Government of the Republic of Trinidad and Tobago

NATIONAL CLIMATE CHANGE POLICY

July 2011

TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS

AR4 – Fourth Assessment Report of the Intergovernmental Panel on Climate Change

°C - Degrees Celsius

CCCCC - Caribbean Community Climate Change Centre

CH_4 - Methane

Cm - Centimetre

CO_2 - Carbon Dioxide

GHG - Green House Gases

Gg - Gigagrammes

HADCM- Hadley Climate Model

In - Inches

IPCC - Intergovernmental Panel on Climate Change

Mm - Millimetre

NCDC- National Climate Data Center of the United States of America

NOAA- National Oceanographic and Atmospheric Administration of the United States of America

NO_x - Oxides of Nitrogen

N_2O - Nitrous Oxide

NMVOCs - Non- Methane Volatile Organic Compounds

PRECIS - Providing Regional Climates for Impact Studies

Ppm - Parts Per Million

SIDS – Small Island Developing States

SLR- Sea Level Rise

SST- Sea Surface Temperature

UNDP - United Nations Development Program

WMO - World Meteorological Organization

1.0 INTRODUCTION

1.1 Climate Change as a Global Environmental Problem

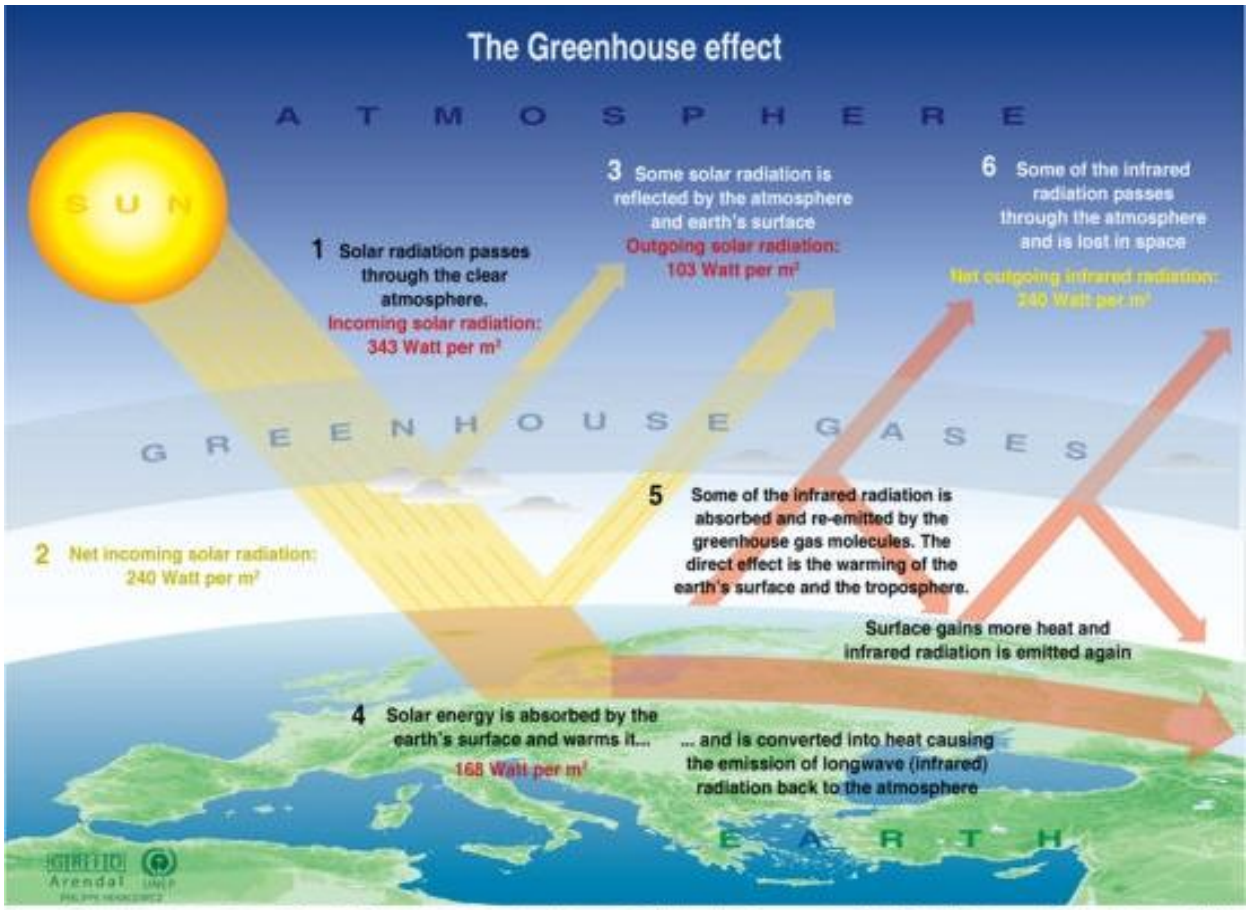
According to data sources compiled by the World Meteorological Organization (WMO), the Earth has warmed on average by 0.74 °C (degrees Celsius) over the last hundred years, with 0.4 °C of this warming occurring since 1970. The past decade has been the warmest on record since the beginning of instrumental climate records in 1850. Globally, the rate of warming averaged over the last 50 years is nearly twice that of the last 100 years. The Intergovernmental Panel on Climate Change (IPCC) has determined that 90 % of the warming effect can be attributed to human activities since the onset of the industrial revolution such as burning of fossil fuels for power generation, transport, industrial processes and housing. Since 1979, anthropogenic induced global warming and climate change has been recognised as an environmental problem affecting mankind and recently acknowledged as perhaps the most pressing environmental issue of the twenty first century which can pose significant challenges to sustainable development objectives.

The international policy response to global climate change has been through the adoption of two legal instruments: the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol. Trinidad and Tobago is a ratified signatory to both these legal instruments. The ultimate objective of the UNFCCC is *"the stabilisation of greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system and in a timeframe that would allow ecosystems to adapt naturally, will not hamper food production and allow sustainable economic development*." The Kyoto Protocol is a legally binding instrument that requires developed country parties to reduce their aggregate greenhouse gas emissions by 5.2 % below their 1990 levels by 2012. Developing countries parties have no such legally binding commitment. However, being signatories to the UNFCCC, they are mandated to pursue development pathways that will achieve the ultimate objective of the UNFCCC by following a low carbon paradigm as far as possible.

1.1.1 Science and Impacts of Climate Change

While global warming and climate change is not a new phenomenon and has been occurring naturally for millions of years, there is now mounting evidence that there is currently an accelerated rate of warming and climate change as a result of human activity, primarily due to an increase in the concentrations of greenhouse gases in the atmosphere as a result of fossil fuel combustion, industrial processes and waste management. Emissions of greenhouse gases (GHGs), which are attributed to be the cause of global warming and associated climate change, continue to rise. Most developed countries and rapidly developing nations share the common view that global average temperatures should not rise by more than 2 ºC above pre-industrial levels before the year 2100.Limiting warming by 2 °C by 2100 will mean capping the current

atmospheric concentration of greenhouse gases of 430 parts per million by volume (ppm) at 550 ppm, or reducing global emissions by 50 %compared to 1990 levels by 2050[1]. The cost of action to reduce GHG emissions and stabilise atmospheric concentrations to 500-550 ppm has been quantified by Sir Nicholas Stern in *The Economics of Climate Change* (2007) to be in the order of 1 % of gross global GDP. Delayed action on this stabilisation can escalate damage costs to as much as 20 % of global GDP taking into account the higher losses in most developing countries.



Sources: Okanagan university college in Canada, Department of geography, University of Oxford, school of geography; United States Environmental Protection Agency (EPA), Washington; Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge university press, 1996.

Figure 1: The Greenhouse Effect

Greenhouse gases include carbon dioxide, methane and nitrous oxide which act as a heat trap and thus, warm the Earth over time as shown in Figure 1. The increased heat energy of the Earth is ultimately dissipated through the climate system so resulting in climate variability and change. Scientific evidence as reported by the IPCC in its Fourth Assessment Report (AR4) suggests that on a global basis, eleven of the twelve years during the period 1995-2006 rank among the twelve warmest years in the instrumental record of global surface temperature (since 1850). Additionally, the National Climate

[1] Meinshausen, M. et al, 2009. Greenhouse-gas emission targets for limiting global warming to 2°C, Nature Vol. 458, pp: 1158-1162.

Data Center (NCDC) of the National Oceanographic and Atmospheric Administration (NOAA) of the United States, list the warmest years on record as being dominated by years from this millennium; each of the 10 years in the period 2001–2010 features as one of the 11 warmest on record[2]. Although the NCDC temperature record begins in 1880, less accurate reconstructions of earlier temperatures suggest these years may be the warmest for several centuries to millennia.

Global average sea level has risen since 1961 at an average rate of 1.8 mm/year and since 1993 at 3.1 mm/year, with contributions from thermal expansion, melting glaciers and ice caps, and the polar ice sheets. Satellite data since 1978 show that annual average Arctic sea ice extent has shrunk by 2.7 % per decade, with larger decreases in summer of 7.4 % per decade. Mountain glaciers and snow cover on average have declined in both hemispheres.

1.1.2 Projected Global Impacts of Climate Change

The Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) projects that by around the year 2100, global temperatures will rise by 1.1 °C to 6.4 °C over 1990 levels, while global mean sea levels are projected to rise by 18 cm to 59 cm, depending on future scenarios of varying global emission levels. Temperature extremes, heat waves and heavy rainfall events are projected to become more frequent as well.

For the next two decades a warming of about 0.2 °C per decade is projected. Even if the concentrations of all greenhouse gases are kept constant at year 2000 levels, a further warming of about 0.1 °C per decade would be expected. Temperature projections increasingly depend on specific greenhouse gas emission scenarios in the future.

1.1.3 Projected Climate Change Impacts for the Caribbean Region

The following details projected impacts of climate change to the Caribbean Region. These projections are based on those estimated by the IPCC AR4:

1. Temperature Increases: Temperature trends in the Caribbean over the past fifty (50) years have mirrored observed global warming trends, with rises in annual average temperatures in the range of 1.1 °C to 6.4 °C being projected during the 21st century by 2100.

2. Extreme Events: Climate change is projected to increase the incidence of extreme events (floods, droughts) and the intensity of hurricanes (a greater likelihood of category 4 and 5 hurricanes). Intense hurricane activity in the Caribbean region was significantly higher during the 1950s and 1960s, in comparison with the 1970s and 1980s and the

[2] http://www.ncdc.noaa.gov/oa/ncdc.html accessed May 26th 2011

first half of the 1990s, except during 1988, 1989 and 1995. Between 1995 and 2000 the region experienced the highest level of North Atlantic hurricane activity.

NOAA however attributes this increased activity to natural occurring cycles in tropical climate patterns near the equator. These cycles, called *"the tropical multi-decadal signal,"* typically last several decades (20 to 30 years or even longer). As a result, the North Atlantic experiences alternating periods that last decades long of above normal or below normal hurricane seasons. NOAA research shows that the tropical multi-decadal signal is causing the increased Atlantic hurricane activity since 1995, and argues it is not related to greenhouse warming.[3]

3. Sea Surface Temperature (SST) Increases: SST trends at some locations in the Caribbean nearly double those being observed over global tropical oceans. SST in the Caribbean Basin over the past two decades indicates that warming is taking place in a range of 0.2 °C to 0.5 °C per decade. The greatest increases in SST have been seen in the Windward Islands of the Lesser Antilles such as Grenada, St. Vincent and the Grenadines, Dominica and St. Lucia. If the average temperature of the Earth increases by 1.5 °C or 2 °C as projected, the accumulation of thermal stress on Caribbean coral reefs will far exceed the known mass coral bleaching thresholds across the Caribbean (UNDP, CCCCC, 2010)

4. **Sea Level Rise (SLR):** Depending upon tectonic influences, Caribbean countries are projected to experience SLR at rates between 18 cm to 59 cm by 2100**.** The impacts of SLR will not be uniform in the Caribbean and it is anticipated that Suriname, Guyana, Belize and the Bahamas will be most severely impacted.

5. Precipitation: Total rainfall is expected to decrease, accompanied by a change in rainfall patterns such that more heavy rain events are projected. These declines in precipitation will lead to an increase in the risk of periods of drought, which are likely to occur more frequently and be more severe.

2.0 SITUATIONAL ANALYSIS

2.1 Geographical Location of Trinidad and Tobago

The Republic of Trinidad and Tobago is an archipelagic state in the southern Caribbean, lying northeast of the South American nation of Venezuela and south of Grenada in the Lesser Antilles roughly between 10^{o}N and 11.5^{o}N (degrees North) latitude and between 60^{o}W and 62^{o}W (degrees West) longitude. It also shares maritime boundaries with Barbados to the northeast and Guyana to the southeast. The country covers an area of 5,128 square kilometers (1,979 square miles) and consists of two main islands, Trinidad and Tobago. Trinidad is the larger and more populous of the two main islands; Tobago is much smaller, comprising about 6 % of the total area and 4 %

[3] http://www.magazine.noaa.gov/stories/mag184.htm accessed May 26th

of the population. Trinidad and Tobago lies on the southern margins of the Atlantic Hurricane belt and normally escapes the passage of cyclones and hurricanes.

2.2 Description of the General Climate and Observations Related to Climate Variability and Change in Trinidad and Tobago

Trinidad and Tobago experiences the year-round warm, humid conditions associated with the Tropics. Mean temperature is around 26 °C, dropping by only a degree or so in the cooler months of December to February. The wet season occurs through June to December, during which the islands receive around 200 mm-250 mm per month. Inter-annual variability in the Southern Caribbean climate is influenced strongly by the El Niño Southern Oscillation (ENSO). El Niño episodes bring warmer and drier than average conditions between June and August, and La Niña episodes bring colder and wetter conditions at this time.

There is little variation in temperature conditions throughout the year. The mean annual temperature for the entire country is 21 °C. In the capital city of Port-of-Spain, the mean annual temperature is 25 °C, with an average minimum of 20 °C and an average maximum of 30 °C in January; the July range is 23 °C - 31 °C. Increasing elevation in Trinidad's Northern Range causes a corresponding decrease in temperature. Nights are generally cool.

In the northern and central hill areas and in Tobago, annual rainfall exceeds 250 cm (100 in) and most likely exceeds 380 cm (150 in) in specific areas. Most hilly sections receive 200 cm (80 in) or more, while in the lowlands the average drops below 165cm (65 in) and in certain sections, below 125 cm (50 in). There is a relatively dry season from about January to May and a wet season from June to December. The dry period is not however, a season of drought, as rain falls every few days in most areas.

Observations from meteorological data suggests that the average ambient temperature increased by 0.6 °C over the period 1961-1990 at an average rate of 0.2 °C per decade, consistent with the observations of the increase of the global average over the same period. However, more recent data analysis indicates an increase of 1.7 °C over the period 1961-2008, implying an increase in the rate of warming.

There has been no statistically significant change in mean rainfall over Trinidad and Tobago since 1960. However, the largest changes in rainfall are observed in the months of June, July and August (wet season) where, on average, rainfall has decreased by 6.1 mm per month (2.6 %) per decade. Additionally, analysis of data from the Nariva Swamp for the period 1951 to 2000[4] revealed a decrease in cumulative rainfall, consistent with future climate projections for the region, and Trinidad and Tobago in particular.

[4] M.N. Khan. 2007. M.Sc. Research Paper. CERMES. University of the West Indies

Observed sea level rise in Trinidad and Tobago has been reported to range between 1.6 mm and 3.0 mm per year over the period 1984 - 1992.[5]

2.3 Projected Impacts of Climate Change in Trinidad and Tobago

Downscaled regional models using the Providing Regional Climates for Impacts Studies (PRECIS) system from the Hadley Centre Coupled Climate Model (HADCM) global model[6] give projections for Trinidad and Tobago for the B1 and A2 scenarios[7] relative to the 1961 - 1990 averages. Projections for temperature increase and precipitation decrease for Tobago generally tended to be more extreme than for those for Trinidad, that is, indications of higher temperature increases and less precipitation in Tobago[8]

The mean annual temperature is projected to increase by 0.7 °C to 2.6 °C by the 2060s, and 1.1 °C to 4.3 °C by the 2090s. The range of projections by the 2090s under any scenario is around 1 °C to 2 °C. The projected rate of warming is similar throughout the year.

Projections of mean annual rainfall indicate decreases in rainfall for Trinidad and Tobago.

Sea-level in this region is projected by climate models to rise by the following levels by the 2090s, relative to 1980 - 1999 sea-level: 0.13 m to 0.43 m under the B1 scenario and 0.18 m to 0.56 m under the A2 scenario.

2.4 Greenhouse Gas Emissions for Trinidad and Tobago

Greenhouse gas inventories for all emitting sectors including power generation, transportation, industry, waste and agriculture have been conducted as part of the reporting obligations of Trinidad and Tobago as a signatory to the UNFCCC. Trinidad and Tobago accounts for 0.1 % of greenhouse gases in the context of global absolute emissions, but has a relatively high per capita emission. The carbon dioxide emissions

[5] Sutherland, Michael and Dare, Peter and Miller, Keith (2008) Monitoring Sea Level Change in the Caribbean. Geomatica, 62 (4). pp. 428-436

[6] http://precis.insmet.cu/eng/datos.html accessed August 6th 2009

[7] The B1 scenario is the emissions of greenhouse gases for a "best-case future world" for addressing climate change and portends a global society with the same global population, that peaks in mid-century and declines thereafter with rapid changes in economic structures toward a service and information economy, with reductions in material intensity and the introduction of clean and resource-efficient technologies. The emphasis is on global solutions to economic, social and environmental sustainability, including improved equity, but without additional climate initiatives. The A2 scenario is the emissions of greenhouse gases for a "worst-case future world" for addressing climate change and describes a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities, and continuously increasing population. Economic development is primarily regionally oriented and per capita economic growth and technological change more fragmented and slower. The B1 scenario therefore describes a best-case scenario while the A2 scenario describes business-as-usual or worst case scenario with little intervention to address climate change

[8] It is to be noted that there is significant uncertainty related to model outputs. The projections presented in this paper are indicative only and are not absolute and are based on statistically downscaled models of a single global circulation model the HAD-CM

level of Trinidad and Tobago for 2008 was 28.37 t/CO_2/per capita[9], which was the highest in the region. This is as a result of having a small population coupled with being the leading Caribbean producer of oil and gas.

Greenhouse gas inventories conducted for the period 1990-2008 using the Revised IPCC Guidelines for National Greenhouse Gas Inventories which examined the emissions of CO_2, CH_4, N_2O, NO_x and NMVOCs indicate that the energy, transportation, power generation and industrial sectors account for the bulk of carbon dioxide emissions and show the following trends:

2.4.1 Energy Sector

The energy sector details fuel combustion and not fugitive emissions from fuels due to unavailability of data and reports sectorally. The industries used in the sectoral approach were the energy, manufacturing, construction, and transport industries. Carbon dioxide emissions from the energy sector increased from 16,806 gigagrams (Gg) to 63,456 Gg, which represents an increase of 278 % over the period 1990 - 2011.

2.4.2 Transport Sector

Carbon dioxide emissions from the transport sector are a subset of emissions reported under the energy sector. Carbon dioxide emissions have doubled from 1990 levels of 1,313 Gg to 2,622 Gg in 2006. There is a direct correlation with the number of vehicles increasing by almost 100 % over the same period from approximately 150,000 registered vehicles in 1990 to approximately 275,000 vehicles in 2006.

2.4.3 Power Generation

Carbon dioxide emissions from power generation are also a subset of emissions reported under the energy sector. Carbon dioxide emissions have increased by 43.3 % comparing the 1990 value of 1,736 Gg to 2,488 Gg in 2006.

2.4.4 Industrial Processes

Carbon dioxide emissions from the industrial processes sector have increased by 86.7 % from 1990 to 2006.

[9] http://www.iea.org/stats/indicators.asp?COUNTRY_CODE=TT accessed May 26th 2011

2.4.5 Role of Sinks

Ecosystems such as forests absorb carbon dioxide and the net emissions would therefore be the difference between emissions and sinks.

The UNFCCC specifically recognises that emissions from developing countries will continue to increase as these countries pursue their development paths towards improving their standards of living and reducing poverty. Trinidad and Tobago is no exception to this expectation and trend.

2.5 Sectoral Vulnerability in Trinidad and Tobago

As a small island developing state (SIDS), Trinidad and Tobago is particularly vulnerable to the adverse impacts of climate change such as those related to temperature increases, changes in precipitation and sea level rise.

Specific sectors that are likely to be impacted on are:

2.5.1 Agriculture

- Projected increases in ambient air temperature is likely to result in increased aridity of soils and decreased crop yields due to intolerance of crop varieties.

- Projected decreased precipitation is likely to result in increased aridity of soils and decreased crop yields due to less irrigation water availability.

- Projected increase in sea level is likely to result in inundation of coastal areas and salinisation of productive soils, leading to decreased crop yields and available areas for agricultural production.

- Projected increases in the incidence of invasive species, pests and diseases.

2.5.2 Human Health

- Projected increases in ambient air temperature are likely to result in the increased spread of vector borne diseases due to increased humidity, while also giving rise to favourable conditions for increased vector populations.

- Projected decreased precipitation is likely to result in reduced availability of potable water. Additionally, reduced rainfall will indirectly affect food availability due to inability to water crops.

- Projected increased sea level and precipitation intensity is likely to result in an increase in the incidences of water borne diseases in permanently or often flooded areas.

2.5.3 Human Settlements and Infrastructure

- Projected increases in intensity or heavy precipitation events[10] in concert with deforestation can result in increased incidences of flooding in flood plains which can have adverse impacts on human settlements and human health. This may result in disruption of settlements, commerce, transport and towns and villages due to flooding which can add further pressures on urban and rural infrastructure and loss of property.

2.5.4 Coastal Zones

Climate change impacts in the coastal zone are expected to be multi-sectoral based on the fact that, in Trinidad and Tobago, settlements are concentrated within the coast and any impacts will be far reaching. These impacts will arise largely as a result of:

- Sea level rise: Increased inundation, increased erosion and loss of coastline and coastal amenities such as human settlements; natural resources such as wetlands and associated ecosystem goods and services; and loss of coastal agricultural lands due to soil salinisation.

- Temperature increase: Increase in sea surface temperature will lead to loss of natural coastal defenses such as coral reefs, further leading to loss of fisheries and increased erosion and inundation as a result of increased wave energy reaching the coast.

- Ocean Acidification: Increased carbon dioxide in the atmosphere dissolves in the ocean resulting in a lower seawater pH which can be detrimental to the fishery.

2.5.5 Water Resources

Impacts in the water resources sector are expected to arise as a result of:

- Temperature increase: Loss of available surface water as a result of increased evapotranspiration.

[10]IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 7-22

- Decreased precipitation: Reduced percolation and recharge of groundwater reserves in aquifers; reduced availability of surface water and potable water.

- Salt Water Intrusion: Saline water entering freshwater aquifers reducing available freshwater.

2.5.6 Tourism

It is acknowledged that while tourism provides a significant source of Gross Domestic Product (GDP) to Tobago, and given that it is dependent on the viability of other sectors such as agriculture, human health, biodiversity, energy, coastal zone management, and infrastructure, it is not treated as a stand - alone sector with respect to biophysical impacts.

3.0 JUSTIFICATION FOR NEEDED ACTION

A lag time exists between emissions of greenhouse gases and the reaction of the atmosphere. Consequently, the world is committed to some degree of climate change as a result of past emissions. This means that there will be inevitable impacts of future climate change even if global greenhouse gas emissions were to be reduced immediately. Adaptation and mitigation therefore remains a priority for highly vulnerable countries such as Trinidad and Tobago. As a SIDS, Trinidad and Tobago will be severely impacted by the adverse effects of climate change as a result of its inherent characteristics such as small land space, limited technical and technological capacity, limited human capacity and susceptibility to the vagaries of international trade and exogenous economic shocks.

Although Trinidad and Tobago accounts for less than 1% of absolute global greenhouse gas emissions, its emissions portfolio is expected to increase as identified by the UNFCCC. This is based on the fact that Trinidad and Tobago is an oil and gas producer. Notwithstanding, the government recognises the need to address the challenge of climate change in accordance with the stated principles of this and other relevant policies as well as with those of the UNFCCC. To this end, the government has identified the following reasons for such action:

1. Integration of adaptation into national planning

Since the impacts of climate change are expected to be cross - sectoral, transcending the biophysical and socio-economic systems, preparedness through adaptation planning for these impacts are crucial, given the government’s intention to address climate change within the context of the seven pillars of sustainable development as well as achieving sustainable development in accordance with the Millennium

Development Goals (MDGs) and the Mauritius Strategy for the Implementation of the Barbados Programme of Action.

2. Co-benefits of mitigation action

Increased use of alternative fuels, renewable energy and cleaner production technology will increase the quality of the ambient air and reduce incidences of respiratory illnesses and the associated provision of health care, along with improving the quality of lives of citizens of Trinidad and Tobago. The conservation of natural carbon sinks such as forests and coastal ecosystems will also ensure continuous provision of food and sustainable livelihoods for communities.

3. Economic opportunities and cost savings

Mitigation and adaptation actions can provide economic opportunities such as the development and deployment of mitigation and adaptation technologies, and participation in the Clean Development Mechanism (CDM) of the Kyoto Protocol. Trinidad and Tobago may also realise cost savings in respect of reduced waste management costs through cleaner production technology. The manufacturing sector can benefit from increased demand for renewable energy technology through research and development of such technology.

4. Enhanced energy security

Trinidad and Tobago already utilizes Compressed Natural Gas (CNG), the least carbon intensive fuel of all fossil fuels, for power generation. Enhancing the use of renewable energy and energy efficiency will augment power generation and demand, and provide greater energy security for the future.

4.0 POLICY CONTEXT

Climate change impacts are very specific in the context of geographical location, sectoral characteristics and cross-sectoral interactions. Accordingly, there is no “one-size-fits-all” policy for countries or even sectors, and climate change policies are developed based on a consideration of national circumstances, development aspirations, and sectoral characteristics and cross-sectoral interactions. This policy was developed after comparisons were made of climate change policies for countries of similar development aspirations, size and geographical location.

4.1 International

Trinidad and Tobago, as a ratified signatory to the UNFCCC and its Kyoto Protocol, is committed under Article 4 of the UNFCCC to *inter alia*:

i. Develop, periodically update and publish national inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases;

ii. Formulate, implement, publish and regularly update national programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of greenhouse gases and measures to facilitate adequate adaptation to climate change;

iii. Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors;

iv. Promote sustainable management, the conservation and enhancement of sinks and reservoirs of greenhouse gases including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems;

v. Prepare for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas affected by drought and desertification, as well as floods;

vi. Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimising adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change;

vii. Promote scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies;

viii. Promote open exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change, and to the economic and social consequences of various response strategies;

ix. Promote education, training and public awareness related to climate change and encourage the widest participation in this process, including that of non-governmental organisations.

Under the Kyoto Protocol, Trinidad and Tobago, as a developing country is committed to:

i. Formulate, where relevant and to the extent possible, cost-effective national programmes to improve the quality of local emission factors, activity data and/or models which reflect the socio-economic conditions for the preparation and periodic updating of national inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases

ii Formulate, implement, publish and regularly update national programmes containing measures to mitigate climate change and measures to facilitate adequate adaptation to climate change. Such programmes would, *inter alia*, concern the energy, transport and industry sectors as well as agriculture, forestry and waste management. Furthermore, adaptation technologies and methods for improving spatial planning would improve adaptation to climate change

The implementation of this policy would, therefore, seek to fulfil the commitments of Trinidad and Tobago to the UNFCCC and the Kyoto Protocol.

4.2 Regional

The Caribbean Community (CARICOM) has agreed that climate change is an urgent issue for the countries of the region and therefore, regional governments have committed to addressing the issue at the local, regional and international levels. CARICOM has also presided over the formulation and execution of regional projects on climate change in which Trinidad and Tobago has participated. CARICOM governments have established a Caribbean Community Climate Change Centre (CCCCC) which would have the responsibility of providing the necessary backstopping for countries of the region to implement climate change programmes and obligations under the UNFCCC and the Kyoto Protocol.

4.3 National

Given that climate change is a multi-faceted and multi-sectoral issue that is also cross-cutting, the climate change policy would of necessity have implications for the revision of other sectoral policies in order to integrate and contextualise the climate change issue in the relevant sectoral policy. Climate change is not specifically addressed in existing sectoral and national policies although there are broad references to mitigation and adaptation in the National Environmental Policy (NEP), 2006 of Trinidad and Tobago.

As policy is developed, it is prudent to ensure that there is synergy with other related policies. Existing national policies and legislation that have some relevance to climate change include:

1. National Environmental Policy (2006)
2. National Policy and Programmes on Wetland Conservation for Trinidad and Tobago (2001)
3. National Protected Areas Policy (2011)
4. National Forest Policy (2011)
5. National Tourism Policy (2010)
6. Environmentally Sensitive Areas Rules (2001)
7. Draft Waste Management Rules (2008) and
8. Water Pollution Management Programme (2005)
9. Certificate of Environmental Clearance Rules (2001)

The NEP provides for the promotion of environmental enhancements in the form of reforestation, coastal protection, and wetlands conservation which can serve to protect coastal areas from storm surges during hurricanes, store water, reduce flooding, reduce wind damage and absorb greenhouse gases (GHG) such as carbon dioxide. At the onset, the policy highlighted the danger climate change posed to environmental sustainability. The NEP also addresses greenhouse gas mitigation through inventorying of GHGs; maintenance of stakeholder involvement in the development of technologies to curtail the emissions, and the conservation of forests, coastal and marine ecosystems that act as sinks for the absorption of GHGs. The policy also provides for the promotion of the use of financial instruments such as taxation on energy consumption (e.g. carbon tax) and employing accounting practices that seek to internalise the "true costs" of investing in fossil fuels as well as an extensive research and development programme into renewable energy sources.

The *National Policy and Programmes on Wetland Conservation for Trinidad and Tobago* was developed, in part, to fulfill obligations under the Ramsar Convention on Wetlands. While there is no specific mention of the role of wetland ecosystems as a sink for greenhouse gases, it is implicit in the role of wetlands in carbon sequestration.

The *National Protected Areas Policy* and *National Forest Policy* both address the role of forests and protected areas in the reduction of GHGs in the atmosphere through the provision of important regulating services such as carbon sequestration and climate regulation. The National Protected Areas Policy further underscored the ability of protected areas to mitigate against climate change via acting as sinks and resilience to temperature changes. As an adaptation measure, protected areas are identified as mechanisms which can lessen the impacts of changing weather patterns.

The *National Tourism Policy of Trinidad and Tobago* identifies climate change as having negative effects on the tourism product. The impacts of climate change can manifest themselves in the form of "beach erosion, coral bleaching, water and food shortages, ecosystem collapse, sea-level rise, extreme weather events and potentially catastrophic

'run-away' global heating". These impacts will ultimately hamper the ability of Trinidad and Tobago and the wider Caribbean region to supply a quality tourism product.

5.0 VISION

Being a signatory to the UNFCCC and responsible member of the international community, Trinidad and Tobago as an industrialising country is committed to pursuing a low-carbon development path, consistent with the principles of sustainable development. This will be done through the development and delivery of strategies and actions for maximising renewable energy resources, clean energy and clean production technology as well as adapting to the adverse impacts of climate change through integration within all aspects of national development in its infrastructural, human and socio-economic systems, at an acceptable balance of costs and benefits.

6.0 GOAL

The National Climate Change Policy will aim to provide policy guidance for the development of an appropriate administrative and legislative framework, in harmony with other sectoral policies, for the pursuance of a low-carbon development path for Trinidad and Tobago through suitable and relevant strategies and actions to address climate change, including sectoral and cross - sectoral adaptation and mitigation measures.

7.0 OBJECTIVES

The policy will guided by the following mutually interactive objectives:

i. reducing or avoiding greenhouse gas emissions from all emitting sectors

ii. enhancing carbon sinks

iii. protection of the natural environment and human health

iv. conserving and building resilience of human and natural systems to adapt to the adverse impacts of climate change, including through capacity building, the application of cleaner and energy efficient technologies, and relevant research and development.

v. enhanced agricultural production and food security

vi. educating the wider public on the potential impacts of climate change and the recommended adaptation strategies

vii. conserving and guaranteeing a sustainable supply of potable water

8.0 GUIDING PRINCIPLES

The climate change policy and strategy for Trinidad and Tobago shall adhere to the following guiding principles:

A. The response to the climate change challenge must be sustainable.

The government will adopt strategies and actions that are environmentally sustainable and compatible with economic growth and social development.

B. The response to climate change will require a consultative and multi-partite approach.

Meeting the challenge cannot solely be the role of Government. Given the nature of the challenge, which pervades all sectors and impacts on all citizens, the government shall engage with all relevant stakeholders including academia, research institutions, public and private sectors, non-governmental organisations (NGOs), community based organisations (CBOs), business and industry organisations, and the citizenry at large in developing strategies and approaches to addressing climate change both from a mitigation and adaptation perspective.

C. The response to climate change must follow the precautionary approach

The government will not await scientific certainty in order to act. Accordingly, the government shall develop, through a process of thorough consultation, win-win or no-regrets solutions, or “actions worth doing anyway” which will redound to the benefit of the citizens of Trinidad and Tobago, for current and future generations consistent with the principles of sustainable development.

D. The response to climate change must be multi-sectoral and include both mitigation and adaptation actions.

Notwithstanding the international recognition that greenhouse gas emissions from developing countries will continue to increase as they continue to develop, the government shall take its obligations under the UNFCCC seriously and act in a manner that will continue to the achievement of the ultimate objective of the UNFCCC. To achieve this, strategies and actions shall take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks

and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors.

E. The response to climate change must be evidence-based

Consistent with the precautionary principle and in recognition of the uncertainties associated with climate change projections, the policy shall be considered a living document and will be revised in the light of new scientific findings.

9.0 POLICY DIRECTIVES AND STRATEGIES

9.1 Policy Implementation and Integration

Implementation of the climate change policy will follow best industry practices in relevant aspects of policy implementation. The implementation of this policy will also require the involvement of all government ministries and agencies. Accordingly, the government shall implement this policy through the incorporation and integration of elements of this policy into existing and proposed sectoral policies by revising relevant policies where applicable, as well as facilitating implementation through the drafting and amendment of relevant legislation.

The implementation of this policy shall be coordinated by the Multilateral Environmental Agreements Unit of the Ministry of Housing and the Environment, which has primary responsibility for the implementation of the UNFCCC and the Kyoto Protocol as well as other multilateral environmental agreements to which Trinidad and Tobago is a signatory, and for which the Ministry is the National Focal Point. It is envisaged that the implementation of this policy would be through the development of relevant strategies and action plans implementable over defined time periods.

9.2 Mitigation

Trinidad and Tobago will continue to develop all relevant sectors including its industrial sector as it aspires towards achieving sustainable development. The government proposes to accomplish this via a low greenhouse gas emission economic development pathway across all sectors of the economy. Accordingly, the government shall:

i. Increase the use of renewable energy by:

    a. Developing a renewable energy policy and standards
    b. Developing suitable fiscal incentives for domestic use and sale to the national grid.

c. Developing initiatives such as replacing conventional street lighting with solar powered Light Emitting Diodes (LEDs) utilising a phased approach through routine maintenance programmes.

ii. Increase energy efficiency in commercial and residential buildings by:
   a. Developing a Green Building Code that will seek to maximise renewable energy and energy efficiency
   b. Formulating and adopting energy efficiency standards through the Trinidad and Tobago Bureau of Standards

iii. Increase the use of alternative fuels and fuel switching in the transportation sector by:
   a. Maximising the use of CNG as a vehicle fuel and the provision of suitable fiscal incentives for vehicle conversion for private owners, and mandatory conversion for state-owned and public vehicles such as buses and taxis
   b. Exploring fiscal incentives for the importation of hybrid vehicles and fuel cell vehicles
   c. Improving public transport efficiency including through mass transit systems
   d. Examining the potential and feasibility of a percentage replacement of traditional fuels by biofuels for domestic production and consumption. In so doing, an examination of demand/supply and cost/benefit issues and their implications for local food production in terms of land use, land use planning and agricultural and forest displacement will be conducted
   e. Exploring other waste minimisation technologies related to emissions such as combined heat and power, and energy from waste

iv. Increase the use of cleaner technology in all GHG-emitting sectors by:
   a. Instituting mandatory inventorying, reporting and auditing of greenhouse gas emissions from all sectors to monitor emission trends and quantities that will inform technology intervention options
   b. Developing regulatory approaches and technology standards
   c. Exploring the feasibility of developing cap-and-trade regimes within and across emitting sectors
   d. Retrofitting emitting sectors with cleaner technologies
   e. Providing fiscal incentives for and disincentives to encourage the use of cleaner technology
   f. Utilisation of information and communication technologies (ICT)

v. Enhance natural carbon sinks by:
   a. Conserving forests and protecting natural systems, including rehabilitation of degraded areas that contribute to carbon sequestration

vi. Maximize the use of the carbon market by:
   a. Strengthening institutional capacity to participate in the Clean Development Mechanism of the Kyoto Protocol

b. Developing incentives for participation in feasible domestic cap-and-trade regimes

vii. Enhance research and development by:
   a. Encouraging research and development in the maximisation of renewable energy resources such as solar, wind, oceans and tides through the development of incentives and institutional arrangements for multipartite involvement including private sector, academia, government and NGOs
   b. Encouraging the development and manufacturing of raw materials for renewable energy technologies such as fuel cells and solar cells through the provision of requisite enabling environment including, *inter alia*, the formulation of incentives to involve private sector investment
   c. Exploring new technologies for carbon sequestration through cooperating with the international community to develop carbon capture and storage technology in geological formations utilizing the already abundant experience of Trinidad and Tobago in using carbon dioxide for enhanced oil recovery
   d. Exploring the potential of emerging and innovative technologies such as those for utilising carbon emissions, for example, greenhouse gas to chemical resources technology

9.3 Adaptation

Trinidad and Tobago as a small island developing state is particularly vulnerable to the adverse impacts of climate change, which are cross-sectoral and multi - faceted. Adaptation measures would therefore need to be integrated into the national development agenda across all sectors, both biophysical and socio-economic. Accordingly, the government shall integrate adaptation planning into national policy and planning by:

   a. Strengthening existing institutional arrangements for systematic observations, research and climate change modeling including through cooperation with academia, NGOs and the private sector
   b. Assessing sectoral vulnerability to climate change by conducting vulnerability analyses and formulating adaptation options, including technological application, in biophysical and socio-economic systems
   c. Revising sectoral policies to include consideration of climate change impacts derived from vulnerability analyses
   d. Revising national development plans to incorporate climate change vulnerability, impacts and adaptation options with a view to climate proofing new developments and retrofitting existing infrastructure
   e. Enhancing the resilience of natural biophysical systems so as to maximize ecosystem services such as the natural coastal defense

properties of coral reefs and mangrove systems, through the development of a system of national protected areas, including for water catchment

f. Promoting community-based adaptation through expanded use of the Green Fund for capacity building and enhancing resilience

9.4 Education, Awareness, Capacity Building and Institutional Strengthening

Education and awareness of national efforts for addressing climate change is critical to the success of the implementation of this Policy. Accordingly, the Government shall:

a. integrate educational programmes on climate change impacts, mitigation and adaptation into primary and secondary school curricula

b. partner with tertiary institutions to enhance programmes on climate change

c. develop and implement within one (1) year of the adoption of this policy a communication strategy to ensure public buy-in of the climate change policy and thereby ensure the effective participation of the public

d. conduct continuous public awareness programmes and initiatives targeting key audiences and utilising a variety of methods and media (including the internet, film and radio)

e. ensure that national and local stakeholders have equitable access to and benefit from information and knowledge on climate change impacts, mitigation and adaptation, including information and knowledge from foreign stakeholders and researchers

f. ensure the enhancement of capacity building and institutional strengthening through the training of public officers in academia, CBOs and NGOs via attachments to overseas Centres of Excellence, including the Caribbean Community Climate Change Centre, in areas that are critical to climate change such as vulnerability analyses, climate modelling, greenhouse gas inventorying and negotiation skills

9.5 Information and Data Sharing

The government recognises that relevant data is critical to the implementation of this policy, which is being collected and housed in various government ministries and agencies. Accordingly, the government shall institute a policy of free exchange of information and data among ministries and agencies for use towards the implementation of this policy.

9.6 Financing Implementation

The government shall provide financial support for the implementation of this policy. Funding shall be augmented by accessing project grants from international

organisations through the preparation of project proposals, and through bilateral and multilateral cooperation.

10.0 ACCOUNTABILITY

Implementation of this policy will be done through the set-up of relevant stakeholder networks designed to facilitate self-monitoring and reporting. The climate change policy will be revised every five (5) years with public review to determine its overall effectiveness in achieving its objectives and update the policy based on findings of the review while simultaneously incorporating new scientific data.

APPENDIX I: GLOSSARY

Adaptation is the term generally used for coping mechanisms for the adverse impacts of climate change.

Caribbean Community Climate Change Centre (CCCCC) The Caribbean Community Climate Change Centre is the official archive and clearing house for regional climate change data in the Caribbean. The Climate Change Centre coordinates the Caribbean region's response to climate change, working on effective solutions and projects to combat the environmental impacts of climate change and global warming.

The Centre also provides climate change-related policy advice and guidelines to the Caribbean Community (CARICOM) Member States through the CARICOM Secretariat.

Climate Variability denotes the inherent change in climate over a period of time.

Greenhouse Gas a greenhouse gas sometimes abbreviated (GHG) is in an atmosphere that absorbs and emits radiation within the thermal infrared range. The primary greenhouse gases in the Earth's atmosphere are: water vapour, carbon dioxide, methane, nitrous oxide and ozone.

Intergovernmental Panel on Climate Change the Intergovernmental Panel on Climate Change (IPCC) is an intergovernmental body opens to all member Countries of the United Nations (UN) and the World Meteorological Organization (WMO) with a mandate to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts. The IPCC is a scientific body. It reviews and assesses the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. It does not conduct any research nor does it monitor climate related data or parameters. Thousands of scientists from all over the world contribute to the work of the IPCC on a voluntary basis. Review is an essential part of the IPCC process, to ensure an objective and complete assessment of current information. IPCC aims to reflect a range of views and expertise. The Secretariat coordinates all the IPCC work and liaises with Governments.

Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. The major difference between the Protocol and the Convention is that while the Convention encouraged industrialised countries to stabilize their emissions, the Protocol commits them to do so. More information is available at www.unfccc.int/kyoto_protocol/items/2830.php

Mitigation as it relates to climate change is the term generally used to address action related to the abatement or avoidance of greenhouse gas emissions.

Ocean Acidification is the name given to the decrease in pH of the Earth's oceans caused as a result of the uptake of atmospheric carbon dioxide.

Salinization is the buildup of salts in soils as a result of capillary flow of saline water towards the surface. This condition results in land being too saline to support life.

Saltwater Intrusion is the movement of saline water into freshwater aquifers

United Nations Framework Convention on Climate Change is an International treaty to address Climate Change which sets the objective of stabilising greenhouse gas concentrations, "*at a level that would prevent dangerous anthropogenic interference with the climate system*". For more information visit www.unfcc.int/essential_background/items/2877.php