



Department of Environment  
Ministry of Natural Resources and Environment  
Malaysia

# THE ROLE OF DEPARTMENT OF ENVIRONMENT

*IN MITIGATING CLIMATE CHANGE*



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# ***FOREWORD***

## FOREWORD

The issue of climate change is more than just a warming trend. Earth's average temperature has risen by 0.8°C over the past century, and is projected to rise at a rate of 0.1°C every decade. Small changes in the average temperature of the planet can translate to large and potentially dangerous shifts in climate and weather. The increasing temperature will eventually lead to changes in weather including major wind patterns, amount and intensity of precipitation, and increased frequency of severe storms and weather extremes. This is, of course, apart from the direct and indirect impacts of climate change in other areas like the ecosystems, freshwater resources, flood, forest products, coastal system, low lying areas and small islands, industry, society and health.

Shifts in the number, severity and location of extreme weather events are among the most important impacts of climate change. In Malaysia, the rising impact of climate change is evident from the increasing occurrence of flooding and prolonged dry spells throughout the country. This indirectly affects the livelihood and well-being of the people.

The Department of Environment Malaysia is entrusted with the responsibility to ensure that alongside the progressive development of the country, a clean, safe, healthy and productive environment is continually conserved for its present and future generations. Hence, it gives me immense pleasure to present this book on DOE's Role in Mitigating Climate Change that in a nutshell summarize the Departments past, present and future actions in reducing greenhouse gases emission from anthropogenic sources. It is my sincere hope that the DOE's efforts in mitigating climate change and its role as an advocator in environment protection will be further enhanced.

I would also like to take this opportunity to express my heartfelt appreciation to all involved in the publication of this book for their valuable contribution and commitment. It is my hope that this book would help facilitate a better understanding of our role and importance of our actions in mitigating climate change.

Best wishes,

**Dato' Halimah Hassan**  
*Director General of Environment*  
*Department of Environment Malaysia*



# ***CHAPTER 1***

## ***INTRODUCTION***

- 1.1 Background
- 1.2 The UNFCCC
- 1.3 The Kyoto Protocol
- 1.4 Malaysia Involvement in UNFCCC & Kyoto Protocol
- 1.5 Institutional Framework at National Level
- 1.6 National Policy Related to Climate Change
- 1.7 National Laws Related to Climate Change

## CHAPTER 1 : INTRODUCTION

### 1.1 Background

The warming over the last 50 years is nearly twice that for the last 100 years. Eleven (11) of the twelve (12) years between 1995 and 2006 ranked among the 12 warmest years in the instruments record of global surface temperature (since 1850). It is projected that the average global surface temperatures will continue to increase between 1.4°C to 5.8°C above 1990 levels by 2100.

The IPCC (2007) estimates that the combined effects of ice melting and sea water expansion from ocean warming are projected to cause the global mean sea level rise between 0.1 m to 0.9 m in the period of 1990 and 2100. For a country like Bangladesh, a 0.5 m sea level rise would place about 60 million people at risk from flooding.

The issue of climate change is more than just a warming trend. The increasing temperature will eventually lead to changes in weather including major wind patterns, amount and intensity of precipitation, and increased frequency of severe storms and weather extremes. This is, of course, apart from the direct and indirect impacts of climate change in other areas such as the ecosystems, freshwater resources, flood, forest products, coastal system, low lying areas and small islands, industry, society and health. Details of future impacts and likely consequences in these areas have been reviewed by the IPCC Fourth Assessment Report 2007 as shown in Figure 1.1.



**Figure 1.1**

Examples of impacts associated with global average temperature change (Impacts will vary by the extent of adaptation, rate of temperature change and socio-economic pathway)

**Upper panel:** Illustrative examples of global impacts projected for climate changes (and sea level and atmospheric CO<sub>2</sub> where relevant) associated with different amounts of increase in global average surface temperature in the 21st century. The black lines link impacts; broken-line arrows indicate impacts continuing with increasing temperature. Entries are placed so that the left-hand side of text indicates the approximate level of warming that is associated with the onset of a given impact.

**Source:** IPCC Fourth Assessment Report (AR4): Climate Change 2007

## 1.2 The UNFCCC

More than a decade after the World Climate Conference in 1979, the United Nations Framework Convention on Climate Change (UNFCCC or FCCC) was adopted at the United Nations Conference on Environment and Development (UNCED), also informally known as the Earth Summit, held in Rio De Janeiro in May 1992. The UNFCCC was opened for signature (ratification) in May 1992 and came into force on 21 March 1994. With 192 countries having ratified the convention, its membership is almost universal. Malaysia signed the UNFCCC treaty on 9 June 1993 and ratified it on 13 July 1994.



*Source: [unfccc.int](http://unfccc.int) & [www.eoearth.org](http://www.eoearth.org)*

The ultimate objective of the Convention and its related legal instruments is to achieve the stabilization of greenhouse gas concentration in the atmosphere at a level that would enable the ecosystem to naturally adapt without harming the food productions. It is a framework for subsequent action where participating nations commit themselves to specific actions to achieve this objective that are guided by the principles of 'common but differentiated responsibilities'. Capabilities of developed and developing countries are to be taken into consideration. In other words, this treaty is a global effort aimed at reducing emissions of greenhouse gases in order to combat global warming.

The convention basically divides the world into two groups: developed and developing countries, or also known as Annex 1 and non-Annex 1 countries respectively. Developing countries may volunteer to become Annex 1 countries when they are sufficiently developed. Under this Convention, Annex 1 countries were encouraged to reduce their emissions of carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O) and methane (CH<sub>4</sub>) in the year 2000 to the 1990 levels. They are also expected to cooperate in the field of science and technology transfer to enable countries to adopt more climate-friendly technologies and adapt to the potential impacts of climate change. Developing countries like Malaysia are not committed to the emission reductions under the Convention unless developed countries supply sufficient funding and technology. The first achievement of the UNFCCC is the greenhouse gas (GHG) inventories, a count of GHG emissions and removals, which is required to be submitted regularly by signatories of the Convention.

### 1.3 The Kyoto Protocol

The Kyoto Protocol was tabled at the Third Meeting of the Conference of Parties (COP-3) in Kyoto, Japan in 1997. It was opened for signatures in the following year to which Malaysia signed in March 1999 and ratified in September 2002. However, there were two conditions for the Protocol to come into force. The first being the '55 parties' clause; not less than 55 parties to the convention, including Annex 1 Parties ratified the Protocol. This condition was fulfilled on 23 May 2002 when Iceland ratified the Protocol. The second condition is the "55% clause" which is to include Annex 1 Parties which accounted for a total of 55% of the total carbon dioxide emissions for 1990. The protocol came into force on 16 February 2005 following the ratification by Russia on 18 November 2004 which satisfied the second condition. To date, 184 countries (also referred to as "Parties") of the convention have ratified the Protocol. Detail rules for the implementation of the protocol were adopted in Marrakesh during COP-7 in 2001, hence known as "Marrakesh Accords".

The Protocol sets legally-binding commitments on 37 developed countries and the European community to collectively reduce emissions of carbon dioxide and other GHG (methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbon and perfluorocarbons) to 5.2% below their 1990 levels, or engage in emissions trading if they maintain or increase emissions in 2008-2012. The following are among principles upon which the Protocol was established:

- The Kyoto Protocol was underwritten by governments, hence is governed by global legislation enacted under the UN;
- Common but differentiated responsibilities are agreed in the UNFCCC treaty whereby developing countries which did not contribute to the historical GHG emissions are exempted from the requirements of the Protocol;
- Annex 1 countries which have accepted GHG emissions reduction target must submit annual GHG inventories; and
- Non-Annex 1 countries have no obligations to reduce GHG emissions but may participate in the Clean Development Mechanism (CDM).

The second commitment period was agreed in Doha, Qatar, on 8 December 2012, where the "Doha Amendment to the Kyoto Protocol" was adopted. The amendment includes new commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 1 January 2013 to 31 December 2020.



*Source: [unfccc.int](http://unfccc.int)*

#### 1.4 Malaysia Involvement in UNFCCC & Kyoto Protocol

As a signatory to both the Convention and the Protocol, Malaysia is grouped under the non-Annex 1 Parties with no greenhouse gas emission restrictions compared to Annex 1 countries. However, Malaysia (along with the rest of developing countries) is subjected to the following obligations as articulated in Article 4 of the UNFCCC:

- i. To develop, periodically update, publish and make available to the Conference of Parties national inventories of anthropogenic emissions by sources and removals by sink of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies to be agreed upon by the Conference of the Parties;
- ii. To formulate, implement, publish and regularly update national and where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removal by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change;
- iii. To promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystem;
- iv. To promote and cooperate in education, training and public awareness related to climate change and encourage the widest participation in this process, including that of non-governmental organizations; and
- v. To communicate to the Conference of the Parties information related to implementation.

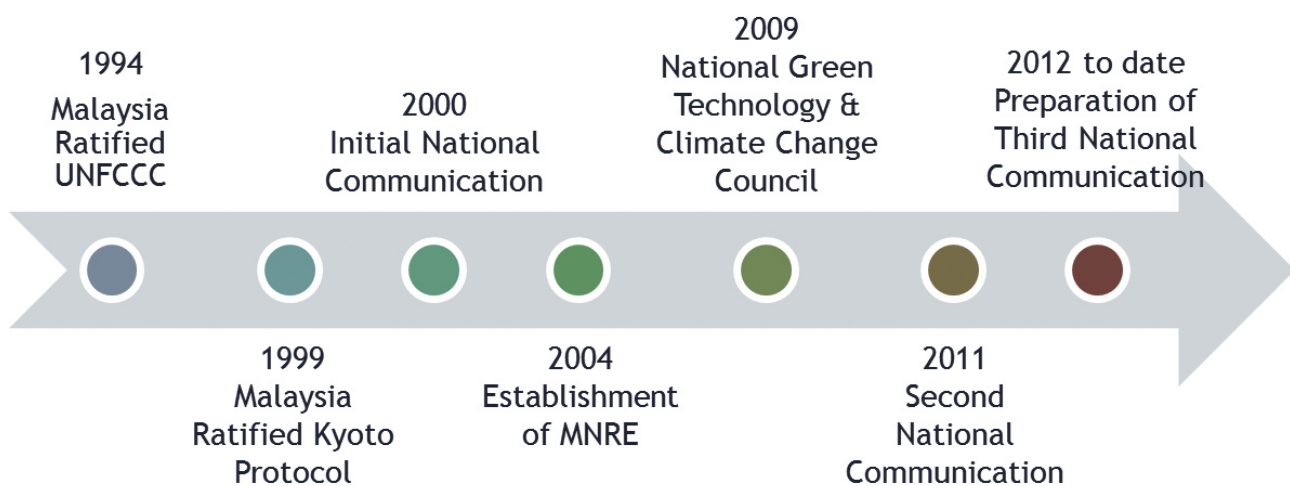
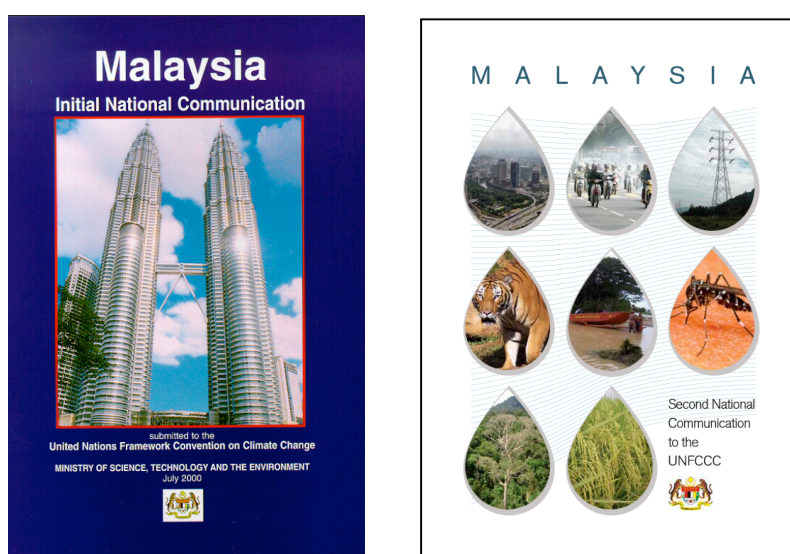


Figure 1.2: Malaysia involvement in UNFCCC

### *Initial National Communication (INC)*

With regards to item (i) and (v) of the obligations, an Initial National Communication (INC) was submitted by Malaysia through the Ministry of Science, Technology and the Environment to the UNFCCC on July 2000. For the preparation of this INC, the Second Conference of Parties guidelines and the 1995 Intergovernmental Panel on Climate Change (IPCC) methodologies for the inventory of GHG emissions were adopted, using 1994 as the reference year.

This INC sets out the national inventory of GHGs, the assessment of the possible impacts of climate change, suggestions for possible initiatives to address the issue and make reference to several mechanisms and measures that represent national policy responses to promote sustainable development efforts.



**Figure 1.3:** Initial National Communication (2000) and Second National Communication (2011) of Malaysia

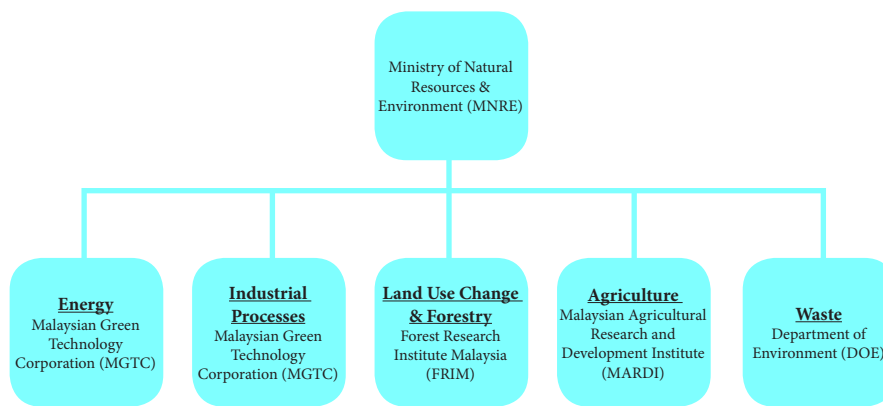
### *Second National Communication (NC2)*

The NC2 report (2011) was prepared as a follow up to the INC report which was completed in 2000. In order to prepare the NC2 report, a Project Management Group (PMG), led by the Undersecretary of Conservation and Environment Division (CEMD) in the Ministry of Natural Resources and Environment (NRE) was set up in 2006 to co-ordinate the work of three main Working Groups (WG) that provide inputs for the report. The three main working groups are as follows:

- (a) National Greenhouse Gas (GHG) Inventory WG;
- (b) Vulnerability and Adaptation (V&A) WG; and
- (c) Mitigation WG

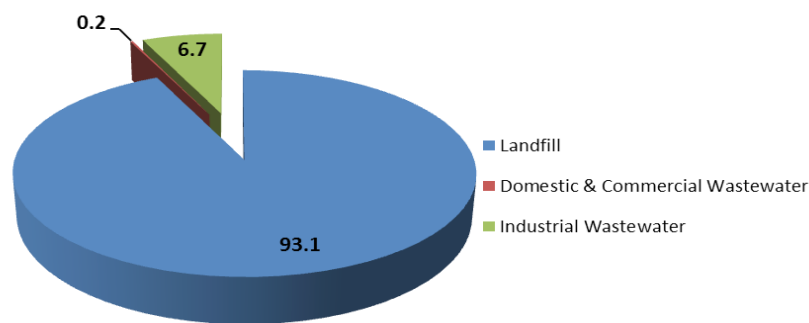
The NC2 report contains the outputs of the deliberations from three working groups. As for the GHG inventory perspective, a much better foundation has been put in place in the preparation, in that more improved guidelines i.e. the Revised 1996 IPCC Guidelines, have replaced the older 1995 IPCC Guidelines used in the first inventory. Data collection, both in terms of quality and quantity, has also been improved. More sectors and activities, which were previously not accounted for, have been included in the current inventory.

In the preparation of the NC2 report, the GHG inventory was assigned to various agencies and institutions to carry out estimations on GHG emissions. The Waste sector has been assigned to Department of Environment (DOE), Land Use Change and Forestry (LUCF) is undertaken by Forest Research Institute Malaysia (FRIM), Energy and Industrial Processes are both assigned to Malaysian Green Technology Corporation (MGTC) and the Agriculture sector to Malaysian Agricultural Research and Development Institute (MARDI).



**Figure 1.4** Greenhouse Gas Inventory Set-Up for NC2

The DOE had played an active role as the lead agency in preparing the report for GHG emission from the waste sector. The GHG inventory for waste sector consists of the inventory of methane emission from various sources such as solid waste disposal sites, domestic and commercial organic wastewater, industrial wastewater and sludge. Methane is emitted during the anaerobic decomposition of organic waste disposed at solid waste disposal sites and during handling of domestic and industrial wastewater under anaerobic condition. Solid waste disposal sites are the largest anthropogenic source of methane emissions, i.e. 93% of total methane emissions from the waste sector.



**Figure 1.5:** Methane Emissions Distribution in Waste Sector  
 Source: Malaysia Second National Communication, 2011

## 1.5 Institutional Framework at the National Level

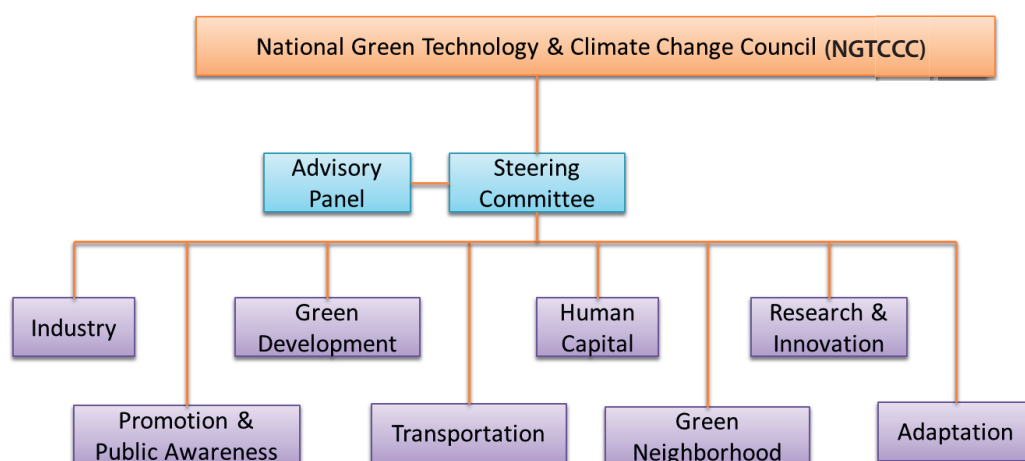
### *National Green Technology and Climate Change Council (NGTCCC)*

In Malaysia, climate change has generally been considered to be an environment issue. Thus, the Ministry of Natural Resources and Environment (NRE) is entrusted with the responsibility to respond to Malaysia's commitment to the UNFCCC. Prior to the establishment of NRE in 2004, climate change was under the purview of the Ministry of Science, Technology and the Environment (MOSTE). With the increasing concern on climate change both at global and domestic level, a National Green Technology and Climate Change Council, was established in early 2010.

It can be seen that the institutional framework on climate change has evolved from a sectoral approach to a more integrated and higher level approach with the establishment of NGTCCC, chaired by the Honorable Prime Minister. This is to achieve a high level coordination among ministries, agencies, private sectors and other stakeholders to implement the Green Technology policy and in tandem with the implementation of the Climate Change Policy to respond to the challenges and issues on climate change.

The NGTCCC is supported by a steering committee and the following eight (8) Working Groups (WG):

- (a) Industry WG;
- (b) Research & Innovation WG;
- (c) Human Capital WG;
- (d) Promotion and Public Awareness WG;
- (e) Transportation WG;
- (f) Green Development WG;
- (g) Green Neighbourhood WG; and
- (h) Adaptation WG.



**Figure 1.6:** National Green Technology & Climate Change Council Institutional Arrangements

*Source: kettha.gov.my*

### ***National Steering Committee on Climate Change (NSCCC)***

The National Steering Committee on Climate Change (NSCCC) was established in 1994 by the Malaysian cabinet to formulate and implement climate change policies including mitigation of GHG emissions and adaptation measures to climate change. This includes coordinating the formulation of climate-related national action plans and national commitments as agreed in the UNFCCC. As the national focal point on climate change, the Committee has the responsibility to discuss and recommend Malaysia's position as well as to seek external financial and technical assistance on climate change related issues. The NSCCC is chaired by the Secretary General of the Ministry of Natural Resources and Environment (NRE).

#### **1.6 National Policy Related to Climate Change**

Environmental concerns had been given more emphasis in national development plans since the Third Malaysia Plan (1976-1980). A number of policies have been formulated by various ministries, which take into account sustainable development and environmental integrity. Although these policies were introduced separately to address different issues of national development, in essence they contribute indirectly to addressing climate change.

Among the national environmental-related policies which could assist and support global climate change mitigation efforts are listed as follows:

- National Policy on Climate Change (2009)  
The objectives of the National Policy on Climate Change are:
  - Mainstreaming climate change through wise management of resources and enhanced environmental conservation resulting in strengthened economic competitiveness and improved quality of life;
  - Integration of responses into national policies, plans and programmes to strengthen the resilience of development from arising and potential impacts of climate change; and
  - Strengthening of institutional and implementation capacity to better harness opportunities to reduce negative impacts of climate change.
- National Policy on the Environment (2002)  
To promote continuous, social and cultural progress and enhancement of the quality of life of Malaysians through environmentally sound and sustainable development.
- National Forestry Policy (1978, revised 1992)  
To ensure the sound climatic and physical condition of the country; safeguarding of water supplies and soil fertility; and minimization of damage by agricultural lands.
- National Energy Policy (1979)  
One of the major objectives of this Policy is to minimize the negative impacts of energy production, transportation, conservation, utilization and consumption on the environment.

- National Policy on Biological Diversity (1998)  
To conserve Malaysia's biological diversity and to ensure that its components are utilized in a sustainable manner for the continued progress and socio-economic development of the nation.
- Third National Agricultural Policy (1998 - 2010)  
Sustainable management and utilization of resources will be guiding principle in pursuing agricultural and forestry development. Rules, regulations and incentives will be strengthened to encourage 'environment-friendly' agricultural and forestry practices and to minimize the negative impacts of these activities on the environment.
- The National Transport Policy (Land)  
Three major objectives: (1) to enhance public transportation infrastructure and to encourage use of public transport; (2) to encourage development and construction of public transportation facilities; and (3) to encourage the use of natural gas in motor vehicles.
- National Green Technology Policy (2009)  
The National Green Technology Policy embodies elements of economic, environment and social policies, as reflected in the five (5) objectives as follows:
  - To minimize growth of energy consumption while enhancing development;
  - To facilitate the growth of the green technology industry and enhance its contribution to the national economy;
  - To increase national capability and capacity for innovation in Green Technology development and enhance Malaysia's competitiveness in Green Technology in the global arena;
  - To ensure sustainable development and conserve the environment for future generations; and
  - To enhance public education and awareness on Green Technology and encourage its widespread use.


### 1.7 National Laws Related to Climate Change

Currently, there are more than 20 environment - related laws in Malaysia, some of which were formulated in response to the implementation of the relevant policies. The following national laws may have a direct or indirect impact on global climate change mitigation efforts :

- Environment Quality Act (EQA) 1974  
Prior to 1974, legislation was largely sectoral specific and hence was unable to address environmental issues holistically. The EQA 1974 was thus conceived to integrate various environmental management sectors, i.e. air, water and noise pollution, waste management and protection as well as enhancement of environmental quality.

- **Land Conservation Act 1960**  
The aim of this Act is to consolidate the law relating to the conversion of hill land and the protection of soil from erosion and the inroad of silt. Among the important elements in this Act is the provision for gazettment of hill areas, prohibition of short-term crop planting and land clearing on hills to control the sources of soil erosion. The act however, were not applicable in the states of Sabah and Sarawak.
- **Energy Commission Act 2001**  
Although not directly related to climate change, this Act allows for the establishment of the Energy Commission which is empowered to regulate and promote all matters relating to the electricity and gas supply industry.
- **National Forestry Act 1984**  
Various forestry enactments and ordinances have been formulated since the early 1900s by respective states in Malaysia but were only standardized and strengthened in areas of forest management and planning with endorsement of the National Forestry Act in 1984. The Act was amended in 1993 to include more stringent penalties for illegal logging and timber thefts offences.
- **National Parks Act 1980**  
Generally, this Act provides for the establishment and control of National Parks in Malaysia and other relevant matters, i.e. establishment of advisory councils, occupation of land, prohibited activities such as mining and public access. The main objective of the establishment of national parks is for preservation and protection of wild life, plant life and objects of geological, archeological, historical, ethnological and other scientific or scenic interest.
- **Town and Country Planning Act 1976**  
Also known as Act 172, this Act generally introduces a more uniform system of law and policy regulation for town and country planning in Malaysia (not including Sabah and Sarawak). It was amended in 1995 (Town Planners Act 1995) to emphasize the integration of environmental consideration in the planning process, particularly on topography and tree preservation.





# ***CHAPTER 2***

## ***THE ROLE OF DOE IN MITIGATING CLIMATE CHANGE ISSUES***

- 2.1 Background
- 2.2 Role of Department of Environment in Mitigating Climate Change Issues
  - 2.2.1 Improvement in Emission Standards from Motor Vehicles
  - 2.2.2 Improvement in Fuel Quality
  - 2.2.3 Implementation of the Fire Prevention Programme at Peatlands

## CHAPTER 2 : THE ROLE OF DEPARTMENT OF ENVIRONMENT (DOE) IN MITIGATING CLIMATE CHANGE ISSUES

### 2.1 Background

Environmental management in Malaysia become more focused with the gazettelement of the Environmental Quality Act (EQA) on 14 March 1974. From thereon, an enforcement agency named Environment Division (later known as Department of Environment (DOE) in 1983) was institutionalized in 1975. Presently, the Department is empowered with 1,606 staffs (on full operation), extending its operation through 15 States Offices and 27 Branch Offices. The Department's main role is to prevent, control and abate pollution through the enforcement of the EQA 1974 and its 36 subsidiary legislations made there under.

In line with the Department's vision, "Environmental Conservation for the Well-being of the People" and mission "To Ensure Sustainable Development in the Process of Nation Building", DOE continues its mandate to administer the Environmental Quality Act 1974. It can be observed that with the introduction of the EQA in 1974, a three-pronged strategy was developed which today forms the basis of environmental management in the country. The major elements of the strategy include:

- (a) Control of pollution and remedial actions;
- (b) Integration of environmental dimensions in project planning and implementation; and
- (c) Provision of environmental inputs into resource and regional development planning.

In order to enhance the three broad strategies above, a number of support programmes have also been developed. These include:

- (a) Environmental monitoring;
- (b) Environmental education, training, information dissemination and public awareness;
- (c) Inter-agency and federal-state cooperation; and
- (d) Bilateral, regional and international legal and institutional arrangements.

As an enforcement agency, the DOE had been enforcing the Environmental Quality Act 1974, to control emissions from various sources such as industries and motor vehicles with the view that Malaysians will enjoy a cleaner, safer environment and at the same time have a better quality of life. Regulations under the EQA 1974 which either directly or indirectly contribute to reduction of greenhouse gas emissions and hence mitigating climate change are:

- Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977
- Environmental Quality (Clean Air) Regulations 2014;
- Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations 1978;
- Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations 1985;
- Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987;

- Environmental Quality (Prohibition on the Use of Chlorofluorocarbon and other gases as Propellants as Blowing Agents) Order 1993;
- Environmental Quality (Control of Emission from Diesel Engines) Regulations 1996;
- Environmental Quality (Control of Emission from Petrol Engines) Regulations 1996;
- Environmental Quality (Refrigerant Management ) Regulations 1999;
- Environmental Quality (Halon Management) Regulations 1999;
- Environmental Quality (Declared Activities) (Open Burning) Order 2003;
- Environmental Quality (Control of Emission for Motorcycles) Regulations 2003;
- Environmental Quality (Control of Petrol and Diesel Properties) Regulations 2007;
- Environmental Quality (Sewage) Regulations 2009;
- Environmental Quality (Control of Pollution from Solid Waste Transfer Station and Landfill) Regulations 2009
- Environmental Quality (Industrial Effluent) Regulations 2009

## 2.2 The Role of Department of Environment in Mitigating Climate Change Issues

The Clean Air Action Plan (CAAP) is drawn up in line with the “7th Green Strategy” in the National Policy on the Environment. The CAAP presents a set of strategies and indicators that altogether provide a roadmap to achieve better air quality by reducing the frequency, severity and duration of poor air quality episodes.

In the implementation of the CAAP, apart from achieving good air quality, it also generates co-benefit in terms of reduction in greenhouse gas (GHG) emissions and combating global warming. Major contributors of GHG emissions that are addressed in the Plan include emissions from motor vehicles, industries, forest fires and open burning activities.



**Figure 2.1:** Clean Air Action Plan as published in December 2010

It is also aimed at contributing to the country’s commitment of achieving a 40% reduction in carbon intensity by the year 2020. Example of efforts to combat climate change which is outlined in the Plan are as follows:-

- (a) Improvement in emission standards from motor vehicles;
- (b) Improvement in fuel quality; and
- (c) Implementation of the Fire Prevention Programme at Peatlands.

### 2.2.1 Improvement in Emission Standards from Motor Vehicles

Based on the statistics from the Road Transport Department, there are 15.8 million active in-use motor vehicles throughout the country in December 2013. Currently, the emission standards for motor vehicles in Malaysia is EURO 2. Thus, DOE is looking into improving the emissions standards to EURO 4 for both petrol and diesel powered vehicles in 2015 which will ensure better control on GHG emissions.

The estimated reduction in emission can be calculated using Table 1. As an example, a petrol powered vehicle with cylinder capacity of 1500cc, with EURO 2 engine will emit CO<sub>2</sub> of 200 g per km journey. The same vehicle, with EURO 4 engine, will emit 172 g CO<sub>2</sub> per km journey. Therefore, there is a reduction of 28 g of CO<sub>2</sub> for each km journey traveled, which translate to 14% in CO<sub>2</sub> reduction.

**Table 1: Average Emissions of Motor Vehicles by Engine Type**

Fuel type	Cylinder capacity	Euro standard						
		6	5	4	3	2	1	0
		CO <sub>2</sub> emissions expressed in g/km						
Petrol & LPG	0 to 1399cc	117	125	140	150	164	173	175
	1400cc to 2000cc	150	159	172	185	200	211	213
	higher than 2000cc	228	238	247	259	279	295	297
Diesel	0 to 1399cc	98	103	120	116	125	132	133
	1400cc to 2000cc	117	125	144	151	163	173	174
	higher than 2000cc	159	169	201	199	214	226	228
CNG	0 to 1399cc	94	100	112	120	131	139	140
	1400cc to 2000cc	120	127	138	148	160	169	171
	higher than 2000cc	182	190	198	207	223	236	238

Source: [www.ecoscore.be](http://www.ecoscore.be)

### 2.2.2 Improvement in Fuel Quality

DOE will continue to regulate and improve the quality of fuel (petrol and diesel) used by motor vehicles to ensure efficient and complete combustion of fuel which ultimately will reduce emission of greenhouse gases, particularly nitrous oxides. Amendment to Environmental Quality (Control of Petrol and Diesel Properties) Regulation 2007 has been gazetted on 2 September 2013 to improve the fuel quality standard from EURO 2M to EURO 4M. The new amended Regulation is expected to be implemented in 2015.

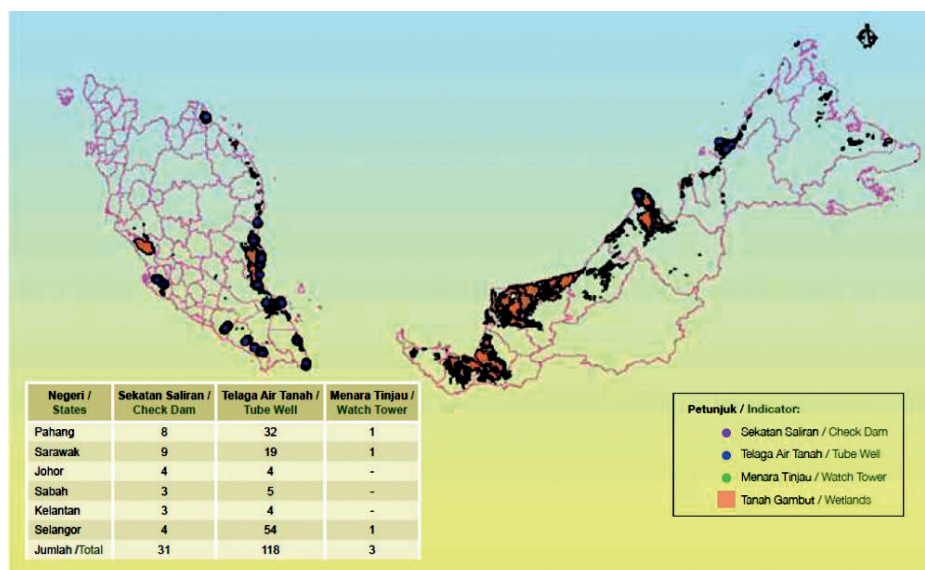
By improving the quality of petrol and diesel from EURO 2M to EURO 4M by 2015, a significant reduction of CO<sub>2</sub> eq emission can be achieved provided the number of vehicles stays constant with 2013 as a base year.

### 2.2.3 Implementation of the Fire Prevention Programme at Peatlands

High organic content of the peat soil is the main cause of peatland fire, either naturally or anthropogenically. The burning will pollute the air and may cause problem to the human health. Under the peatland management programme, several check dams, tube wells and watch towers have been and will be built in the fire prone areas in Malaysia such as in Selangor, Pahang, Johor, Sarawak and Sabah. These infrastructures are aimed to reduce the number of open burning cases in these areas. Check dams are built to maintain the water table level and as an additional water source during peat fire occurrences while tube wells will act as the main water source to put out fire in these areas. Watch towers are built at strategic locations to monitor any fire occurrence within peatland areas.

Currently the Fire Prevention Programme at Peatlands involves (6) states which are Selangor, Pahang, Johor, Kelantan, Sabah and Sarawak, covering an area of 2.6 million hectares of peatland. Until 31st December 2013, a total of 135 check dams were constructed in; Johor (54), Pahang (37), Sarawak (21), Selangor (8), Kelantan (11) and Sabah (4) and a total of 40 tube wells were constructed in Sarawak (10), Pahang (10), Johor (6), Selangor (4), Kelantan (5) and Sabah (5). In addition, 3 watch towers were constructed each in the state of Selangor, Pahang and Sarawak.

Under the programme, a Standard Operating Procedure (SOP) was prepared to provide guidance in mitigating open burning within peatland and to avoid haze occurrence from these local sources. In the spirit of 1NRE Enforcement, this SOP involves cooperation of key agencies within NRE such as Department of Irrigation and Drainage (DID), Minerals and Geoscience Department (MGD) and Forestry Department of Peninsular Malaysia and also other agencies such as the Fire and Rescue Department and Malaysia Meteorological Department. Through the implementation of this programme, time taken to put out peat fires has been reduced significantly from 7 days to 3 days. Thus, it is estimated that 13 million MT of carbon emission resulting from open burning activities can be avoided.



**Figure 2.2:** Infrastructure constructed under the Peatland Fire Prevention and Management Programme as of 2012

*Source: DOE 2012 Annual Report*



Figure 2.3: Top Left Watch Tower; Top Right Tube Well; Bottom Left & Bottom Right Check Dam  
Source: DOE library



# ***CHAPTER 3 SPECIAL PROJECTS BY DOE IN MITIGATING CLIMATE CHANGE***

- 3.1 Background
- 3.2 Phase-Out of Ozone Depleting Substance (ODS)
- 3.3 HCFC Phase-Out Management Plan
- 3.4 Methane (CH<sub>4</sub>) Capture from Palm Oil Mill Effluent (POME) Treatment System
- 3.5 Inventory of Greenhouse Gases (GHGs)
- 3.6 Green Industry Initiatives

## CHAPTER 3 : SPECIAL PROJECTS BY DOE IN MITIGATING CLIMATE CHANGE

### 3.1 Background

Rising carbon dioxide levels leads to global warming, which causes environmental degradation and damages global ecosystems. Compliance with environmental and emissions standards is more to keep the environment intact rather than treating damages.

DOE will continue to support initiatives and commitments made by Malaysian Government to reduce carbon emission. Aside from engaging the Clean Air Action Plan (CAAP) and enforcing the EQA 1974, DOE has also undertaken some special projects that contribute in mitigating climate change as follows:

- (a) Phase-out Ozone Depleting Substance (ODS)
- (b) Hydrochlorofluorocarbons (HCFC) Phase-Out Management Plan (HPMP);
- (c) Methane (CH<sub>4</sub>) Capture from Palm Oil Mill Effluent (POME) Treatment Systems; and
- (d) Inventory of Greenhouse Gases (GHGs)

### 3.2 Phase-out of Ozone Depleting Substance (ODS)

Malaysia ratified the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer on 29 August 1989. As a Party to the Montreal Protocol, Malaysia has the obligation to phase out ozone depleting substances (ODS) according to the phase-out schedule set by the Protocol.

Among the developing countries, Malaysia has led the way in phasing out the use of ODS. DOE, as the lead agency for implementing the Montreal Protocol in Malaysia, was an early participant in the global effort to preserve the ozone layer by taking a proactive role in formulating strategies and policies for phasing out ODS. Legal measures had been in place since 1993 to restrict the use of ODS that brought Malaysia way ahead of the time-frame granted. Through the various technical assistance projects and industrial programmes undertaken by DOE and related agencies under the National CFC Phase-Out Plan, Malaysia has successfully reduced consumption of CFC from 3,634 metric tonnes (MT) in 1990 to 48 MT in 2009, which is equivalent to the reduction of about 99% of GHG emission from CFC. Under the Montreal Protocol obligation, Malaysia has also stopped the importation of chlorofluorocarbon (CFC), halon and carbon tetrachloride (CTC) starting 1 January 2010.

### 3.3 HCFC Phase-Out Management Plan (HPMP)

The hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs), are now thought to contribute to anthropogenic global warming. On a molecule-for-molecule basis, these compounds are up to 10,000 times more potent greenhouse gases than carbon dioxide. The Montreal Protocol currently calls for a complete phase-out of HCFCs by 2030, but does not place any restriction yet on HFCs. Since the CFCs themselves are equally powerful as greenhouse gases, the mere substitution

of HFCs for CFCs does not significantly increase the rate of anthropogenic global warming, but over time a steady increase in their use could pose a possible threat to the climate.

**Table 2: Malaysia Targets for Compliance**

Target	Maximum Consumption Level of HCFC (ODP tonnes)
From 01 January 2013	515.8
From 01 January 2015	464.2
From 01 January 2020	335.3
From 01 January 2025	167.6
From 01 January 2030	12.89 (Strictly for servicing)

*Source: 43rd National Steering Committee for the Protection of Ozone Layer*

HPMP is the overarching strategy to phase out the use of HCFC in major manufacturing sectors and reducing dependence on HCFCs while at the same time controlling and reducing HCFC use wherever possible in the servicing sector. The HPMP is developed with consensual between government agencies and other stakeholders such as industries, to encourage proactive partnerships between government and private sectors. The strategies that have been formulated under the HPMP comprised of the following components:

1. Policies and regulations
2. Project management, coordination and monitoring
3. Awareness and communication

Based on HCFC Consumption Baseline of 515.8 ODP tonnes, Malaysia under the Montreal Protocol is committed to reduce consumption of HCFC by 10% ODP tonnes in 2015 and 35% ODP tonnes in 2020. There are two (2) significant HCFC substance used in Malaysia which is HCFC-22 and HCFC-141b, which will be converted to HFC (R-410A) and HC, respectively. Due to the relatively high GWP of HCFCs, their phase out will reduce the GHG emissions from ODS industries such as foam sectors. HC for example have a significantly low GWP which is 11 in comparison to HCFC-141b which has a GWP of 725. Thus, the conversion from HCFC-141b to HC will result in reduction of approximately 616,000 CO<sub>2</sub> eq.

**Table 3: Comparison of GHG Emission Before and After Conversion**

	Before conversion	After Conversion
	HCFC-141b	HC
Consumption (MT)	860	688
GWP	725	11
Impact (CO <sub>2</sub> eq)	623,500	7,568

*Adapted from Malaysia HCFC Phase-Out Management Plan (HPMP Stage-1) (2012-2016)*

**Table 4:** Strategy to Phase-Out HCFC

YEAR	PLANNED REGULATORY ACTION
2012	Establishment of Approved Permit (AP) import quota system based on HCFC Baseline (515.8 ODPT - average consumption for 2009/2010)
	Amend existing regulations for controlling use, imports, manufacturing, assembly and installation of products containing HCFCs
2013	Licensing re-export of HCFCs
	Enforcement of Approved Permit (AP) quota system
	Prohibition of establishment and expansion of new HCFC-based manufacturing capacities
	Establish incentive system for promoting use of alternatives to HCFCs
	Certification of technicians for handling HCFCs
2015	Prohibition of manufacturing, assembly and import of HCFC-based air conditioners (2.5 HP and lower) for use in Malaysia
	Prohibit imports of polyols pre-blended with HCFCs
	Include HCFCs in the list of restricted gases
2020	Prohibit the manufacture, assembly and import of all products and equipment using HCFC (except for essential use)
	Prohibit HCFC 141b as blowing agent
	Prohibit the use of HCFC in the manufacturing and installation of new fire extinguishing systems
2025	No more installation of new products and equipment using HCFCs
2030	AP limited to 2.5% of baseline for servicing use only
2040	Total ban on the import and use of HCFCs

*Source: Malaysia HCFC Phase-Out Management Plan (HPMP Stage-1) (2012-2016)*

### 3.4 Methane (CH<sub>4</sub>) Capture from Palm Oil Mill Effluent (POME) Treatment Systems

Palm oil mill effluent (POME) is regulated by DOE through Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, 1977. The requirement for BOD level has been further tightened in some states with environmentally sensitive areas such as Sabah & Sarawak where the prevailing national regulation of 100 mg/L BOD has now been reduced to 20 mg/L. Therefore, palm oil mills are obliged to adopt a more reliable and effective effluent treatment process to comply with the effluent limits.

Due to the high concentration in BOD, anaerobic digestion is widely used in the palm oil industry to treat BOD content in POME. This results in generation of methane gas from the digester. Methane gas is one of the major contributor in global warming and can be used as a biogas to generate energy.

Thus, methane capture has been gaining popularity in the palm oil industry to utilize biogas and produce additional energy for internal or external use while reducing the GHG emissions from palm oil industry.



**Figure 3.1:** Biogas Plant (Example of methane capture from POME)

*Source: [www.etp.pemandu.gov.my](http://www.etp.pemandu.gov.my)*

MPOB in its study on life cycle assessment of palm oil production, has found that GHG emission reduction from palm oil mills with methane capture facility is about 76%. It is estimated that about 13.6 MT (20,000 m<sup>3</sup>) of biogas or methane can be obtained per day from 60 tonne Fresh Fruit Bunch (FFB) per hour mill. The biogas has a calorific value of 50 MJ/kg which is more than diesel's 45 MJ/kg. From the study, it is concluded that methane capture activities from POME could assist in reducing the carbon footprint in Malaysia and methane has the potential to generate additional energy for the plant.

Even though the advantages of methane capture are well known among palm oil mills, but most of them are still opting for the conventional ponding system and release methane uncontrollably to the atmosphere. This is due to the high investment cost and long payback period.

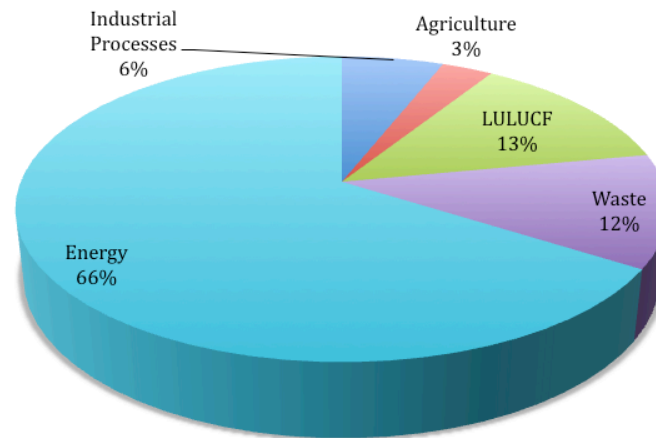
Palm oil industry is foreseen to continue grow over time and POME can potentially become a sustainable source of biogas to boost up the renewable energy sector. It is expected that if all palm oil mills install biogas facility, more than 500 thousand tonnes of methane could be produced in a year which is equivalent to 3.2 million MWh of electricity. This could potentially reduce more than 10,000 MT CO<sub>2</sub> eq of GHG emission each year.

### 3.5 Inventory of Greenhouse Gases (GHGs)

Malaysia as a party to the UNFCCC is required to submit National Communication and Biennial Update Report (BUR) as decided by the Conference of Parties (COP). As of 2014, Malaysia had submitted 2 National Communication to UNFCCC in 2000 and 2011, respectively.

Currently, the Ministry of Natural Resources and Environment (MNRE) is preparing the Third National Communication (NC<sub>3</sub>) and BUR. Five (5) working groups (WG) had been setup for this purpose which comprises of Energy Sector, Industrial Processes and Product Use (IPPU) Sector, Agriculture Sector, Land Use, Land Use Change and Forestry (LULUCF) Sector and Waste Sector.

DOE has been appointed as the lead agency for WG on Waste Sector. Thus, DOE has taken the initiative to form a Committee on WG on Waste Sector which is responsible to collect and analyse data on GHG emissions. The committee members appointed includes related government and private agencies such as National Solid Waste Management Department, Indah Water Konsortium (IWK), Natural Resources and Environment Board (NREB) and Public Works Department. Based on Malaysia Second National Communication (NC2), waste sector is the third major GHG emission source in Malaysia after the Energy and Land Use, Land Use Change & Forestry (LULUCF) sector.



**Figure 3.2** Percentage of Greenhouse Gas Emissions by Sectors in 2000

*Source: Malaysia Second National Communication, 2011*

By developing GHG inventory for waste sector, DOE is able to estimate as well as understand emissions sources and the trend to project future emissions. This will be an essential tool in identifying cost-effective emission reduction opportunities and developing climate related policies in Malaysia. GHG inventory could also help in quantifying the benefits of activities that reduce emission and also set goals or targets for future reductions.

### 3.6 Green Industry Initiatives

DOE has progressively focused on another environmental management strategy, which is green industry. United Nations Industrial Development Organization (UNIDO) has defined green industry as the development and industrial production, which is carried out without compromising the quality of environment or human health. One of the main concept of green industry is cleaner production which involves reducing environmental impacts along with the entire life cycle of a product / service by conserving resources (raw materials, energy and water), eliminating toxic raw materials and reducing the quantity and toxicity of all emissions and wastes.



**Figure 3.3:**  
Benefits of Cleaner Production  
**Source:**  
*Introduction to Cleaner Production*

Under the Tenth Malaysia Plan (RMK-10), one of the policy strategy is to promote green industry practices and create a pool of experts and consultants to enhance green industry practices among small and medium enterprises (SMEs). The number of SMEs is more than 95% of total industry in Malaysia, making it the major contributor to environmental pollution in Malaysia. Thus, DOE through Green Industry Unit initiated programs to promote and improve the SMEs ability in prevention and control of pollution towards self-compliance of environmental regulations. One of the goals is to reduce carbon emissions from SMEs which will help in mitigating climate change. This will also help SMEs to equip themselves for a bigger challenge in the future, such as the implementation of green economy, green labelling, green procurement etc.

Since the establishment of Green Industry Unit, DOE has conducted several trainings for DOE officers, industries and auditors on green industry practices. DOE has also provided consultation / assistance on Cleaner Production (CP) audit to 10 local SMEs under its Cleaner Production Audit Assistance and Consultation program. The efforts will be continued in the Eleventh Malaysia Plan (RMK-11), to further enhance green industry capability through the Cleaner Production Demonstration Program, Green Industry Award Program and research and development program in collaboration with local research institute and universities.





***CHAPTER 4***  
***CONCLUSION***

## CHAPTER 4 : CONCLUSION

Malaysia had taken the initiative to reduce climate change impacts by initially ratifying the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol in 1994 and 1999 respectively. Malaysia had also established institutional framework in order to coordinate issues regarding climate change such as the National Green Technology and Climate Change Council (NGTCCC) chaired by the Honorable Prime Minister and the National Steering Committee on Climate Change (NSCCC) chaired by the Secretary General of Ministry of Natural Resources and Environment (NRE). There are several national policies and laws related to climate change which had been identified and imposed under the national framework. These policies include National Policy on Climate Change, National Policy of Environment, National Forestry Policy, National Energy Policy and others while related national laws are the Environmental Quality Act (EQA) 1974, Laws of Malaysia Act 610, Energy Commission Act 2001, National Forestry Act 1984 and others.

Department of Environment's (DOE) role in reducing mitigating climate change impacts is in line with the department's vision and mission. DOE had developed the Clean Air Action Plan (CAAP) with the main objective of achieving better air quality which has a co-benefit of reducing greenhouse gas (GHG) emission. Some of the efforts outlined in the CAAP which contribute to mitigating climate change impacts are improvement in emission standards for motor vehicles, improvement of fuel quality and implementation of the Fire Prevention Programme at Peatland. Apart from CAAP, there are also several special projects undertaken by DOE which contribute to climate change mitigation efforts. These projects are the phasing out of Ozone Depleting Substance (ODS), HCFC Phase-out Management Plan (HPMP), Methane (CH<sub>4</sub>) Capture from Palm Oil Mill Effluent (POME) Treatment System, Development of National GHG Inventory and the Green Industry Initiatives.

All in all, DOE takes a multifaceted approach towards climate change mitigation in her efforts to help Malaysia move towards a low-carbon and developed society.



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