savings.

In the transportation sector, initiatives were undertaken to control emissions from motor vehicles along with higher use of energy efficient vehicles and biofuels. The Government gazetted EURO 4M standards in 2013 and enforce its use in RON97 in 2015. To support implementation of bio-diesel B5 Programme (5% bio-diesel blending in automotive fuel), 35 depots were constructed nationwide with in-line blending facilities. As of 2013, the implementation of B5 Programme had managed to reduce GHGs emission by 1.4 million tCO₂eq. By end of 2014, Malaysia had also introduced the bio-diesel B7 programme (7% bio-diesel blending) nationwide.

Waste management initiatives have also helped avoid and reduce GHGs emission. Conversion of empty palm oil fruit bunches to energy avoided

GHGs emission of 33.1 million tCO₂eq, while paper recycling activities reduced GHGs emission of four million tCO₂eq, as of 2013. The Reuse, Reduce, and Recycle (3R) programme was intensified during the Tenth Plan and household recycling rate rose from 5.0% in 2010 to 10.5% in 2012. To support waste-to-wealth initiatives, the National Biomass Strategy 2020 was launched in 2013 to assess how Malaysia will develop new industries by utilising agricultural biomass waste for high value products, including those for exports. An example is the use of palm oil biomass pellets for power generation and for other uses such as medium-density fibre boards.

Forest areas in the states of Pahang, Perak and Selangor were gazetted as Permanent Reserved Forest and this resulted in GHGs emission avoidance of 11.8 million tCO₂eq. The implementation of projects from the Green Technology Financing Scheme (GTFS) also resulted in GHGs emission reduction of nearly 93,000 tCO₂eq. In terms of meeting the Montreal Protocol commitment, Malaysia has achieved specific pre-2010 outcomes for reducing ozone-depleting substances and is on-track to comply with the post-2010 provisions of the Protocol by the

Exhibit 6-2

Energy savings from SAVE Programme over 2011 – 2013

Sustainability Achieved via Energy Efficiency (SAVE) Programme

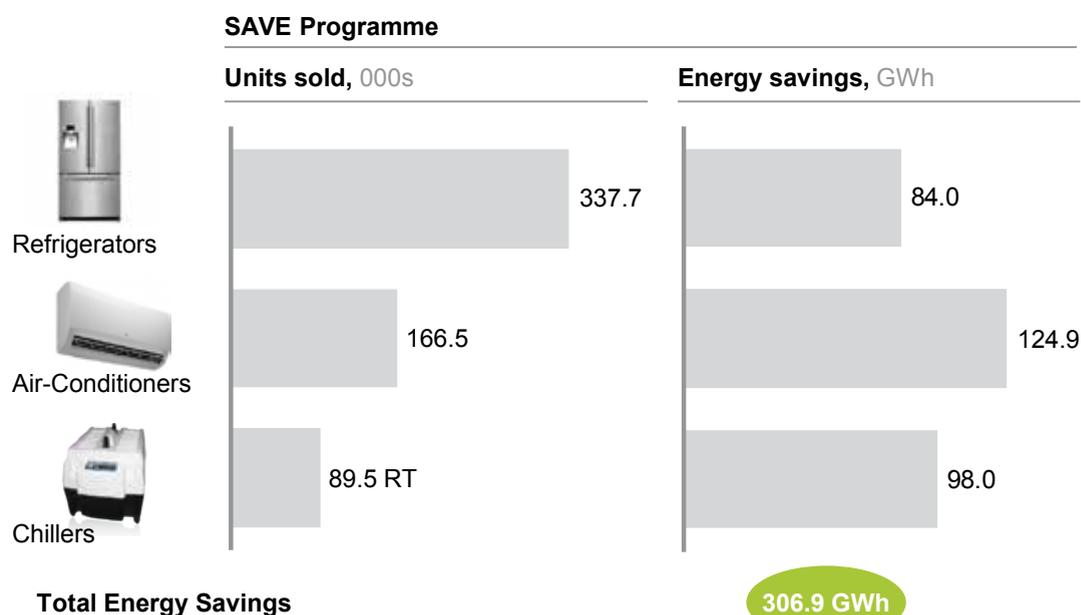
The SAVE programme was an initiative spearheaded by the Ministry of Energy, Green Technology and Water (KeTTHA) from 2011 to 2013

Introduced by the Government in collaboration with utility companies and participating appliance manufacturers

Rebates offered to qualified customers for

- Purchase of five star rated appliances, RM200 for refrigerators and RM100 for air-conditioners
- Replacement of old chillers (>10 years) to energy efficient chillers, RM200 per RT¹

Encouraged addition of new energy efficient products – 27 new brands of air-conditioners and refrigerators



¹ Refrigeration Tonnes

Source: Sustainable Energy Development Authority (SEDA), Economic Planning Unit (EPU)

end of 2015 with the phasing out of the hydrochlorofluorocarbon (HCFC) substances.

To support the development of local green products, 73 eco-label licences were issued to companies producing such products, which included electrical appliances, cleaning agent for household and personal care as well as products used for construction and steel industry. MyCarbon Reporting Programme, a voluntary reporting mechanism was launched in December 2013 to encourage and facilitate private entities to measure and report their GHGs emissions, from which

they could identify actions to reduce the emissions. As of January 2015, 26 companies volunteered to participate in the programme.

Climate adaptation: protecting the nation from the impact of climate change

In terms of adapting to the impact of climate change, focus was given to water resources and the agriculture sector. The implementation of 194 flood mitigation projects has shielded nearly one million people from floods. In addition, 34 hazard maps were developed to facilitate

Exhibit 6-3

Marine water quality of selected estuaries in Malaysia

Unit = Marine water quality index¹

	2011, index	2013, index	Change, %
Kuala Batang Rejang, Sarawak	70.8	86.8	15.9
Kuala Kedah, Kedah	65.4	84.2	18.8
Kuala Sungai Lukut, N. Sembilan	67.9	66.8	-1.2
Kuala Sungai Segget, Johor	67.5	61.5	-6.0
Kuala Sungai Setiu, Terengganu	49.8	61.1	11.3
Muara Sungai Inanam, Sabah	58.8	59.2	0.4
Kuala Sungai Kelantan, Kelantan	45.1	53.9	8.8
Kuala Sungai Langat (Jugra), Selangor	53.0	53.6	0.6
Kuala Sungai Gula, Perak	22.9	50.9	28.0
Kuala Sungai Juru, Pulau Pinang	49.6	49.7	0.1
Kuala Sungai Perlis, Perlis	54.7	48.8	-5.9
Kuala Sungai Kesang, Melaka	67.1	45.3	-21.8

¹ Index measures water quality on a 0-100 scale, with <50 classified as 'Poor', 50-79.99 as 'Moderate', 80-89.99 as 'Good' and >90 as 'Excellent'

Source: Department of Environment

disaster prevention and development planning in major high-risk areas. Coastal erosion prevention efforts were undertaken to rehabilitate and protect coastal areas from being further eroded. In this regard, 24.4 kilometres of coastal areas in Johor, Kelantan, Pulau Pinang, Sabah, Sarawak, Selangor, and Terengganu were rehabilitated. In addition, the National Water Resources Policy was launched in 2012 to provide clear directions and strategies for water resources management, including collaborative governance to ensure water security and continued sustainability.

In addition to building the resilience of the nation against flooding or prolonged drought, new strategies to improve food security were introduced. A new aerobic paddy variant, known as MR1A1, was launched in 2013 with improved resistance to heat and water scarcity, allowing plantation of this staple food in water-poor areas and during off season. The aerobic variant will help to increase rice production while adapting to climate change.

Enhancing conservation of the nation's ecological assets

Natural assets, particularly forests, are critical to ensure the sustainability of Malaysia's growth and to act as defenses against natural disasters. Reversing natural resource depletion is therefore critical. During the Plan period, forest cover has increased from 56.4% in 2010 to 61% in 2014. Various conservation initiatives were also undertaken, such as gazetting 23,264 hectares of forest as Permanent Reserved Forest under the Central Forest Spine initiative and the planting of 53 million trees. Along coastal areas, nearly 2,509 hectares of mangroves and other suitable species were planted to protect coastlines against wave actions and coastal winds, reduce salt water intrusion into rivers and provide breeding grounds for fish and other marine life. Additionally, 1,500 flowering tree species were documented and Crocker Range Park in Sabah was listed as Man and Biosphere Reserves by UNESCO in 2014.

At the same time, relevant policy and legislation were reviewed to strengthen conservation and enforcement efforts. The National Policy on Biological Diversity, 1998 was revised to serve dual purposes - as

the principal policy document to guide biodiversity management and to align with internationally accepted Aichi Biodiversity Targets. Management plans were developed for Pulau Sibul-Pulau Tinggi Marine Park, Johor; Pulau Tioman Marine Park, Pahang; and Pulau Redang Marine Park, Terengganu to enhance and improve management of these parks and their resources. Exhibit 6.3 shows marine water quality for selected estuaries in Malaysia. The National Conservation Trust Fund for Natural Resources was established in 2014 to support conservation efforts. Besides funding from the Federal government, contribution from other parties, such as state governments, private sector, individuals, as well as organisations from within and outside the country is being encouraged. Concurrently, the 1Malaysia Biodiversity Enforcement Operation Network, involving multiple enforcement agencies, was established so that concerted and coordinated efforts to combat poaching and illegal wildlife trade effectively were undertaken.

* * *

While the Tenth Plan laid the foundation for sustainable economic growth, increased frequency and intensity of climate related disasters have had an impact on the livelihood and safety of the people. This highlights the need for strengthening disaster risk management, addressing gaps in how it is assessed and prepared for, and involving communities and the private sector. Insufficient consideration of social and environmental costs in certain socio-economic development projects also undermined the natural asset base and caused ecological degradation, ultimately creating a detrimental impact on people and costs that will be borne by the Government. Stronger protection and conservation of terrestrial and marine areas, environmentally sensitive ecosystems and water resources should therefore be intensified to limit and avoid such damage. Regulatory framework that lay the foundations for transformational shifts such as RE investments have been introduced, but new instruments and stricter enforcement is necessary to boost these initiatives. Malaysia is a fast growing economy, with citizen lifestyles, demands and expectations changing rapidly. As demand drives supply, the demand side needs to be addressed systematically as well.

Summary of focus areas

Eleventh Malaysia Plan, 2016-2020

Strengthening resilience against climate change and natural disasters

- Strengthening disaster risk management (DRM)
- Improving flood mitigation
- Enhancing climate change adaptation

Strengthening the enabling environment for green growth

- Strengthening governance to drive transformation
- Enhancing awareness to create shared responsibility
- Establishing sustainable financing mechanisms

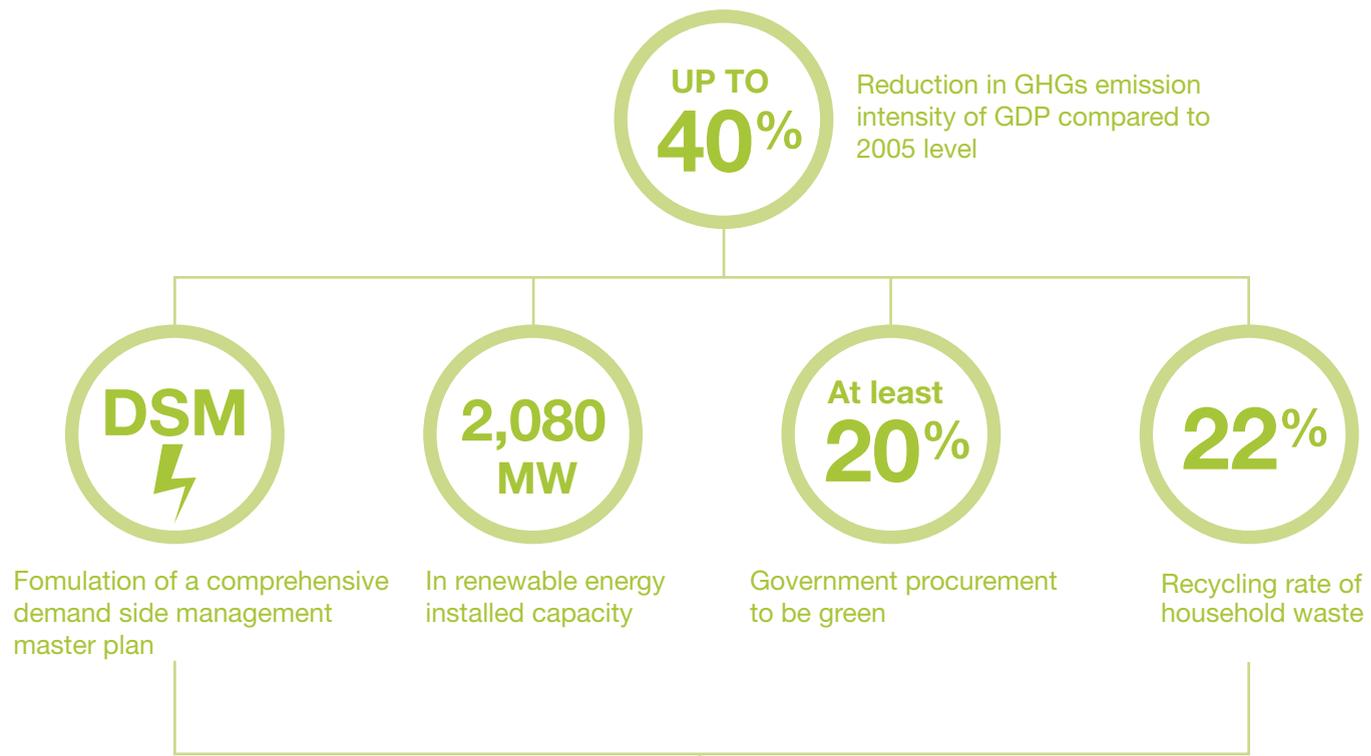
Conserving natural resources for present and future generations

- Ensuring natural resources security
- Enhancing alternative livelihood for indigenous and local communities

Adopting the sustainable consumption and production concept

- Creating green markets
- Increasing share of renewables in energy mix
- Enhancing demand side management (DSM)
- Encouraging low carbon mobility
- Managing waste holistically





Adopting the sustainable consumption and production concept



Strengthening resilience against climate change and natural disasters



National crisis and disaster management centre to enhance capacity for disaster preparedness and response



People protected through flood mitigation projects

Conserving natural resources for present and future generations



Terrestrial and inland water areas gazetted as protected areas



Coastal and marine areas gazetted as protected areas

Moving forward Eleventh Malaysia Plan, 2016-2020

Green growth will be the game changer in bringing Malaysia towards a sustainable socio-economic development path, where improvements in quality of life are in harmony with the sustainability of the environment and natural resources.

Building upon the initiatives launched in the Tenth Plan to address issues in environmental protection, climate change and biodiversity, the Eleventh Plan continues to strengthen the nation's resilience to natural disasters, and more fundamentally, charts a paradigm shift towards green growth. For the Eleventh Plan, two principal outcomes have been set. Firstly, to reduce GHGs emission intensity of GDP by up to 40% compared to 2005 levels by year 2020, in line with the voluntary target announced by the Prime Minister at the 15th Conference of the Parties to the United Nations Framework Convention on Climate Change in 2009, and secondly, to conserve at least 17% of terrestrial and inland water areas, as well as 10% of coastal and marine areas as protected areas in line with the Aichi Biodiversity Targets.

To achieve these outcomes, the Government will introduce a transformative green growth strategy framework. This framework reinforces the Government's commitment to address the impact of climate change and manage natural resources in a comprehensive and sustainable manner. An elaboration of green growth as a game changer for Malaysia is shown in the following page. Four focus areas under this framework will lead to significant changes in Malaysia's approach to sustainable and resilient development. The Government will strengthen the supportive environment for this transformation to take place. Development in environmentally

sensitive areas and dependency on stressed natural resources will be reduced significantly. A comprehensive disaster risk management approach will be put in place to respond to the increased frequency and intensity of climate-related disasters, with an important reorientation from a cost to an investment for the future. In addition, flood mitigation approaches with multifunctional purposes will be explored to attract investments in value-generating economic activities. Management of waste will shift towards a comprehensive reuse, reduce, and recycle (3R) approach that will reduce development of new landfills. In the area of energy security, there will be a shift from a focus on supply-side solutions towards a stronger balance of both supply-side and demand side management measures.

To achieve these, the Government will focus on four key areas in pursuing green growth for sustainability and resilience as follows:

- Focus area A: Strengthening the enabling environment for green growth
- Focus area B: Adopting the sustainable consumption and production concept
- Focus area C: Conserving natural resources for present and future generations
- Focus area D: Strengthening resilience against climate change and natural disasters

Game Changer Embarking on green growth

“Growth that is **efficient** in its use of natural resources, **clean** in that it minimises pollution and environmental impacts, and **resilient** in that it accounts for natural hazards and the role of environmental management and natural capital in preventing physical disasters.”
(World Bank)

Efficient + Clean + Resilient

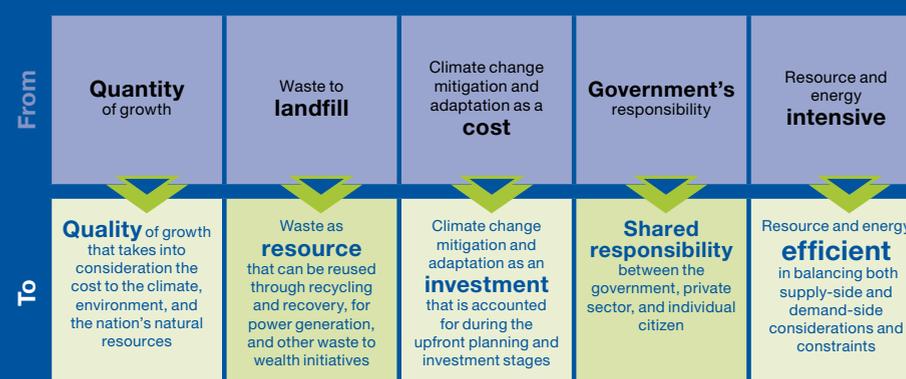
Why is green growth important for Malaysia?

Malaysia, like many countries across the world, is grappling with the challenge of balancing a growing population and demand, with a natural environment that is increasingly under stress. In a global context of increasing intensity and frequency of extreme weather events, adopting green growth has now become an imperative for Malaysia. It represents Malaysia’s commitment to renew and, indeed, increase its commitment to the environment and long-term sustainability.

What will success look like?

A successful green growth trajectory will ensure:

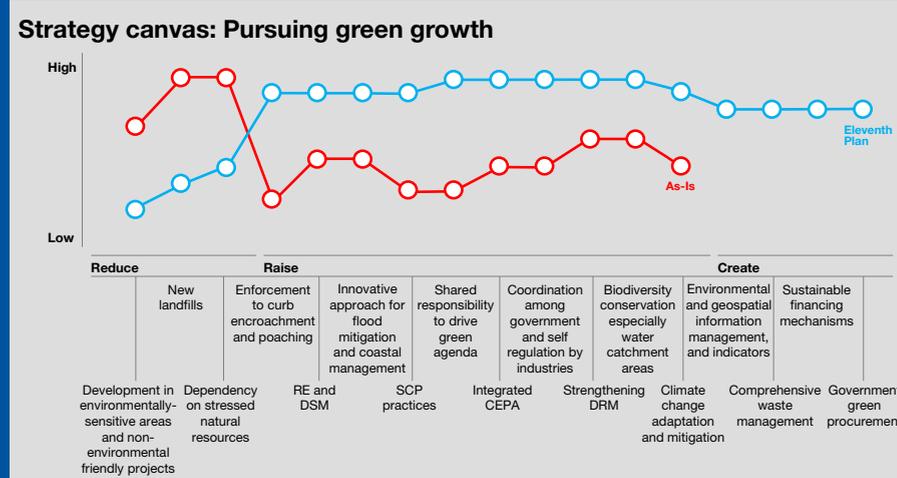
- Detrimental impact of socio-economic activity on environmental systems is reduced;
- Natural capital, including forested areas, biodiversity, and water resources as well as its ecosystems, is valued and sustainably managed;
- Development gains are protected, thus ensuring wellbeing of people across generations; and
- Energy use is efficient and renewable energy is widely used.



How will this be achieved?

Achieving these aspirations requires a fundamental shift away from a ‘grow first, clean up later’ development model towards one that views resilient, low-carbon, resource-efficient, and socially inclusive development as an upfront investment that will yield future gains over multiple generations to come. This requires fundamental changes across every major dimension including how policy is determined, how institutions are regulated, how responsibilities are shared, and how people value their environment.

The strategy canvas highlights areas that should be eliminated, reduced, raised or created for this game changer.





Focus area A

Strengthening the enabling environment for green growth

Green growth requires fundamental transformations – in regulations and guidelines applicable to businesses, in guiding consumers to make household purchasing decisions and in managing the nation’s energy and natural resources. Many of these changes are innovative, either involving new green technologies or technologies relatively novel to the Malaysian context. For this change to take place smoothly, the Government will provide the relevant policy and institutional framework for green growth. Creating long-term commitment from all stakeholders, businesses, civil society, and most importantly the people, is critical as this transition and associated results will take time. Concurrently, measures and instruments to build capacity, monitor, and evaluate programmes to support green growth efforts will be put in place. Three strategies will be undertaken to establish the enabling environment for green growth:

- **Strategy A1: Strengthening governance to drive transformation** by enhancing regulatory and institutional framework, coordination, capacity as well as monitoring and evaluation mechanisms;
- **Strategy A2: Enhancing awareness to create shared responsibility** through comprehensive communication, education, and awareness programmes and platforms for knowledge sharing; and
- **Strategy A3: Establishing sustainable financing mechanisms** by expanding existing and identifying new economic instruments.

Strategy A1 Strengthening governance to drive transformation

The policy, regulatory and institutional framework will be strengthened to encourage industries to shift to greening their products and services by adopting green technologies as well as accelerating innovation and development of indigenous green technology.

Formulating and strengthening relevant policies and legislations

Existing regulations such as the Environmental Quality Act, 1974; Solid Waste and Public Cleansing Management Act, 2007; National Policy on Climate Change, 2009; and biodiversity-related policies will be revised and strengthened to further encourage and support sustainable socio-economic development. New policy framework, including the sustainable consumption and production (SCP) blueprint, sustainable development blueprint, national mitigation plan, and national policy on geospatial information management will be formulated. Legislation on disaster risk management and geospatial information management will also be formulated to regulate and provide an enabling environment for green growth.

Strengthening institutional framework

The institutional framework will be strengthened with the establishment of a national crisis and disaster management centre, national climate change centre, national committee on sustainable waste management, and national chemical management board through the restructuring and deployment of talent from existing agencies. Coordination and collaboration among relevant ministries and agencies, particularly at the federal and state levels, will also be strengthened to achieve green growth and better resource management.

Enhancing capacity and capability

The transition to green growth will be supported by developing the required capacities, capabilities, and skills at all levels. This will be undertaken by relevant ministries and agencies at the federal, state and local levels as well as the private sector and academia. Initiatives will include identifying new competencies and skills needed for the development of areas such as RE, demand side management, green buildings, waste to energy, bioengineering, and biosafety; introducing and scaling up training programmes and enhancing their effectiveness through certification by relevant authorities; and intensifying research and development and innovation of indigenous green technology to support green growth, particularly in RE, construction, and transport.

Improving monitoring and evaluation mechanisms

Comprehensive monitoring and evaluation mechanisms will be established to track and assess the effectiveness of green growth initiatives, as well as to facilitate planning and decision-making process, so as to enable continuous improvements in undertaken efforts. In this regard, a one-stop centre will be established to provide access and linkage to all data in the nation, including data that are housed in relevant agencies. This will facilitate data searching and ensure accessibility. In view of this, the Department of Statistics Malaysia will take the lead to establish an appropriate mechanism and coordinate with relevant ministries and agencies. Simultaneously, new indicators such as the green economy indicators, resource indicators and inventory, and SCP indicators will be developed to complement existing ones, making them more meaningful in reflecting the current situation.

Strategy A2 Enhancing awareness to create shared responsibility

Communication, education and public awareness (CEPA) programmes engaging all levels of society will be enhanced to increase awareness about the environment, climate change adaptation and mitigation, conserving natural resources, and the role of green growth in raising productivity. This will instil a sense of shared responsibility among all stakeholders including federal and state governments, the private sector, academia, NGOs, and the *rakyat* towards comprehensive and coordinated efforts for better quality of life. Better knowledge and awareness will ultimately lead to changes in mindset, behaviour and habits.

Comprehensive communication and awareness programmes

The Government will improve the effectiveness of CEPA programmes by coordinating and integrating public awareness messages communicated by different public sector agencies and on different themes – including demand side management, transport, energy consumption, recycling, biodiversity conservation, climate change, disaster risk management, and environmental pollution. Better

coordination will increase understanding, visibility and retention of such messages, ensuring the right messages are communicated to the correct target audiences. Besides Government-led initiatives, involvement of the private sector, NGOs, academia, and the *rakyat* in CEPA programmes will also be encouraged.

Platform for knowledge sharing and collaboration

Platforms will be created for sharing of best practices and collaboration on green growth related projects. This will involve opportunities for public sector planning agencies and implementers to share best practices, knowledge, and expertise. Such collaboration will also extend beyond the public sector to include all stakeholders, particularly the private sector, NGOs as well as indigenous and local communities involved in conservation, innovation and disaster risk management.

Strategy A3 Establishing sustainable financing mechanisms

Negative externalities of socio-economic development will be taken into consideration when planning, evaluating, and implementing public and private sector development projects, to achieve the double dividend of higher economic growth and lower environmental impact.

Expanding existing economic instruments

Implementation of existing mechanisms such as Polluter Pays Principle and Payment for Ecosystem Services will be expanded to support funding needed to address environmental pollution and conserve biodiversity and its ecosystem.

Funding green growth through new economic instruments

Economic instruments such as green tax, carbon tax, and REDD+ (reducing emissions from deforestation and forest degradation) will be utilised where appropriate to develop green financing systems. This is important to support the implementation of green initiatives and expand conservation efforts. The Government will continue to evaluate the use of such mechanisms.



Focus area B

Adopting the sustainable consumption and production concept

Sustainability refers to the efficient use of limited resources like water, land, energy and other raw materials, and holistic management of residues - solid waste, effluents or emitted gases. The Government will take the lead in establishing the sustainable consumption and production (SCP) approach in prominent sectors in Malaysia including industry, power generation, infrastructure, and transportation. This requires establishing relevant regulatory framework – standards, certifications and guidelines. Details on the SCP framework are highlighted in Box 6-1, and the following five strategies will be undertaken:

- **Strategy B1: Creating green markets** through Government green procurement, adoption of green buildings criteria and strengthening green certification;
- **Strategy B2: Increasing share of renewables in energy mix** by exploring new RE sources, enhancing capacity of RE personnel and implementing net energy metering;
- **Strategy B3: Enhancing demand side management (DSM)** by formulating a comprehensive DSM master plan and expanding DSM measures;
- **Strategy B4: Encouraging low carbon mobility** through utilisation of energy efficient vehicles and public transportation; and
- **Strategy B5: Managing waste holistically** through better coordination, encouraging 3R and using waste as a resource for other industries.

Strategy B1

Creating green markets

The Government will act as a catalyst to create green markets in products and services including buildings. The Ministry of Energy, Green Technology and Water (Kementerian Tenaga, Teknologi Hijau dan Air, KeTTHA) supported by relevant ministries and agencies will promote the development of a domestic market for green products and services. Measures to be undertaken include implementing Government green procurement, promoting the development of green buildings and greening of industries to spur green growth. A Government driven push will encourage local industries, especially small and medium enterprises, to develop green products and services, eventually leading to further greening of the supply chain.

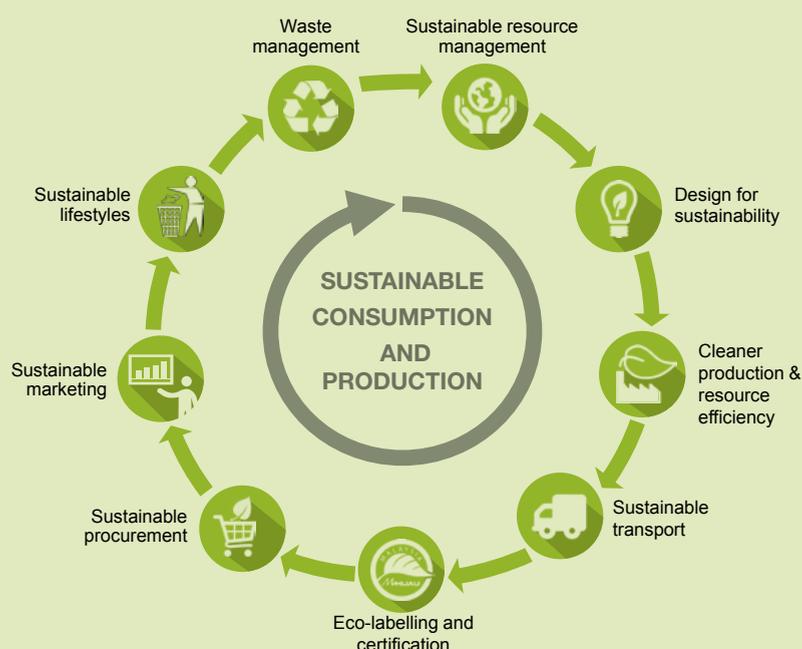
Implementing Government green procurement

Government green procurement (GGP) will be made mandatory for all government ministries and agencies. GGP will create the demand for green products and services, encouraging industries to raise the standard and quality of their products to meet green requirements. GGP will complement the existing eco-labelling scheme in the country for green products certification. By 2020, it is targeted that at least 20% of government procurement will be green. Concurrently, the private sector will also be encouraged to emulate Government efforts in green procurement.

Encouraging widespread adoption of green buildings criteria

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 also be encouraged to obtain green certification for private buildings such as GreenPASS and the

Box 6-1

Sustainable consumption and production**Background**

Sustainable consumption and production (SCP) is a concept that promotes economic growth without compromising the environment or jeopardising the needs of future generations. This means efficient use of natural resources, minimising use of hazardous substances and reducing pollution and waste over the life cycle of products and services. Through this life cycle approach, SCP invites people to consider the environmental impact and ensure resource efficiency at both the production and consumption phases.

SCP in Malaysia

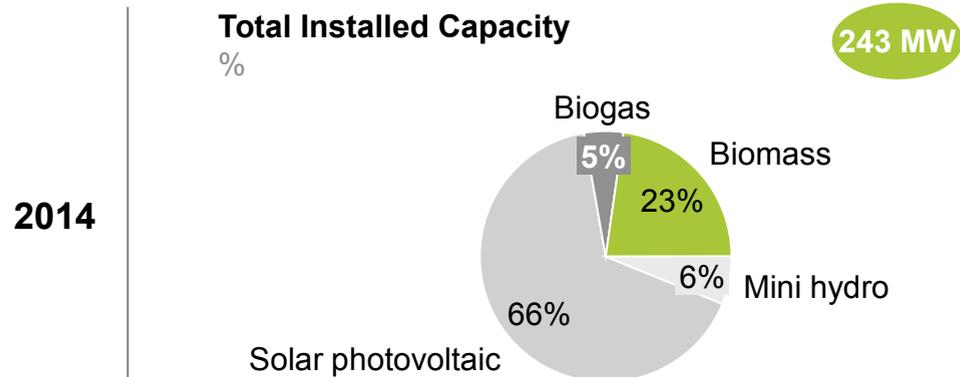
SCP is one of the approaches to achieve green growth. Malaysia is undertaking the SCP project under the SWITCH-Asia Programme Policy Support Component for a period of four years, from February 2012 until January 2016. The project coordinates the goals of

economic growth, environmental protection and social inclusiveness into an integrated development concept. The main output is a national SCP blueprint, outlining measures and areas of priority to achieve green growth.

Initiatives undertaken in Malaysia

- 1. Government green procurement (GGP):** Government purchases of environmentally friendly products and services to spur demand for green industries. Malaysia has developed GGP guidelines and as a pilot project that started in July 2013, five selected ministries have procured green products and services worth RM352 million as of April 2015.
- 2. SCP in education:** Integrating SCP in the formal syllabi to instil sustainable behaviour among students. The SCP curriculum was drafted in collaboration with the Ministry of Education, containing training along eight themes, including energy, water, waste, food consumption and production, transport and sustainable buildings.
- 3. SCP portal (www.scpmalaysia.gov.my):** Developed to enhance awareness, knowledge and capacity of all levels towards green growth.
- 4. Development of SCP indicators:** Indicators to assess the impact of SCP on the economy, society and the environment:
 - Greenhouse gas emissions per GDP (tCO₂eq per year per GDP);
 - Proportion of citizens living under the poverty line (%);
 - Domestic Extraction (DE) per GDP;
 - Domestic Materials Consumption (DMC) per GDP;
 - Products in the Green Directory (number);
 - Resource consumption per capita - energy, water and materials;
 - Waste generation (tonnes solid waste per year);
 - Energy consumption per square metre per capita and total energy consumption;
 - Share of biofuels in transport fuel mix (%);
 - Expenditure on government green procurement (RM million); and
 - Eco-label awards according to the National Eco-Label Programme (SIRIM Eco-labelling Scheme) (number).

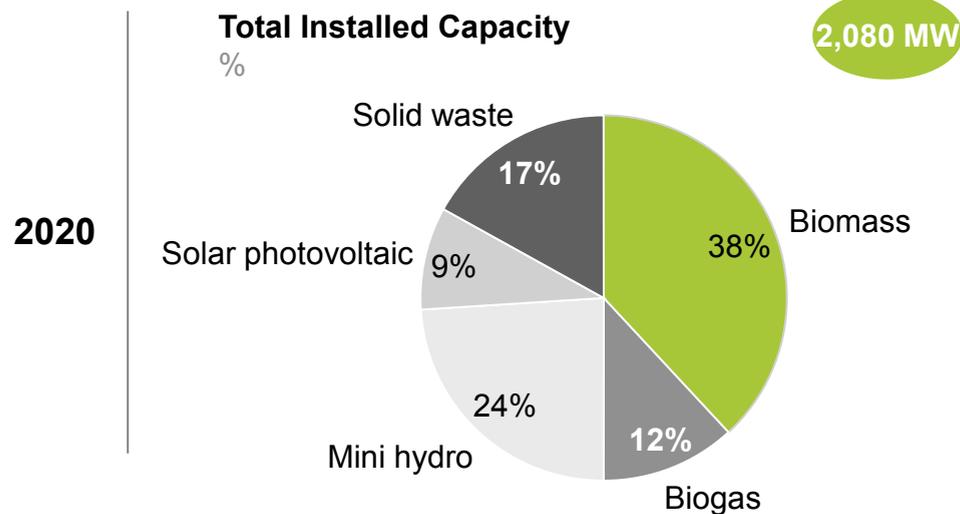
Exhibit 6-4

Renewable energy installed capacity by sources

Green Building Index. Apart from ensuring efficient use of resources, particularly energy and water use, green buildings will also reduce GHGs emission.

Strengthening green certification

Green rating systems and standards, aligned with international best practices, will be introduced to promote the greening of industries. Simultaneously, the MyHijau Mark programme, a uniform labelling established by the Government for green products and services, will be expanded for key product areas such as household products, electronic and electrical appliances. 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.

**Strategy B2****Increasing share of renewables in energy mix**

RE capacity is expected to reach 2,080MW by 2020, contributing to 7.8% of total installed capacity in Peninsular Malaysia and Sabah. In the Eleventh Plan, focus will be on promoting new RE sources, enhancing capacity of RE personnel and implementing net energy metering to further intensify the development of RE. Current and forecasted RE installed capacity is shown in Exhibit 6-4.

Exploring new RE sources and enhancing capacity of RE personnel

Studies will be conducted to identify new RE sources to diversify the generation mix. In the Eleventh Plan, new RE sources such as wind, geothermal and ocean energy will be explored. Currently, the national wind mapping exercise is underway and is expected to be completed by 2016. The exercise will further enable a study of the feasibility of wind energy to be developed. Geothermal potential will also be further explored with the discovery of a 12 square kilometres

Source: Sustainable Energy Development Authority and Economic Planning Unit

geothermal field in Apas Kiri, Sabah. Viability of ocean energy will be explored to take advantage of Malaysia's geographical position of being surrounded by sea.

The RE industry will diversify Malaysia's energy mix in a more sustainable manner, create employment, and enhancing skills. The industry is expected to create about 15,300 jobs, comprising of skilled and semi-skilled jobs. The Government will provide training to 1,740 personnel through the Sustainable Energy Development Authority (SEDA), creating experts in the field of biomass, biogas, mini hydro and solar PV. The participants will be employees from the industry such as RE project developers, financial institutions and potential service providers. In addition, the private sector will be encouraged to conduct training and increase the number of RE experts.

Implementing net energy metering

To complement the current FiT mechanism in encouraging the take-off of RE, a new instrument termed as net energy metering (NEM) will be implemented in the Eleventh Plan. The objective of NEM is to promote and encourage more RE generation, by prioritising internal consumption before any excess power generated is fed to the grid. NEM is anticipated to encourage manufacturing facilities and the public to generate power without any restriction on their generation capacity. This will further assist the Government's effort to increase the contribution of RE in the generation mix. NEM will be executed by KeTTHA and utility companies, and regulated by Suruhanjaya Tenaga based on amended legal provisions.

Strategy B3

Enhancing demand side management

Demand side management (DSM) marks an important paradigm shift for Malaysia towards efficient management of energy resources. This initiative will give due emphasis to the demand side for a balanced management of the entire energy spectrum. In addition, DSM provides solutions to problems such as load management, energy efficiency, and strategic conservation of resources. The main goal of DSM is to encourage consumers to use less energy during peak hours and to move the time of energy use to off-peak hours. This

strategy will broaden and extend the successful outcomes from early DSM initiatives during the Tenth Plan such as MEPS and the SAVE programme.

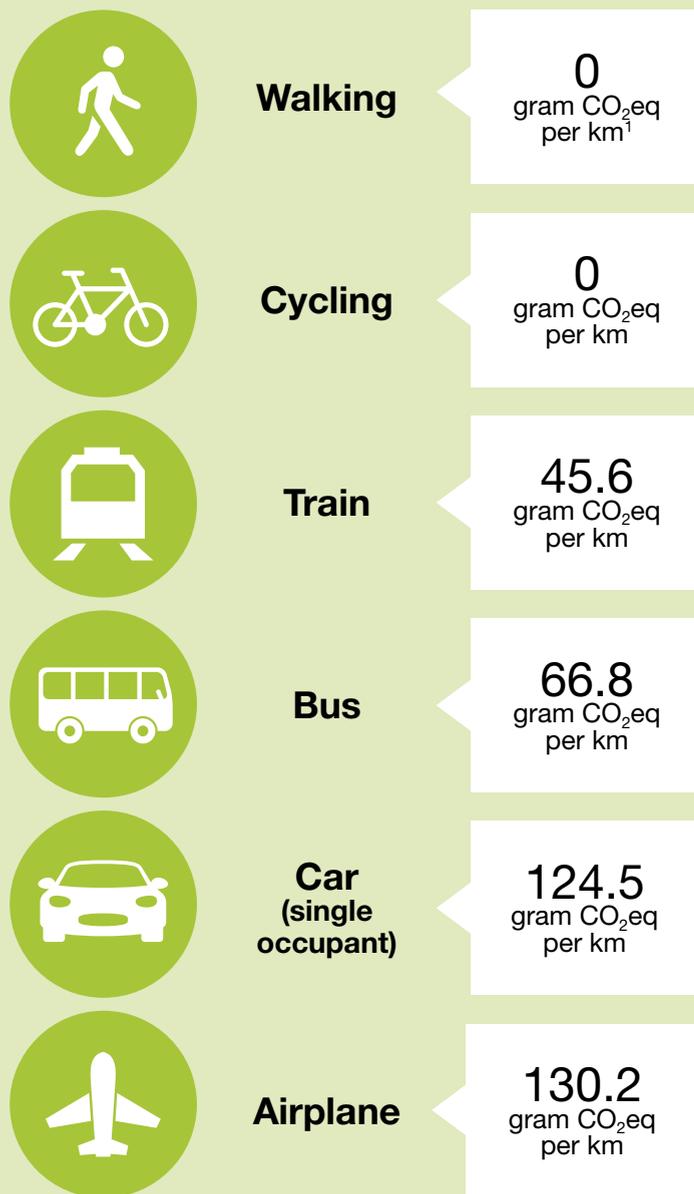
Formulating a comprehensive demand side management master plan

A comprehensive long-term DSM master plan is required for prudent energy usage. The Economic Planning Unit, Prime Minister's Department (EPU) will initiate a study on DSM which covers the entire spectrum of the energy sector. DSM is a vital tool to reduce peak electricity demand impacting the overall load on an electricity network. This will have beneficial effects including mitigating electrical system emergencies and increasing system reliability. It will also result in less dependence on expensive imports of fuel, reducing peak power demand and minimising harmful emissions to the environment. DSM will be able to maximise the return on utilisation of existing and new electricity supply assets. The flattening of the demand curve will positively constrain demand growth and result in deferment of construction of new electricity supply infrastructure. The scope of the new DSM master plan will include the electric and thermal energy, including usage in the transport sector.

Expanding demand side management measures for buildings, industries and households

During the Eleventh Plan, measures will be taken to identify potential improvements and appropriate approaches to ensure efficient use of energy in buildings, industries and households. These measures include increasing competencies of energy service providers, especially Registered Electrical Energy Managers, and promoting the implementation of Energy Performance Contracting for government buildings. User awareness will be enhanced on energy labelling and the availability of standards such as ISO 50001 for buildings and MEPS for appliances will be promoted. Other specific measures will include introduction of Enhanced Time of Use (EToU) tariff scheme and gradual abolishment of the Special Industrial Tariff for energy intensive industries. Infrastructure related initiatives such as implementation of smart grids and highly efficient co-generation technologies for combined heat and power system will be promoted.

Box 6-2

Comparison of carbon footprint by modes

¹ Grams of carbon dioxide equivalent per kilometre
Source: European Energy Agency

Strategy B4 Encouraging low carbon mobility

Low carbon mobility emphasises the usage of public transport, which can have a carbon footprint of nearly half that of a single occupant car as shown in Box 6-2. By encouraging the use of public transport, dual objectives of reducing congestion and minimising environmental pollution can be achieved. There are several mechanisms to reduce energy consumption and emissions of harmful gases including black smoke of the transport sector. These include using energy efficient vehicles (EEVs), increasing the use of biofuels and compressed natural gas (CNG), placing higher fuel standards to reduce air pollution and increasing the use of public transportation as the preferred mode by providing a seamless and reliable modal mix of transportation. This will eventually reduce over-dependency on private vehicles.

Encouraging adoption of energy efficient vehicles

The use of EEVs is in line with the objectives of the National Automotive Policy (NAP), 2014. EEVs can contribute to minimising the impact on the environment in terms of reducing dependency on fossil fuel and fuel wastage as well as emission of harmful gases and black smoke. The Government will work with relevant private agencies to increase adoption of EEVs, especially for public transport like buses and taxis.

Reducing environmental impact of transport sector

Other measures will be undertaken with relevant public transport authorities to reduce the environmental impact of the sector. Public transport investments in cities – including Mass Rapid Transit (MRT) systems in Greater Kuala Lumpur/Klang Valley (GKL/KV) and bus systems in other state capitals – will be made in line with declared targets to achieve 40% public transport modal share in GKL/KV and 20% in other cities. The Government will also work towards increasing bio-diesel blending requirements of up to 15% in automotive fuel and implementing the EURO 5 emission standards during the Eleventh Plan. The use of CNG will also be promoted.

Strategy B5 Managing waste holistically

All seven types of waste - solid, agricultural, construction, radioactive, mining, sewage, and scheduled waste - will be managed in a holistic manner based on a life cycle approach. This approach extends beyond merely disposing the waste, rather it aims to increase recycling and recovery rate of waste and improve management of landfills to reduce the amount of waste and pollution. The National Solid Waste Management Department and the Solid Waste Management and Public Cleansing Corporation (SWCorp) will spearhead these initiatives, together with other relevant agencies such as the Atomic Energy Licensing Board, Department of Agriculture, DOE, Minerals and Geoscience Department, and Suruhanjaya Perkhidmatan Air Negara (SPAN).

Increasing coordination on waste management

A waste management platform that meets regularly to coordinate matters on sustainable and holistic waste management will be established. Waste management is currently implemented independently by relevant agencies such as the DOE, SPAN and SWCorp as per their respective jurisdictions. This creates a gap in waste management, which will be addressed effectively through the establishment of a mechanism to provide oversight and perform tasks in a more integrated and coordinated manner.

Encouraging reuse, reduce and recycle (3R)

The Government has set a goal of 22% household recycling rate by 2020. Waste reuse, reduction, and recycling is a long-term goal. Achieving it involves changing mindsets and behaviour while phasing in systems that enable better management of waste. Investments in 3R awareness and education programmes therefore need to continue during the Eleventh Plan to shape better consumption and waste disposal behaviour. Concurrently, implementation of waste separation at source can help achieve recycling outcomes. Waste separation at source for households will be implemented in selected states starting September 2015 and rolled out to other states subsequently during the Eleventh Plan.

Increasing investment in waste as a resource

Using waste as a resource gives it economic value, thus diverting it away from landfills towards more productive use. Apart from addressing the issues of waste disposals and landfills, investing in waste recycling and recovery will also reduce dependency of industries on natural resources, as waste becomes a valuable resource – either converted to energy (e.g. biomass and food waste for power generation) or used as an input for other products. These initiatives will be private sector driven to ensure long-term financial viability of such projects and so that industries see the value of waste as a source of energy or inputs for their processes.



Focus area C

Conserving natural resources for present and future generations

Malaysia is blessed with rich biodiversity – forest, marine, and coastal areas with unique ecosystems, flora and fauna. These areas are invaluable buffers against climate change and natural disasters and are home to important biological assets. Conserving Malaysia's biodiversity is a commitment the Government will make to ensure future generations have the same access to these resources as the population today. While Malaysia has large forested areas, some have suffered environmental degradation in the recent past, highlighting the need to further intensify conservation efforts. Increasing enforcement against illegal deforestation and poaching and undertaking reforestation in affected areas will help towards this objective. Endangered plant and wildlife species also need to be specifically focused on to increase their numbers. To make this work, the Eleventh Plan will lay the regulatory framework on access to biological resources and benefits sharing (ABS). Communities that live on the fringes of protected areas and depend on natural resources will be trained to take on new opportunities to improve their quality of life. In order to enhance the conservation of biodiversity, two strategies will be undertaken, namely:

- **Strategy C1: Ensuring natural resources security** by conserving terrestrial and marine areas as well as endangered plant and wildlife species, managing natural resources and strengthening biosafety; and
- **Strategy C2: Enhancing alternative livelihood for indigenous and local communities** by involving them in biodiversity conservation and empowering them for alternative economic opportunities.

Strategy C1

Ensuring natural resources security

Malaysia's natural assets such as forest and marine areas, plants and wildlife, as well as minerals will be managed sustainably. Where threat of deforestation or extinction exists, special focus will be given to restock these assets. Legal framework will provide institutional support to conservation efforts and promote rational use of biological resources.

Conserving terrestrial and marine areas

Conserving Malaysia's immense natural wealth is the first step to ensure the sustainability of the biodiversity present in the country. Important biodiversity areas will be gazetted as terrestrial and marine protected areas. Reforestation and forest enrichment efforts will be undertaken in affected areas to improve degraded forests. Measures to reduce illegal deforestation activities and forest degradation will be taken through stricter enforcement. Similarly, relevant measures and strict enforcement will help improve the quality of marine parks as well as water quality throughout Malaysia. Environmental forensics will be implemented to support site investigation, site remediation, and strengthen legal enforcement and resource management.

Conserving endangered plant and wildlife species

Biodiversity conservation efforts will be increased by protecting, rehabilitating, breeding and restocking selected endangered plant and wildlife species such as the tiger, sambar deer, elephant, gaur, *keruing layang*, *asam batu* and slipper orchid in its natural habitat (*in-situ*) and outside its natural habitat (*ex-situ*). New methods and technologies, including advanced reproductive technology, will be used to increase the population of endangered species. 1Malaysia Biodiversity Enforcement Operation Network initiatives to curb encroachment into protected areas and poaching of wildlife will be intensified. Examples of Malaysia's endangered species are shown in Box 6-3.

Box 6-3

Selected endangered species of flora and fauna in Malaysia

**Malayan Tiger***Panthera tigris jacksoni*

Estimated number:

250 – 350**Sambar Deer***Rusa unicolor*

Estimated number:

700 – 1000**Keruing layang***Dipterocarpus sarawakensis*

Estimated number:

63 trees including saplings*Keruing layang* is found only in Terengganu and Sarawak.**Asam batu***Begonia herveyana* (Begoniaceae)Estimated number: **300** seedlings and saplingsThis species of *asam batu* is found only in Johor and Malacca. Quality of its habitat is rapidly declining.

All of these species are endangered as their population is decreasing due to habitat loss, habitat fragmentation and poaching. As key umbrella species in Malaysia, protecting them means protecting other species as well.

Malayan Elephant*Elephas maximus*

Estimated number:

1,220 – 1,680**Gaur***Bos gaurus*

Estimated number:

270 – 330**Slipper orchid***Paphiopedilum callosum*
var. *sublaeve*

Estimated number:

As of 2014, about **200** individuals are thought to be present.

This variety is endemic to Kedah. The species is severely threatened by habitat decline and harvesting pressures.

Managing natural resources

Continuous research to identify the potential and value of natural resources, including minerals, will be undertaken. This will create a comprehensive natural resource inventory database with estimations of national natural resource availability to facilitate better decision-making and determine appropriate actions needed to conserve and use natural resources in a sustainable manner. A holistic regulatory framework to curb the misappropriation of natural resources will be formulated. The Government will finalise the Bill of Access to Biological Resources and Benefits Sharing (ABS Bill) to regulate bioprospecting activities in Malaysia, ensuring that benefits are shared in a fair and equitable manner. The law will establish a transparent framework

allowing users to negotiate mutually agreed terms with providers prior to accessing biological resources. Details on the ABS Bill are in Box 6-4.

Strengthening biosafety

The Department of Biosafety, Ministry of Natural Resources and Environment (NRE) will be strengthened to increase its capacity and capability in assessing and evaluating harmful effects from emerging and new technology. This is in view of increasing investment and growth in biotechnology, particularly synthetic biology, bioengineering and genetic engineering, including genetically modified organisms (GMOs), which require more sophisticated approaches in biological resource management. Definitions of key terms are shown in Box 6-4.

Box 6-4

Bill of Access to Biological Resources and Benefits Sharing

- Accessing biological resources refers to taking these resources from their natural habitat where they are found or grown, for the purposes of research and development on any genetic resources derivative or biochemical compounds contained in these resources;
- The Ministry of Natural Resources and Environment is finalising the Bill of Access to Biological Resources and Benefits Sharing (ABS Bill) after robust consultation with various stakeholders such as federal and state agencies, NGOs, indigenous and local communities and the private sector;
- The objective of the Bill is to regulate bioprospecting activities in Malaysia and ensure that benefits are shared in a fair and equitable manner; and
- The Bill will provide a transparent framework allowing users to negotiate mutually agreed terms with providers prior to accessing biological resources.

Biotechnology: key definitions

Source: Ministry of Natural Resources and Environment

- **Synthetic biology** refers to the design and construction of new biological parts, devices and systems that do not exist in the natural world, or the re-design and fabrication of existing biological systems for useful purposes;
- **Bioengineering or biological engineering** is the use of artificial tissues, organs, or organ components to replace damaged or absent body parts; and
- **Genetic engineering** is the development and application of scientific methods, procedures, and technologies to directly manipulate genetic material and alter the hereditary traits of a cell, organism or population.

Source: Synthetic Biology Project and The American Heritage Science Dictionary 1st Edition

Strategy C2

Enhancing alternative livelihood for indigenous and local communities

Indigenous and local communities (ILCs) living on the fringes of protected terrestrial and marine areas and largely dependent on natural resources for their livelihood will be provided with alternative economic opportunities to reduce this dependency and avoid illegal extraction of natural resources from these areas.

Enhance ILCs involvement in biodiversity conservation

Active efforts to promote community and civil society participation, especially ILCs, in the planning and management processes of protected areas will be undertaken, including initiatives to proactively engage ILCs in conservation programmes. An example of such an initiative is shown in Box 6-5.

Empowering ILCs for alternative economic opportunities

Capabilities of ILCs will be enhanced through participation in training programmes such as language courses, nature guides and entrepreneurship, as well as basic medical and emergency response to prepare them for alternative income generation. Sustainable use and benefits sharing of biological genetic resources and associated traditional knowledge will be promoted by regulatory measures such as the ABS Bill. This will further improve the economic position and independence of ILCs.

Box 6-5

Community involvement in conservation

Kelawat Forest Reserve joint forest management initiative

The Sabah Forestry Department initiated a joint forest management initiative in the Kelawat Forest Reserve with 24 families of the Dusun community living in extreme poverty.

The community was allowed to enter and occupy part of the forest reserve in 2014 and use it for rubber agroforestry and fruit tree plantation. In return, they assisted the forestry department with restoring, managing and protecting the reserve, and nurturing dipterocarp trees grown interspersed in plantations.

Outcome

- **Three- to fourfold increase in household income** through rubber latex and fruit sales, increasing monthly income of 80% of the households above RM1,000, lifting them from extreme poverty; and
- **Restoration of denuded forest areas**, with forest area rehabilitated and conserved, as well as restoration of biodiversity and watershed functions in denuded areas resulted in enhancement of protection of Kelawat Forest Reserve from encroachment and forest fires.



Source: Sabah Forestry Department



Focus area D

Strengthening resilience against climate change and natural disasters

Increased frequency and intensity of natural disasters due to the adverse impact of climate change has affected the nation. As Malaysia develops socio-economically, it is important to ensure its development gains are not reversed by natural disasters. Resilience of growth is therefore important to ensure the increase in standards of living enjoyed by people today will continue to rise for future generations. The immediate step is to make sure no one is left at risk. Planning and preparing for natural disasters, identifying which areas and communities are at risk and providing the right tools in case such situations occur will be important in preparing a comprehensive disaster risk management (DRM) framework.

The following strategies will be undertaken to reach these objectives:

- **Strategy D1: Strengthening disaster risk management** by establishing DRM policy and institutional framework, improving disaster detection and response capacity, incorporating DRM into development plans and creating community awareness;
- **Strategy D2: Improving flood mitigation** by generating new investments from flood mitigation projects, enhancing long-term planning and strengthening flood forecasting and warning systems; and
- **Strategy D3: Enhancing climate change adaptation** by developing a national adaptation plan, and strengthening resilience of infrastructure, natural buffers including water and agriculture sector as well as creating awareness on health impact.

Strategy D1

Strengthening disaster risk management

Increased frequency and intensity of climate-related disasters such as floods, coastal erosion and landslides, compounded by extensive and indiscriminate land use, which has expanded into environmentally sensitive areas, have affected the nation. Therefore, there is an urgent need for a more comprehensive DRM framework to be put in place. This will include hazard and risk management, vulnerability reduction and preparedness, as well as response and recovery. In this regard, the Government will strengthen DRM to arrest and reduce the impact of natural disasters on people and infrastructure. It will also ensure effective and faster response time to communities affected by natural disasters when they occur.

Establishing a policy and institutional framework for disaster risk management

The Government will strengthen the policy, regulatory and institutional framework of DRM under the National Security Council (Majlis Keselamatan Negara, MKN). A comprehensive national DRM policy and its related legislation will be formulated, and relevant standard operating procedures will be revised. Concurrently, a national crisis and disaster management centre will be established as the main training centre in Malaysia to conduct training programmes and drills. It will also act as a platform for greater engagement with stakeholders such as DRM related agencies, the private sector, academia, civil society organisations and the *rakyat*. MKN will play a critical role in ensuring a more coordinated, integrated and interconnected approach to managing disasters.

In addition to establishing a DRM framework, the Government will continue to strengthen coordination and collaboration among disaster-related agencies at the federal, state and district levels, including on issues regarding deployment of resources and assets to ensure faster response.

Improving disaster detection and response capacity

Capacity in disaster detection and early warning will be improved by upgrading detection technology and forecasting systems. Mapping of disaster prone and high risk areas is essential to enhance disaster detection efforts. Capabilities of all parties involved in disaster preparedness, response and recovery including capacity to conduct forecasting analysis will be strengthened to improve response time and effectiveness of DRM.

Incorporating DRM into development planning

DRM will be reoriented from a cost to an investment and as a prerequisite for cities and infrastructure. Measures will be taken to ensure development complies with existing environmental standards and development guidelines, as well as incorporate climate change considerations into development planning, evaluation, and implementation.

Improving communications and awareness

Local communities, civil society organisations and the private sector also play an important role in disaster preparedness, response and recovery. Efforts will therefore be taken to enhance awareness, build capacity and empower them to take initial response measures in a disaster. For example, drills in risk prone areas, done on a large scale and involving all sectors can help communities to deal with a natural disaster scenario. Communication strategies and platforms among disaster-related agencies as well as between the Government and the people will be established to enable better coordination and faster response time.

Strategy D2 Improving flood mitigation

Flood mitigation efforts will be further improved through innovative solutions taking into account the intensity and frequency of extreme weather events.

Generating investments from flood mitigation projects

The Department of Irrigation and Drainage Malaysia (DID) will use alternative and new technologies, including multifunctional mechanisms, to mitigate floods and encourage investment. For example, retention ponds besides mitigating floods, will also be used as artificial wetlands for water quality improvement, habitat grounds for wildlife and recreational parks. Retention ponds with aesthetic improvements will increase the commercial value of land surrounding the area. Similarly, dams will be constructed for multiple purposes besides flood mitigation, such as power generation, irrigation, water supply and recreation.

The approach to addressing flood mitigation in floodplains and high risk areas will be reoriented, including generating new economic activities, and improving the financial viability of such investments. Developments in such areas, especially construction of buildings and infrastructure, will be based on appropriate design and technology to adapt to floods and extreme weather. A similar approach was adopted by Austrian authorities in the Danube River in Vienna as described in Box 6-6.

Long-term planning for flood mitigation

In addition, the DID and relevant agencies will strengthen long-term flood mitigation solutions through implementation of Integrated Water Resource Management, Integrated River Basin Management and Integrated Flood Management. This includes the implementation of integrated solutions using a combination of structural components – such as retention ponds, diversion and river improvement works, and non-structural components – such as flood maps, flood warning system, and flood proofing as well as awareness and education programmes. DID will also review existing flood mitigation measures such as bunds and flood levees to cope with higher flood levels. Average recurrence interval in high risk locations will be raised as part of these efforts.

Box 6-6**Case example: Austria's Danube Island**

The Danube Island, a long, narrow island in central Vienna, Austria, is part of Vienna's highly sophisticated flood protection system. The island is 21.1 kilometres in length and 70 to 210 metres in width and lies between the Danube River and a parallel excavated channel called the New Danube.

The Danube Island serves as an innovative example of protective water management practices in Austria. It is an integrated flood management system, which comprehensively addresses prevention, response and aftercare. The uniqueness of the Danube Island concept stems from its design which aims to achieve the greatest possible safety from floods through meaningful interaction of spatial planning, structural engineering and organisational measures.

Flood mitigation measures

The first notable protective measures were taken between 1870 and 1875, when a central bed of 280 metres was dug out and an inundation area of 450 metres created on the river's left bank. In 1970, modifications were made with an additional channel – the New Danube – to replace the former inundation area. This flood control system is designed to bring river flows up to 14,000 cubic metres per second to protect Vienna from flash floods.

Innovative applications

However, over the past few decades, the New Danube has been increasingly adapted for other uses beyond flood management. Investments to-date include a 172 megawatt hydroelectric power generation, groundwater augmentation, business centre riverfront development, leisure and recreation spaces. Its multi-faceted development is a prime example of how flood mitigation projects could be adapted for other economic or social purposes.



1975



2009

Strengthening flood forecasting and warning system

An effective flood warning system will be able to improve the accuracy of prediction and provide early warning of impending incidents. This will substantially reduce damage during floods. The Government will upgrade the current flood forecasting and warning system to allow a longer lead time in numerical weather prediction, raising from current three days lead time to seven days, and flood warnings from current six hours to two days lead time.

Strategy D3

Enhancing climate change adaptation

Climate change adaptation measures will be enhanced to minimise the impact of increasingly frequent and severe extreme weather events. These measures will reduce risks to socio-economic growth, secure energy, food and water needs, ultimately protecting development gains.

Developing a national climate change adaptation plan

Climate change impact is cross-sectoral in nature. Effectively addressing its impact requires long-term planning and investments along with integration across many areas including public policy and economic activities. In this regard, NRE will develop a national climate change adaptation plan to provide a coherent framework as well as coordinate and synergise adaptation efforts across relevant ministries and agencies.

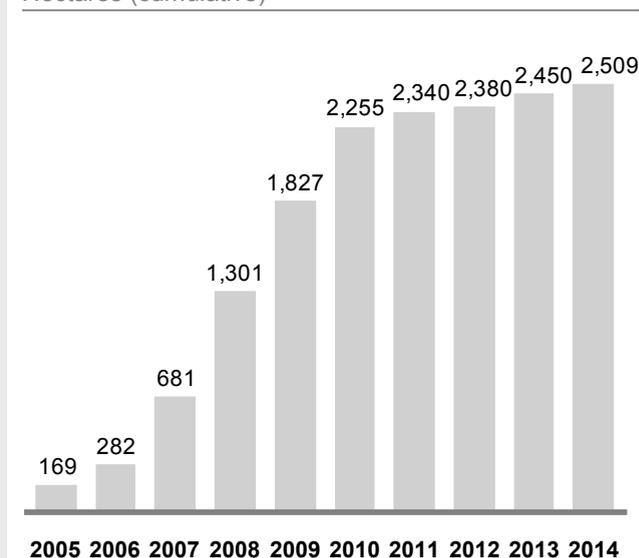
Exhibit 6-5

Rehabilitation of coastal areas in Malaysia, 2005 - 2014



Areas planted with mangroves and other suitable species

Hectares (cumulative)



Building resilient infrastructure

Building resilience in infrastructure is important in the face of climate change impact. In energy-related infrastructure, due consideration will be given to climate change and environment at the planning, evaluation and implementation stages. Dependency on particular sources, especially polluting or non-renewable ones, will be systematically addressed through introduction of renewable sources. Alternative sources of water such as recycled water, ground water, lakes and reservoirs will be explored to increase the diversity of supply and resilience against potential climate change impacts.

Strengthening natural buffers

Biodiversity, particularly the forest and coastal ecosystems will be conserved to act as natural buffers against the impact of climate change. The Government will strengthen efforts to enhance terrestrial and marine biodiversity through conservation measures. Management of rivers and coastal areas will be improved by adoption of water management guidelines as well as continuation of conservation efforts, particularly mangrove forests and related coastal forest species, as shown in Exhibit 6-5.

Increasing resilience of agriculture sector

Resilience in the agriculture sector is important to secure not only Malaysia's food sources but also economic growth. Research and development, especially in agriculture-climate modelling, will be intensified and adoption of good agricultural practices will be extended to 500 new fruit and vegetable plantations, 160 new farms and 65 new aquaculture farms.

Creating public awareness on health impact of climate change

The objectives of this initiative is to enhance public awareness on climate-related diseases to improve public health. Changes in rainfall and increases in temperature can increase vector capacities, resulting in greater and wider transmission of vector-borne diseases. Focus will be on vector-borne diseases such as malaria and dengue as well as air- and water-borne diseases.

Conclusion

Climate change continues to be a major threat as it adversely impacts economic and social development gains and deepens economic inequalities. Over-exploitation of natural resources, unsustainable use of land, illegal deforestation, loss of biodiversity, and land-use change will weaken the provision of ecosystem services, increase vulnerability to climate-related disasters, and jeopardise the needs of present and future generations. In the Eleventh Plan, Malaysia is breaking free from the conventional wisdom of development at all costs to green growth, which is a more sustainable path of growth. This will see Malaysia enter the ranks of advanced economies in 2020 with an economy resilient to the adverse impact of climate change and with secure and sufficient supply of natural resources such as water, food, and energy. Partnership and shared responsibility across all levels of society, including individuals, will be key to safeguarding the environment and biodiversity. Successful green growth will not only expand economic opportunities, but also enhance inclusivity and reduce disaster risks.