Government of Jamaica

EMISSIONS POLICY FRAMEWORK

July 2021

Table of Contents

List of Figures

List of Boxes

List of Tables

Place Holder

[Message by the Minister with Portfolio Responsibility for the Environment]

LIST OF ACRONYMS

BAU	Business as usual
CBO	Community-based Organization
CCAB	Climate Change Advisory Board
CCD	Climate Change Division
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CSEII	Caribbean Sustainable Energy and Innovation Institute
CSGM	Climate Studies Group, Mona
GDP	Gross Domestic Product
GFEI	Global Fuel Economy Initiative
GHG	Greenhouse gas
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
IPCC	Inter-Governmental Panel on Climate Change
ITA	Island Traffic Authority
JAAQS	Jamaica Ambient Air Quality Standard
JCAA	Jamaica Civil Aviation Authority
JUTC	Jamaica Urban Transit Company
JRC	Jamaica Railway Corporation
KMR	Kingston Metropolitan Region
lge/km	litres per gallon equivalent/kilometres
MAJ	Maritime Authority of Jamaica
MARPOL	International Convention for the Prevention of Pollution from Ships
MEGJC	Ministry of Economic Growth and Job Creation
MOH	Ministry of Health
MRECC	Ministry responsible for the Environment and Climate Change
MRV	Monitoring, Reporting and Verification
MRV	Measurement, Reporting and Verification (UNFCCC)
MSET	Ministry of Science, Energy and Technology
MW	Megawatt
MTM	Ministry of Transport and Mining
NAMA	Nationally Appropriate Mitigation Action
NDC	Nationally Determined Contribution
NEPA	National Environment and Planning Agency
NGO	Non-Governmental Organization
NRCA	Natural Resources Conservation Authority

NSWMA	National Solid Waste Management Authority
PIOJ	Planning Institute of Jamaica
PRTR	Pollutant Release and Transfer Register
REDD+	Reducing Emissions from Deforestation and forest Degradation plus conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks
SDG	Sustainable Development Goal
TWG	Thematic Working Group
UNFCCC	United Nations Framework Convention on Climate Change
UTECH	University of Technology
UWI	University of the West Indies
WHO	World Health Organization
WMO	World Meteorological Organization
YEAP	Youth Environmental Advocacy Programme

FOREWORD

The decision to prepare a policy framework on emissions was based on several factors, among them the need for a coordinated, structured approach to ensuring that Jamaica meets its targets for the reduction of the emission of harmful gases and substances and also the need for a definitive policy position on outdoor air pollution caused by human activities.

Recent scientific assessments on emissions of gases and particles which cause global air pollution and climate change highlight a worsening situation in terms of emissions increasing instead of decreasing. The World Health Organization considers air pollution to be the greatest environmental risk to health and an environmental health emergency, noting that the primary cause of air pollution (burning of fossil fuels) is also a major contributor to climate change.

According to the World Meteorological Organization, greenhouse gas emissions are still rising and has confirmed that 2015-2019 are the warmest five years on record, with the months January to May 2019 being the third warmest such period recorded[1]. The Intergovernmental Panel on Climate Change has reported that limiting global warming to 1.5° C will require rapid and far-reaching transitions in land, energy, industry, buildings, transport, and cities, and that global net human-caused emissions of carbon dioxide need to fall by about 45% from 2010 levels by 2030, reaching "net zero" around 2050.

The United Nations' Special Rapporteur on Human Rights and the Environment in his report to the Human Rights Council dated March 2019 has also called on States to take urgent action to improve air quality in order to fulfil their human rights obligations.

This is the global context within which Jamaica is expected to play its part in meeting its obligations under various treaties and agreements such as the 2030 Agenda on Sustainable Development. By the middle of this century there will have to be transformational change as the world looks to a carbon neutral future and to leave dependence on fossil fuels behind. New technologies are already being developed in the fields of transport, information and communication and energy which will replace fossil fuels, and contribute to cleaner air.

At the national level, Vision 2030 Jamaica - National Development Plan (which is over 90% in alignment with the Sustainable Development Goals) includes goals for a healthy and stable population and a healthy natural environment and the provisions of the Charter of Fundamental Rights and Freedoms (Constitutional Amendment) Act, 2011 address the need to protect public health and the environment.

[1] Article *'May 2019 was the 4th hottest on record for the globe'*, June 18, 2019 (https://www.noaa.gov/news/may-2019-was-4th-hottest-on-record-for-globe)

One of the main aims of the Emissions Policy Framework is to put in place a mechanism for coordinated approaches for how best to achieve effective and transparent implementation, taking advantage of synergies. The Emissions Policy Framework is not intended to conflict with sector policies or with other policy frameworks such as the Climate Change Policy Framework which itself involves several entities and addresses areas such as adaptation which are not covered in this document.

The year 2030 is particularly significant in terms of this Emissions Policy Framework not only in relation to Vision 2030 Jamaica – National Development Plan, but by 2030 as well, Jamaica should have met its Nationally Determined Contribution to reduce greenhouse gas emissions, in accordance with commitments under the 2015 Paris Agreement; implemented the National Energy Policy 2009-2030; and assessed its attainment of the Sustainable Development Goals of the 2030 Agenda for Sustainable Development. We will review this Policy Framework within the next five years and report, as required, on progress in achieving our targets.

The capacity, technological and financial requirements must be in place for successful outcomes within this timeframe. We have highlighted the urgency of climate finance for small island developing states and for urgent action to be taken for the reduction of greenhouse gas emissions, especially as globally emissions continue to increase. Jamaica, he Republic of France and Qatar , on the request of the United Nations, co-led efforts on climate finance in 2019, a critical matter for the achievement of the targets of the Paris Agreement.

The necessity for the involvement of the public as set out in Principle 10 of the Rio Declaration[2], 1992 is also recognized, namely, that environmental issues are best handled with the participation of all concerned citizens.

We thank the funding partners who have been working with Jamaica in support of our programmes and projects for environmental protection and sustainable development.

[2] The 1992 Rio Declaration on Environment and Development comprises 27 principles on sustainable development, including Principle 10. Subsequent to the Declaration, Jamaica and nine other governments from Latin America and the Caribbean endorsed the application of Principle 10 in 2012. In so doing, the countries: affirmed their commitment to the rights of access to information, public participation and justice in environmental matters; called for a regional instrument promoting these rights; and requested the support of the Economic Commission for Latin America and the Caribbean to guide the process. The Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (the “Escazú Agreement”) was subsequently adopted in 2018 and signed by Jamaica in 2019.

EXECUTIVE SUMMARY

1. Rationale for the Policy Framework

There is growing concern nationally and globally about the harm to human health, the environment and the climate caused by emissions of certain gases and substances.

The Government of Jamaica decided to review the current status regarding emissions, taking into account people's rights under the Constitution, the goals of Vision 2030 Jamaica – National Development Plan, and the need to address persistent air pollution issues island-wide. The review was also to cover Jamaica's commitments under global agreements on the environment which, in some cases, require countries to meet certain targets within specified timelines, and or to make fundamental changes for sustainable development.

In Jamaica, several policies and pieces of legislation have been developed over the years in relation to the energy, transport (land, air and sea), industrial, waste and agricultural sectors which are the main sources of emissions of air pollutants and greenhouse gases. This Emissions Policy Framework is intended to address cross-cutting issues, to set out overarching goals and to identify resource needs and gaps in the coverage of ambient (outdoor) air pollution and climate change issues as well as synergies between approaches to emissions reduction and climate change mitigation.

The context within which the Policy Framework has been developed is very dynamic especially at the global level, as there are constant changes in technologies (such as artificial intelligence, renewable energy, cleaner vehicles, etc.); the availability of data; revision of deadlines based on increasing urgency; increasing the ambition of targets and priorities; and growing calls from the public for action by governments to reduce harmful emissions.

The areas which are not included within the scope of the Policy Framework are: (1) natural sources of emissions; (2) radioactive emissions; and (3) indoor air pollution, which can result from sources such as smoke from cooking, recreational smoking, building materials and household cleaning products. Indoor air pollutants, including biological contaminants such as bacteria, moulds and mildew, are primarily addressed by the Ministry of Health in collaboration with the Ministry of Labour.

2. The Issues

Air pollution

The World Health Organization (WHO) has stated that by reducing air pollution levels, countries can reduce the burden of disease from stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, including asthma. The Organization has published assessments of the

impact of air pollution on deaths, disease and loss of productivity showing the data for all countries. WHO estimates that air pollution – both ambient and household – causes 7 million deaths per year (around 600,000 of children): 5.6 million from non-communicable diseases and 1.5 million from pneumonia. It is estimated that 90 per cent of the world's population breathes polluted air. The total number of deaths due to ambient air pollution in Jamaica in 2016 was estimated to be 695: 246 attributable to ischaemic heart disease, and 349 to stroke.

WHO's First Global Conference on Air Pollution and Health in October 2018 resulted in the Geneva Action Agenda to Combat Pollution with the aspirational goal of reducing the number of deaths from air pollution by two thirds by 2030.

The United Nations' Special Rapporteur on Human Rights and the Environment in his report to the Human Rights Council dated March 2019 called on States to take urgent action to improve air quality in order to fulfil their human rights obligations.

The National Environment and Planning Agency (NEPA) has stated that for the goals of Vision 2030 Jamaica – National Development Plan to be achieved, it is essential for existing air quality problems to be solved to prevent exacerbation and suppress the release of other pollutants. [3]

Greenhouse gas emissions

The emission of greenhouse gases such as carbon dioxide and methane from human activities is the main contributor to global warming, one of the main aspects of climate change. The Paris Agreement, under the UN Framework Convention on Climate Change, in 2015, led almost all countries in the world to make commitments to reduce greenhouse gas emissions, including through Nationally Determined Contributions (NDCs). The Agreement requires that by the middle of this century, carbon neutrality should have been achieved.

The Emissions Gap Report 2018, prepared by United Nations Environment, used scientific information to assess the gap between the likely state of emissions based on NDC pledges and where it should be to meet the temperature goal of well below 2ºC or 1.5º C. The Report found, among other things, that the gap had increased significantly in comparison with previous estimates and that "if the emissions gap is not closed by 2030, it is very plausible that the goal of a well-below 2°C temperature increase will not be reached." [4] The IPCC's Special Report[5] on Global Warming of 1.5 °C states that limiting global warming to 1.5 °C above pre-industrial levels will require rapid and far-reaching transitions in land, energy, industry, buildings, transport, and cities,

[3] Jamaica Air Quality Management Programme, NEPA November 2010

[4] Emissions Gap Report, 2018, page xiv (https://www.unenvironment.org/resources/report/emissions-gap-report-2018-key-messages)

[5] Special Report on Global Warming of 1.5°C, 2018, Summary for Policymakers, page 15 (https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf)

and that global net human-caused emissions of carbon dioxide need to fall by about 45% from 2010 levels by 2030, reaching "net zero" around 2050.

Jamaica's NDC includes a Nationally Appropriate Mitigation Action (NAMA) project in the water sector. A NAMA on Renewable Energy was also prepared.

The Planning Institute of Jamaica (PIOJ) has to date issued a State of the Jamaican Climate and summary for policy makers for 2012 and 2015 prepared by the Climate Studies Group, Mona.

Climate Change and Air Pollution

WHO had included air pollution and climate change among ten of the major issues to be addressed in 2019, considering air pollution to be the greatest environmental risk to health and noting that the primary cause of air pollution (burning fossil fuels) is also a major contributor to climate change, which impacts people's health in different ways. The WHO's Five Year Programme of Work (2019 -2024) includes *Platform 5: Addressing health effects of climate change in small island developing States and other vulnerable States*. In this platform, air pollution is described as an increasingly serious risk factor for non-communicable diseases.

The Global Conference on Air Pollution and Health of the WHO held in October 2018 with the United Nations Framework Convention on Climate Change (UNFCCC) as a major partner, made a direct link between improving air quality and combatting climate change, thereby saving lives.

3. Current policy, legal and institutional arrangements

The main policies related to climate change mitigation are Jamaica's National Energy Policy, 2009-2030 and its draft sub-policies, the Transport Policy, 2007, and the Climate Change Policy Framework, 2015[6]. The latter two policies are being updated. There is no specific policy on air quality although there are guidelines for developers which refer to air quality requirements. The main pieces of legislation on air quality are the Natural Resources Conservation Air Quality Regulations, 2006, the Public Health (Nuisance) Regulations, 1995, and the Clean Air Act, 1964, but some of these provisions are outdated or have gaps in coverage. Emissions from motor vehicles are to be addressed through the proposed Road Traffic Regulations under the Road Traffic Act, 2018.

In terms of institutions, the Natural Resources Conservation Authority, the National Environment and Planning Agency and the Ministry of Health have responsibility under relevant legislation for air quality, and the Climate Change Branch under the Ministry with responsibility for climate

[6] In 2020, the Climate Change Policy Framework, 2015 was updated by the MRECC to align the Policy Framework to existing commitments, the expected trajectory of the Paris Agreement as well as national and regional developments in key sectors including transport, finance and energy.

change response has a clear role in addressing climate change mitigation and adaptation. There are however, several other entities with responsibilities relating to emissions of air pollution and greenhouse gases from sectors such as energy, transport, industry, natural resource management. There are gaps and need for clarity in several areas such as institutional collaboration and coordination; the collection, management and accessibility of data; the involvement of the private sector, academia and local communities; and the availability of adequate human, technological and financial resources. Table 1 shows the current coverage and gaps in the management of various sources of emission of pollutants.

Table 1 – Coverage/Gaps in Management of Sources of Emissions

Source/Type	Main pollutants	Coverage/Gaps/Issues
Stationary/Point sources - power plants, oil refineries, industrial facilities	**Criteria air pollutants -** sulphur dioxide(SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ground level ozone (O_3) lead (Pb), particulate matter (PM); **Hazardous air pollutants** (e.g.benzene, perchloroethylene, dioxin, asbestos, mercury, cadmium)	**Emissions of criteria and toxic air pollutants from major and significant facilities -** **Legislation**: The Natural Resources Conservation (Air Quality) Regulations 2006; Clean Air Act, 1964 Natural Resources Conservation Authority (Ambient Air Quality Standards) Regulations, 1996 **Policy/Guidelines**: Air quality guidelines; Development and Investment Manual, 2007; Development Orders **Programme**: Air Quality Management Programme, 2008-2016 **Gaps/Issues:** 1.Some major and significant facilities are not included in the licensing system under the Regulations 2. Outdated legislation - The legislation to be reviewed and updated, including the increase in scope of the air quality standards. 3.Epidemiology studies on communities near to facilities needed. 4. Increased and up-to-date monitoring equipment and training in operations and maintenance required. 5. Updating of the air quality programme to be completed. 5. Better enforcement is needed.
Mobile – motor vehicles, trains	**CO, VOC, particulate matter, SOx, CO_2** **Hazardous air pollutants**	**Motor vehicle emissions: Visible emissions (as under the Road Traffic Act)** **Legislation:** Draft Road Transport Regulations, 2018; Draft Motor Vehicle Emissions Standards, 2015

		Policy/Guidelines: Transport Policy 2007, National Energy Policy, 2009, Development and Investment Manual, 2007, Development Orders **Programme:** None **Gaps/Issues:** 1. System for motor vehicle emission testing needs to be implemented, incorporating the motor vehicle emissions standards. 2. Energy, transport and motor vehicle import policies need to be reviewed and harmonized taking into account the impact of air pollution on health and the goal of cleaner fuels and cleaner and more efficient vehicles 3. Epidemiology studies on communities near to major traffic corridors needed. 4. Plans needed to address communities affected by air pollution. 5.Road traffic planning to take into account communities affected by air pollution 6. Opportunities to include the transport sector in the achievement of the nationally determined contribution to climate change mitigation to be explored.
Air transport	**Hazardous air pollutants** **Greenhouse gases**	**Legislation:** Natural Resources Conservation (Permits and Licences) Regulations, 1993 **Policy/Guidelines:** Investment and Development Manual, 2007 **Programme: ICAO CORSIA** **Gaps/Issues:** Airport operations: No specific monitoring equipment located at the airports, nor reporting requirements. Emissions from aircraft**:** Carbon offset schemes should be considered.
Sea transport	**SOx, NOx greenhouse gases, ozone-depleting substances**	**Legislation:** Natural Resources Conservation (Permits and Licences) Regulations, 1993 **Policy/Guidelines:** Investment and Development Manual, 2007 **Programme:** GLOMEEP project including the development of regulations on emissions from ships.

		Gaps/Issues: No specific monitoring equipment located at the harbours and ports nor reporting requirements. Legislation drafted for compliance with IMO regulations. Jamaican ships need to comply with global agreements for clean fuel and reduction in emissions (MARPOL)
Area sources - Stationary area sources or aggregated point sources (minor sources)	**Criteria and hazardous air pollutants, persistent organic pollutants**	Minor sources of air pollution such as dry cleaning establishments, gas stations, incinerators **Legislation:** No specific legislation or regulatory framework **Policy/Guidelines:** **Programme:** National Implementation Plan on Persistent Organic Pollutants Gaps/Issues: There is no regulatory or other measure to control emissions from this sector.
Fires (open sources)	**Hazardous air pollutants, dioxins and furans, particulate matter**	**Legislation:** Forest fires - the Forest Act and Regulations; Open burning - the Public Health Act and Nuisance Regulations; the NRCA (Environmental Protection Measures) Order; 2016 Burning of sugarcane and agricultural waste - the Country Fires Act, 1942 Waste disposal sites: NRCA (Permits and Licences) Regulations, 1996 (amended 2015)) **Policy/Guidelines:** Forest Policy for Jamaica, 2017 **Programme:** National Implementation Plan to address POPs **Gaps/Issues:** Outdated legislation regarding open burning; stronger enforcement and compliance measures needed; culture change needed. Fires at the waste disposal sites have had serious impacts on health, the environment and the economy – more effective management needed. Illegal activities for the recovery of metals have affected the communities – public awareness, and enforcement and compliance measures needed.
Dust from paved and unpaved roads, construction sites, land clearing	**Particulate matter**	Unregulated except for conditions in permits and licences on fugitive dust
Natural sources - wind-blown dust	**Particulate matter**	**Speciation studies to be carried out on impact of Sahara dust**

Among the recommendations of the Policy Framework are the establishment of stronger mechanisms for coordination among Government agencies and at the Ministerial level, policy coherence, the review and updating of legislation, the updating of the National Air Quality Management Programme, provision of information for the public on air quality as well as action in terms of communities affected by air pollution, strengthening of the regulatory agencies in terms of capacity, equipment and technology.

4. Vision, Goal and Objectives of the Policy Framework

The Vision and Goal of the Policy Framework are as follows:

Vision: A healthy and productive Jamaica with clean air in keeping with a low carbon development pathway in support of economic growth, social well-being and environmental sustainability.

Goal:

Effective and coordinated systems for the reduction of emissions from key pollutant sources and maintenance of good air quality throughout Jamaica.

The objectives and strategies of the Policy Framework are as follows:

Objective 1: To coordinate approaches to the reduction of emissions

Strategies

1.1 Improve communication among the public agencies that guide policies that may have a direct or indirect impact on emissions

1.2 Establish institutional arrangements for coordinated approaches to the prevention and reduction of emissions

1.3 Enhance policy coherence through the consultative process including the active engagement of the private sector and local communities.

1.4 Further identify and implement critical actions for reducing emissions including the use of incentives related to environmentally friendly equipment and practices.

1.5 Active engagement of non-State actors in approaches to reduce emissions

Objective 2: **To strengthen the mechanisms for the effective management of emissions that affect human health and the environment**

Strategies

2.1 Review existing laws and promulgate, as necessary, new or amended legislation to address the sources of emissions of air pollutants

2.2 Develop and implement strategies, action plans and medium-term programmes that focus on reducing the emission of air pollutants taking into account effects on natural resources and human health

2.3 Update and effectively implement the Air Quality Management Programme

Objective 3: To increase education and awareness on air quality issues to facilitate public participation in the protection of their health and the natural and built environment

Strategies

3.1 Increase public education and awareness of the impacts of emissions on human health and the natural and built environment.

3.2 Provide and make available data and information on emissions of air pollutants including the annual ambient air quality reports

Objective 4: To increase advocacy for the reduction of emissions in regional and international fora

Strategies

4.1 Provide support to regional institutions and civil society for enhanced advocacy

Objective 5: To identify and pursue opportunities for funding and technical assistance for the management of air quality

Strategies

5.1 Develop a framework for identifying funding opportunities for reduction of emissions

Objective 6: To establish effective systems for research and data collection

Strategies

6.1 Improve and maintain the national air quality database

6.2 Strengthen the National Environment and Planning Agency's capacity to collect data to facilitate, *inter alia,* reporting under environmental agreements, including on greenhouse gas emissions

f. Reporting

There are requirements for Parties to the Paris Agreement, including Jamaica, to report on their climate change responses and progress in meeting their targets for reduction of greenhouse gas emissions, and with the Paris Agreement Rulebook there should be transparency and common rules for all.

At the national level, regular reports on the state of air quality should be prepared and as necessary, presentation in the Houses of Parliament on emissions affecting air quality, climate change and health.

g. Funding, Institutional Arrangements and Action Plans

Funding opportunities are available under the Green Climate Fund and the Global Environment Facility to address issues related to climate change adaptation and mitigation, and the Climate Change Division of the Ministry with responsibility for environment and climate change (MRECC) is gathering information on resources which could be available. Under the Paris Agreement, there is provision for internationally transferred mitigation measures, the modalities for which are being developed, and which Jamaica could pursue as appropriate in keeping with its commitment to continue efforts to identify and pursue additional funding sources. There is no specific fund for air pollution management, but where there may be co-benefits for improved air quality from climate change mitigation measures, these should be explored. Implementation of the Emissions Policy Framework will require, *inter alia*, support from the Government's recurrent budget as well as external financial and technical assistance. for the prioritization of air quality matters for financial and technical assistance.

The Policy Framework includes an outline of the various targets and goals at the global and regional levels in relation to air pollution and emission of greenhouse gases. There is also a five-year Action Plan on the steps to be taken towards achievement of the goal of the Policy Framework as well as information on reporting requirements and monitoring/measurement and verification.

The institutional arrangements focus on the strengthening of existing structures as well as new committees for better coordination at the technical and Ministerial levels.

1. BACKGROUND

1.1 Overview of Emissions

The emissions of gases, particles and aerosols into the atmosphere which cause air pollution and contribute to increased temperatures (global warming), come primarily from human activities. There are also natural sources of emissions such as volcanic eruptions, windblown dust, wildfires, sea spray and decaying plant material.

Box 1
Impact of Air Pollution on Health and the Environment

- Short term health effects include irritation to the eyes, nose and throat, headaches, dizziness and nausea.
- Globally, approximately 4.2 million deaths a year are linked to exposure to outdoor air pollution. According to WHO, by reducing air pollution levels, countries can reduce the burden of disease from stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, such as asthma.
- WHO estimated the number of deaths attributable to ambient air pollution in Jamaica to be 695people in 2016.
- Wildlife, aquatic ecosystems, water resources, forests, agricultural productivity, the built environment and cultural resources are adversely affected by air pollution.

Air pollution has negative impacts on health, food production, ecosystems and structures at the local and national levels as well as globally. Reports (2016) from the World Health Organization (WHO) have described air pollution as 'the biggest environmental risk to health. Air pollution continues to rise at an alarming rate, and affects economies and people's quality of life.'[7] (Box 1), Children and babies, older people and those with respiratory or heart diseases are more vulnerable to air pollution. The main sources of air pollutants are the combustion of fossil fuels - used in transport, electricity generation and consumption, industrial production and processes; and fires – burning of wastes, forest fires.

Global warming, one of the main aspects of climate change, is caused primarily by the concentration of heat-trapping greenhouse gases (GHG) in the atmosphere resulting from the combustion of fossil fuels; industrial processes, wastes, land use, land use change; and deforestation. According to the World Meteorological Organization's provisional report State of the Global Climate in 2018, global warming continued in 2018, with 2014 to 2018 being the four warmest years on record.[8] Globally, economic and population growth continued to be the most important drivers of increases in CO_2 emissions from fossil fuel combustion.'[9]

As a small island developing state, Jamaica's emission of GHGs is small compared to big emitters; however, Jamaica has a relatively high per capita GHG emission, comparable to countries such as Uruguay and Georgia.[10] A commitment has been made under the Paris Agreement for the

---

7 Ambient air quality: A global assessment of the burden of disease. WHO, 2016 (https://www.who.int/phe/publications/air-pollution-global-assessment/en/)

8 https://library.wmo.int/opac/doc_num.php?explnum_id=3414

9 http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

10 Third National Communication of Jamaica to the UN Framework Convention on Climate Change, 2018 (

mitigation of the equivalent of 1.1 million metric tons of carbon dioxide per year by 2030 - a reduction of 7.8% of emissions versus the business as usual scenario. Jamaica has committed itself to a low-carbon economy by the middle of the century, mainly through renewable energy development and efficiency and conservation. [11]

Many of the sources of emissions that affect air quality and contribute to climate change are the same, but for practical purposes there are separate institutional arrangements to manage different sectors. This Policy Framework outlines the approaches to be taken by various stakeholders as well as how best to achieve effective and transparent implementation, taking advantage synergies in dealing with ambient air pollution and global warming.

The areas not included in the scope of this Policy Framework are: (1) natural sources of emissions including from the agricultural sector; (2) indoor air pollution, which can result from sources such as smoke from cooking or recreational smoking, building materials or household cleaning products; and (3) radioactive emissions.

Without renewed attention to preventing the deterioration of air quality and taking remedial action in polluted areas, people's health and wellbeing will continue to be affected. Without mitigation action to reduce the emission of greenhouse gases, adaptation efforts could become too expensive or ineffective. The Action Plan related to the implementation of this Policy Framework is set out at Appendix 1.

1.2 Categories of Emissions

For the purpose of managing and controlling emissions, certain harmful substances have been categorized in internationally agreed terms. There are six criteria, common or classical[12] air pollutants for which a human exposure limit exists, according to the global ambient air quality guidelines issued by the World Health Organization. At the national level, the Jamaica Ambient Air Quality Standards (JAAQS) have been developed in relation to the criteria air pollutants. Priority air pollutants, hazardous air pollutants or air toxics (e.g. benzene, perchloroethylene, dioxin, asbestos, metals such as cadmium), are substances for which no exposure limits have been set given their serious impacts on health and the environment: exposure at sufficient concentrations and durations is linked globally to the occurrence of different types of cancer, stroke, heart disease, chronic obstructive pulmonary disease, and acute respiratory infections in children.

Jamaica is a Party to several global agreements to protect human health and the environment which have been developed arising from concern about the impact of emissions. Tables 2 and 3 set out the emissions covered under national legislation and the global treaties related to emissions.

---

11 Third National Communication of Jamaica to the UN Framework Convention on Climate Change, 2018

12 The criteria (US EPA), classical (WHO) or common air pollutants are sulphur dioxide (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), particulate matter (PM_{10}, $PM_{2.5}$), ozone ($_{03}$), lead($_{Pb}$)

Table 2 – Emissions covered under National Legislation

Natural Resources Conservation Authority (Air Quality) Regulations, 2006
Criteria Air Pollutants
Total suspended particulates (TSP)
Particulate matter with diameter less than ten microns (PM_{10})
Sulphur dioxide (SO_2)
Carbon monoxide (CO)
Nitrogen dioxide (NO_2)
Lead (Pb)
Ozone (O_3) (Ground level or tropospheric ozone)
Greenhouse Gases: Reports on emissions required of licensees regarding- Carbon dioxide; Methane; Nitrous oxides; Hydrofluorocarbons; Perfluorocarbons; and Sulphur hexafluoride.
Priority Air Pollutants (Selected)
Hexachlorobenzene
Polychlorinated biphenyls (PCB)
Polychlorinated dioxins and furans
Aldrin
Chlordane
Benzene
Mercury and compounds
Cadmium and compounds
Trade (Restriction on Importation of Chlorofluorocarbons) Order, 1999 (example of Orders issued)
Chlorofluorocarbon (CFC) –11, 12, 113, 114, 115

The Clean Air Act, 1964
Noxious or offensive gases such as fumes or dust from any works for the production of alumina, cement, lime, gypsum, petroleum; ash, dust or soot from any sugar factory; etc.

Table 3 – Emissions covered under Global Agreements

Gases/Substances covered under International Treaties to which Jamaica is a party	
Greenhouse Gases (UN Framework Convention on Climate Change, 1994/Kyoto Protocol, 2005)	
Direct	Carbon dioxide (CO_2)
Direct	Methane (CH_4)
Indirect	Sulphur dioxide (SO_2)
Indirect	Carbon monoxide (CO)
Indirect	Nitrogen oxides (NOx)
Direct	Nitrous oxide (N_2O),
Direct	Sulphur hexafluoride (SF_6)
Direct	Perfluorocarbons (PFCs)
Direct	Hydrofluorocarbons (HFCs)
Indirect	Non-methane volatile organic compounds (NMVOCs)
Persistent Organic Pollutants (Selected) (Stockholm Convention, 2004)	
Hexachlorobenzene	
Polychlorinated biphenyls (PCB)	
Polychlorinated dioxins and furans	
Aldrin	
Chlordane	
Dieldrin	
Mercury Minamata Convention on Mercury, 2017	
Mercury emissions and mercury-added products	
Ozone Depleting Substances (Montreal Protocol on Substances that deplete the Ozone Layer and its amendments and adjustments Including the Kigali Amendment)	
Chlorofluorocarbons, Hydrochlorofluorocarbons, Halons, Methyl Bromide, Trichloroethane, Hydrofluorocarbons	

2. SITUATIONAL ANALYSIS

2.1 The State of Ambient Air Quality in Jamaica

The main sources of harmful emissions in Jamaica are the combustion of fossil fuels (in industrial facilities, power generation, and transport); open burning of cane fields and to clear lands for farming, agricultural waste and waste at disposal sites and in backyards; and certain synthetic or man-made chemicals.

The air quality in some of Jamaica's urban centres and corridors has declined over the years. Poor air quality is particularly evident in those communities located within the environs of industrial facilities, waste disposal sites and along major roadways. There have been several large fires in the Kingston Metropolitan Region (KMR) particularly at the Riverton City waste disposal site, while sections of the KMR as well as rural and semi-rural areas have been affected by slash and burn agricultural practices, especially the burning of cane fields. The illegal burning of tyres and other materials for the production of scrap metal for export also has to be addressed as a priority.

The sustainability of Jamaica's natural environment and human health is impacted where there is a constant increase in the volumes and types of emissions without adequate mitigation measures and planned action for the management of such emissions.[13]

The increase in the motor vehicle fleet, the use of high sulphur petroleum[14] and a significant number of fuel-inefficient vehicles have also contributed to the poor air quality in urban centres. In some cases, inadequate maintenance of vehicles, including some of those used in the public transportation sector, and the resultant incomplete burning of fuels cause black smoke to be emitted from these vehicles to pollute the air.

Ambient air quality standards were promulgated in 1996 (Natural Resources Conservation (Ambient Air Quality Standards) Regulations) and ambient air quality monitoring is carried out primarily under the Natural Resources Conservation Authority (Air Quality) Regulations, 2006 (Air Quality Regulations) in relation to criteria or common air pollutants emitted by major and significant industrial facilities. Reports on the emission of priority or toxic air pollutants are also required under these Regulations. Not all sources of emissions are regulated, however, as the Air Quality Regulations do not cover small emitters, nor the transport sector, nor open burning. This situation is examined in the section on the legal and policy framework regarding emissions.

[13] Issues Paper – Emissions – National Environment and Planning Agency (May 2017)

[14] Low sulphur diesel and lead free gasoline ares available on the domestic market

Air quality monitoring

Under the Air Quality Regulations, ambient air quality monitoring must be conducted with regard to emission sources whose concentration of any pollutant is expected to be 75% or more of the applicable standard under the JAAQS for that pollutant. The data obtained from these monitoring activities are submitted to the National Environment and Planning Agency (NEPA) for validation before inclusion in the air quality database. A number of sectors have met the requirement for ambient air monitoring and have installed the requisite monitoring stations.

The current ambient air quality monitoring network consists of seventy five (75) air quality monitoring stations, 69 (92%) of which are operated by private industries, (mainly the bauxite sector which accounts for 70% of the industry stations) and the remaining 6 stations (8%) by NEPA. The section of the monitoring network (8%) that was operated by NEPA in 2017 was limited to PM_{10} and $PM_{2.5}$; the industry operated monitoring stations for particulate matter (total suspended solids and PM $_{10}$, and gases (sulphur dioxide, nitrogen dioxide and carbon monoxide),

The network is distributed across the island, with 80% (60) located outside of the Kingston and St. Andrew region, as shown in Figure 1.[15]

Figure 1: Map o*f Jamaica showing Ambient Air Monitoring Network (NEPA)*

Reports on emissions

i) Annual reports

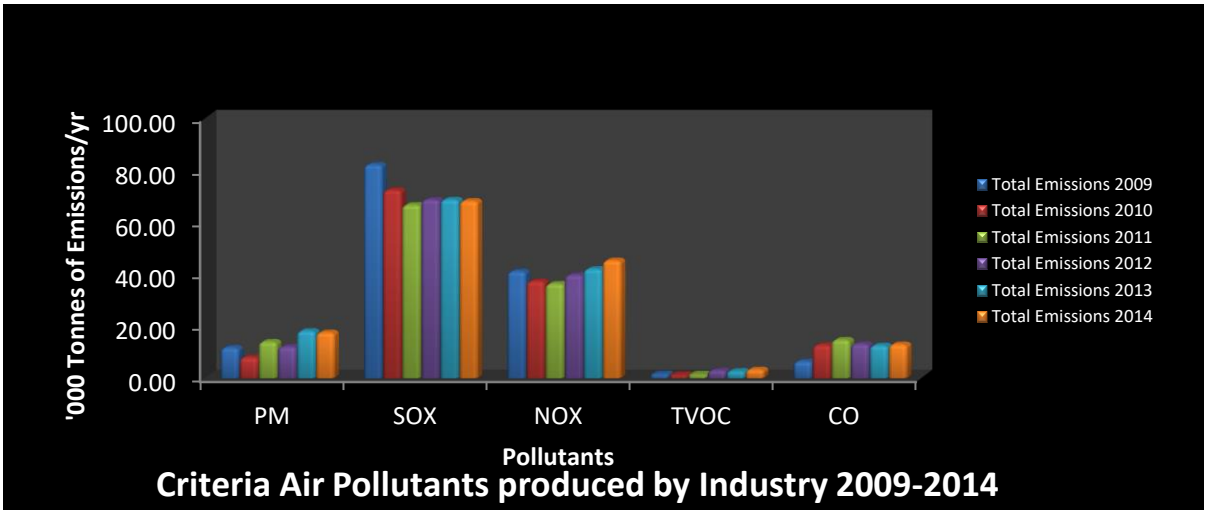
Under the Air Quality Regulations, 2006, the Natural Resources Conservation Authority (NRCA), through the NEPA, is required to:

[15] Annual Ambient Air Quality Report for 2017, NEPA

"(a) develop a National Emissions Inventory to track air quality within identified air sheds and emissions; (b) make such Inventory available to the public; and (c) provide to the Minister an annual report containing information on air quality."[16]

Annual reports on ambient air quality have been produced by NEPA since 2012. The 2015 air quality report included a review of emissions over the period 2009 to 2014. In terms of trends in ambient air quality and emissions, the report states that "The emissions data available for 2014 indicate that sulphur oxides (SO_x) and nitrogen oxides (NO_x) represent over 80% of the emissions from major and significant sources. This however is not being materialized in ambient air. The data clearly show that particulate emissions continued to be the major concern for the country, and that ambient air quality is impacted to a lesser extent by the gaseous pollutants." (Figure 2) [17].

Figure 2: Emissions from Major and Significant Sources in Jamaica 2009-2014 (NEPA)



Key: *PM – particulate matter; SOx- sulphur oxides; NOx – nitrogen oxides*
TVOC – total volatile organic compounds; CO – carbon monoxide

The ambient air quality data for 2017, however, indicate that Jamaica continues to experience low impact from nitrogen dioxide and sulphur dioxide as ambient concentrations of these pollutants did not exceed their respective Jamaica Ambient Air Quality Standard. (JAAQS).

Particulate matter continued to be the main pollutant present in ambient air with exceedances of the standards occurring in the Kingston Metropolitan Region (KMR). Over the five-year period 2013-2017, except at the UWI Mona Geoinformatics monitoring location, there was significant increase in the PM_{10} concentrations at all locations, in some cases to the highest recorded levels.

[16] NRCA (Air Quality) Regulations, 2006, Section 47 (1)
[17] National Annual Ambient Air Quality Report 2015 (draft)

The Spanish Town Road and Rockfort areas were highlighted as needing attention to reduce the high levels of pollution loading as a result of various activities and sources.[18]

Among the factors affecting the KMR are its location and meteorological conditions. Kingston is surrounded by the mountains to the north and eastern sides and the Caribbean Sea on the south. The wind is predominantly from the south east, moving inland towards the mountains. All the major sources of emissions in the area are located along the coast and so the predominant wind direction takes the fallout of these pollutants inland to the communities in the city.

Outside of the Kingston Metropolitan Region there is better dispersion of the pollutants as the distance of the mountain terrain from the coast allows for greater movement of air.

NEPA has recommended that interventions be made in the areas which were identified by NEPA's monitoring as compromised, namely Hayes Corn Piece, Clarendon and Waterford, Portmore,[19] in addition to Spanish Town Road and Rockfort in the KMR. As at 2020, NEPA was in the process of preparing a strategic plan for the management of air quality challenges in the Rockfort area. Strategic plans will also be developed for other areas identified by NEPA as compromised.

ii) Reports on fires

There have been several open fires at waste disposal sites across the island over the years, among the most notable being major fires at the Riverton City disposal site in Kingston, the Retirement site, St. James, and the Haddon site, St. Ann. The fires at the Riverton City disposal facility in March 2015 and July 2018 resulted in negative impacts on the ambient air quality in Kingston and St Andrew as well as parts of St. Catherine including Portmore. Following the 2015 fire and a report from the Public Defender, the National Solid Waste Management Authority (NSWMA) has installed fire suppression facilities and developed mitigation strategies to deal with spontaneous combustion. In 2018, the NSWMA board outlined other measures to respond to fires and to increase security to prevent arson. The Board also urged that a timeline be indicated for the privatization and possible relocation of the sites as the ultimate solution to the problem.[20].Reports on the fires at Riverton have been prepared by NEPA to provide information for the public on the pollutants released and the impact and the limitations of the report. In the 2018 report, the Agency noted that the associated health and socio-economic impacts of the fire were not included in the report, but that it was expected that the Ministry of Health would interpret the findings and predict the impact on human health.[21]

---

18 Annual Ambient Air Quality Report, 2017 National Environment and Planning Agency

19 Ibid

20 http://go-jamaica.com/pressrelease/item.php?id=7393

21 Riverton Fire August 2018 Report – NEPA, August 2018 (https://www.nepa.gov.jm/new/services_products/subsites/air_quality/docs/reports/FINAL_Report_on_Riverton_2018_Fire.pdf)

2.2 Current Institutions, Policies and Legislation

2.2.1 Overview

Several Ministries, Departments and Agencies have responsibilities related to the emission of pollutants which contribute to poor air quality and/or climate change. The need for consultation in making decisions is clear, especially where a decision in one sector could have great implications for other sectors – for example, the importation of motor vehicles involves not only the commercial sector, but also has implications for energy, environmental, health, transport and climate change and commitments under global agreements for the reduction of emissions.

The main entities concerned with ambient air quality are the NRCA/NEPA and the Ministry of Health which have specific mandates under legislation and also are focal points under regional and international agreements related to air pollution[22]. The Climate Change Division of the Ministry under whose portfolio climate change response falls is the main entity responsible for managing and coordinating actions on climate change adaptation and mitigation under the United Nations Framework Convention on Climate Change.

The policies of the entities responsible for transport, energy, agriculture, tourism and industry include references to the need to reduce emissions both in terms of air quality and climate change mitigation. As at January 2019, there is no legislation which specifically addresses the reduction of greenhouse gases, and there are some gaps and outdated legislation in the coverage of sources of emission of air pollutants. There are, however, proposals for the development of new legislation for example, as regards regulations on emissions from ships as proposed by the Maritime Authority of Jamaica[23].

Other agencies such as the PIOJ, Vision 2030 Jamaica Secretariat and the Statistical Institute of Jamaica are concerned with the monitoring of Jamaica's progress in meeting global goals, targets and indicators under the 2030 Agenda for Sustainable Development, several of which address air quality and climate change mitigation.

2.2.2 Policies and Legislation related to Air Quality

This section sets out the institutional, legal and policy framework relating to emissions that cause air pollution – from the industrial and energy and transport sectors and open burning (Table 4). The two main pieces of legislation related to air pollution are administered by the NRCA/NEPA and the Ministry of Health. The Forestry Department and the Ministry responsible for Agriculture

[22] The Ministry with responsibility for the environment, through the Environment and Risk Management Branch, is the focal point for the Basel, Stockholm and Minamata Conventions.

[23] These proposals were developed by the Government of Jamaica to meet its obligations under the International Convention for the Prevention of Pollution from Ships (MARPOL) – Annex VI, to which Jamaica is a Party.

have laws related to forest fires and burning of fields by farmers. There are, however, significant gaps in the coverage of some sources of emissions.

Under the Air Quality Regulations, a licence is required for the emission of criteria air pollutants from certain industrial facilities and, in specific cases, emissions of priority air pollutants have to be measured and reported to NEPA and an action plan to control the emissions developed and implemented. The Regulations provides the basis for the compilation of information on all types of sources of pollution, to track the progress and effectiveness of relevant regulations and policies, to report periodically on the emissions (an emissions inventory) and to fulfil some obligations under the UNFCCC and the Stockholm Convention on Persistent Organic Pollutants (POPs).[24] The information provided by licensees is included in a pollutant release and transfer register (PRTR) developed and maintained by NEPA that can be made available to the public and could provide communities with information on, *inter alia*, the emissions from licensed major and significant facilities. The PRTR is expected also to act as an incentive for facilities to reduce emissions.[25] Another such incentive in the Regulations is the application of the polluter pays principle in the calculation of annual fees based on the volume of pollutants emitted for the year. These Regulations do not cover emissions from area sources of emissions such as small facilities which may have a cumulative effect in a particular geographical area. NEPA does not monitor air quality in the vicinity of ports and airports.

The Clean Air Act, 1964 authorizes inspectors appointed by the Minister of Health to inspect the premises of specified[26] industrial works and incinerators, and to test or take samples of any substance, smoke, fumes, gas or dust as considered necessary. The Clean Air Act also requires operators of the facilities to use "best practicable means" to prevent the escape or discharge of noxious and offensive gases or to render them harmless, taking into account local conditions and circumstances, the financial implications and the current state of technical knowledge. Section 3 ofthe Public Health (Nuisance) Regulations, 1995, make it an offence to cause or permit a nuisance such as 'dust, smoke, fumes, gases or effluvia emitting from any manufacturing process or caused by the carrying on of any trade or business or otherwise by the action of any person' and 'offensive smells including the emission of noxious fumes, gases or powerful smells, as a result of agricultural, domestic or industrial processes or otherwise'.

---

[24] Based on Technical Support Document for the Regulatory Impact Analysis for Air Quality Regulations Developed by the National Environment and Planning Agency, 2002 - Executive Summary, pages xv-xvi

[25] Regulatory Impact Analysis Statement, 2002.

[26] *List of Noxious or Offensive Gases* - Fumes or dust emanating from any works for the production of alumina, cement, lime, or gypsum; gas containing any sulphur compound from any petroleum works; fumes, vapour, or gas from any electrical generating station; ash, dust or soot from any sugar factory.

There is need for review of the provisions of the NRCA (Air Quality) Regulations, 2006 and the Clean Air Act, 1964 especially in terms of the rationalization of the roles of the regulatory agencies to avoid areas of duplication.

Emissions from mobile sources are not yet covered by legislation. Standards for motor vehicle emissions have been developed by NEPA, and are to be included in the Road Traffic Regulations with a requirement for tail-pipe emissions testing to be carried out as a part of motor vehicle fitness certification.

Table 4 – Institutions, Policies and Legislation – Air Quality

Issue	Source	Policies and Plans	Legislation	Regulatory Authority
Industrial emissions	Major and significant facilities	Vision 2030 Jamaica – National Development Plan, 2009-2030 Air Quality Management Programme, 2010 National Energy Policy, 2009 Renewable Energy Policy, 2009 (draft) Biofuels Policy (draft) Manual for Development and Investment, 2007 - Vol. 2, Section 1 – Environment National Hazardous Waste Policy, 2018 (draft)	Natural Resources Conservation Authority (Air Quality) Regulations, 2006 Natural Resources Conservation (Ambient Air Quality Standards) Regulations, 1996	Natural Resources Conservation Authority/National Environment and Planning Agency (NRCA/NEPA) (The Jamaica Bauxite Institute has an MOU with NEPA for monitoring of the bauxite companies.)
			Public Health (Nuisance) Regulations, 1995	Ministry of Health
			Clean Air Act, 1964	Ministry of Health/Central Board of Health
	Minor facilities	-	-	-
Open burning	Open fires in specified areas from February to October	-	NRCA (Environmental Protection Measures) Order, 2016	NRCA/NEPA
	Forest fires	Forest Policy for Jamaica, 2017 National Forest Management and Conservation Plan, 2016-2026 (revised 09/2017)	Forest Regulations, 2001	Forestry Department
	Sugar cane fields	Jamaica Country Strategy for the Adaptation of the Sugar Cane Industry, 2009-2020	Country Fires Act, 1942	Ministry responsible for Agriculture

Issue	Source	Policies and Plans	Legislation	Regulatory Authority
	Slash and burn agriculture	Vision 2030 - Agriculture Sector Plan 2009		
	Charcoal	-		
	Backyard burning	-	Public Health (Nuisance) Regulations, 1995	Ministry of Health
	Other (e.g. extraction of metals, e.g. from tyres)	-	Public Health (Nuisance) Regulations, 1995	Ministry of Health
Transport	Motor vehicle emissions	National Transport Policy, 2007 Vision 2030 Jamaica - Transport Sector Plan, 2009 National Road Safety Policy, 2001 National Energy Policy, 2009	Road Traffic Act (visible emissions) Road Traffic (Amendment)Act, 2018 Draft Regulations – Road Traffic Act – tailpipe emissions (Petroleum Quality Control) Act and regulations	Jamaica Constabulary Force Ministry responsible for Transport Island Traffic Authority Ministry responsible for Energy
		Off-road vehicles	-	-
	Rail, Aircraft	National Transport Policy		Ministry responsible for Transport/ Jamaica Railway Corporation/ Jamaica Civil Aviation Authority
	Ships	National Transport Policy	Drafting instructions – amendment of the Shipping Act and development of regulations – on emissions and fuel quality	Ministry responsible for Transport/ Maritime Authority of Jamaica

2.2.3 Inter-agency Committees on Air Quality

There are two inter-agency bodies which deal with emissions and air pollution as follows:

Air Quality Management Committee

The NRCA in 2016 re-established the Air Quality Management Committee, chaired by the Chief Executive Officer of NEPA, composed of representatives of the NRCA, and organizations such as the Jamaica Bauxite Institute, the University of the West Indies and the University of Technology, Jamaica, and the Ministry of Health. The role of the Committee includes review of air pollutant discharge licence applications and consideration of air pollution issues. The Air Quality Management Committee reports to the NRCA.

Central Board of Health

The Central Board of Health has overall responsibility for health-related matters, and includes specialized agencies such as NEPA and the National Water Commission. Air quality issues are addressed from time to time by this Board.

2.2.4 Policies and Plans related to the Emission of Greenhouse Gases

Although small island developing states (SIDS) such as Jamaica do not manufacture certain chemicals and contribute little to global emissions, issues such as ozone-depletion and global warming are of such a critical nature that international agreements and programmes usually include and support even small countries in efforts to protect the global environment. These efforts are in keeping with the overall sustainable development priorities of small countries.

One of the national plans which, *inter alia*, address the impacts of increased GHG emissions is Vision 2030 Jamaica - National Development Plan which includes among the outcomes the creation of a modern, efficient, diversified and environmentally sustainable energy sector in Jamaica (Outcome 10 - Energy Security and Efficiency). The National Strategy 14-4 (under National Outcome 14 – Hazard Risk Reduction and Adaptation to Climate Change) is to 'Contribute to the Effort to Reduce the Global Rate of Climate Change. Among the measures noted are the reduction of emission of greenhouse gases, through energy conservation, and reforestation which would not only increase the amount of greenhouse gases removed from the atmosphere, but also provide improved watersheds and waterways and reduce landslides and soil erosion. Active participation in developing global solutions to climate change and lobbying for major GHG-producing countries to take mitigation action are other actions outlined.

The main policies related to climate change mitigation and adaptation are the Climate Change Policy Framework, 2015 which explicitly refers to climate change considerations; the National

Energy Policy, 2009 – 2030 and its sub-policies; as well as the National Transport Policy, 2007 and the Transport Sector Plan, 2009-2030 , which are also essential for Jamaica's move to a low-carbon economy. Several of the policies also refer to improvement in air quality through reduction of emissions as a co-benefit of actions to reduce the use of fossil fuels. These policies are being revised and updated.

Jamaica submitted its Biennial Update Report to the UNFCCC in 2016 and submitted its Third National Communication on climate change in 2018. The Communication focused on the health, forestry, agriculture, water and tourism sectors.

2.2.5 The Main Entities Involved in the Reduction of Emissions related to Climate Change

The following sections outline the roles of the main Government entities involved in addressing climate change in Jamaica.

Climate Change Division

The Climate Change Division (CCD), established in 2012 in the Ministry with responsibility to address climate change, is the main entity to coordinate climate change adaptation and mitigation responses. The Division, in implementing the Climate Change Policy Framework, 2015 has assisted Ministries, Departments and Agencies in the mainstreaming of climate change considerations in the preparation of sector strategies and plans for climate change adaptation and mitigation. Work has begun towards the development of climate change plans for the transport and agriculture sectors. Similar plans will also be developed in the areas of tourism; water; finance; human health; coastal resources; human settlements and; energy. The CCD is the lead institution responsible for coordinating the implementation of Jamaica's Nationally Determined Contribution (NDC) under the Paris Agreement. The Division in collaboration with the Ministries of Energy and Transport and the Forestry Department, among others, has updated Jamaica's NDC and it has been submitted to the UNFCC in June 2020.

Climate Change Advisory Board

The Climate Change Advisory Board (CCAB) comprises representatives of the public and private sectors, academia and non-governmental organizations (NGOs), with the chair having a strong scientific background and experience in policy-making. The CCAB's role is to support the Government of Jamaica's climate change agenda by reviewing emerging climate change issues and developments and providing strategic advice to the Minister with responsibility for climate change and guidance to the Climate Change Division, where appropriate. The CCAB is supported by two sub-committees dealing with Technology and Education and Communication. The CCD is the secretariat for the Board.

The following tables outline areas of responsibility related to emission of air pollutants and greenhouse gases at the level of individual entities (Table 5) and inter-agency organizations (Table 6).

Table 5 – The main entities responsible for the reduction of emissions of air pollutants and/or Greenhouse Gases

Entities	Roles
Ministry responsible for the subjects - Climate Change and the Environment/ Climate Change Division and the Environment and Risk Management Branch	Main entities responsible for legislation, policy and plans related to climate change (Climate Change Policy Framework, 2015) and management of hazardous chemicals, including their emissions (National Implementation Plan for Persistent Organic Pollutants, 2005[27])
MRECC / Natural Resources Conservation Authority/National Environment and Planning Agency Ministry of Health National Ozone Unit (NEPA)	Main entities responsible for legislation, policy and plans related to ambient air quality Responsible for legislation related to health aspects of air quality management (Clean Air Act, Public Health Act) Phase-out of ozone depleting substances
Ministry responsible for Energy (Ministry of Science, Energy and Technology) Office of Utilities Regulation Generation Procurement Entity	Energy Policy - choice of fuels National Policy for the Trading of Carbon Credits 2010-2030 (draft) – emissions trading Support of renewable energy and promotion of energy efficiency, emissions trading Legislation on fuel quality Energy efficient motor vehicles New electricity generation capacity
Ministry responsible for Transport (Ministry of Transport and Mining) and its Agencies (JUTC, MAJ, JRC,JCAA)	Transport policy, road development and maintenance, transport systems - e.g. multi-modal transport system, public transport systems, road, rail, air and sea transport, motor vehicle imports Introduction of alternative fuel vehicles in the public transport system Submissions to the Ministry of Finance regarding concessions for energy efficient vehicles
Ministry responsible for mining and quarrying (Ministry of Transport and Mining) and its agencies (Mines and Geology Division) Jamaica Bauxite Institute	National Minerals Policy (draft) Bauxite mining
Ministry responsible for industry and investment/ Motor Vehicle Imports (Ministry of Industry, Commerce, Agriculture and Fisheries) Trade Board	Policies on industrial development, motor vehicle import policy, motor vehicle import regulations and orders under the Trade Act
Forestry Department	Forest policy, conservation of forests, protection of forests from threats such as deforestation, forest fires, REDD+

[27] Jamaica's National Implementation Plan for Persistent Organic Pollutants is being updated.

Entities	Roles
Ministry responsible for Agriculture	Agricultural land use policy, legislation on burning of agricultural crops, including sugar cane fields promotion of climate smart agriculture, promotion of green cane harvesting
Ministry responsible for waste management and the NSWMA	Solid waste management policy, management of waste disposal sites (fires, release of methane)
Ministry of Finance	Incentives, carbon tax, petroleum tax (specific and ad valorem special consumption taxes)
Ministry responsible for local government and local planning authorities	Planning policies and guidelines, zoning Local sustainable development plans, building code
Ministry responsible for economic development/Ministry of Tourism	Policies on economic development

Table 6 – Inter-agency and other groups relevant to air quality and climate change concerns

Entity	Emissions of GHGs	Emissions of Air Pollutants
Boards/Inter-agency committees	**Climate Change Advisory Board**	Natural Resources Conservation Authority **Air Quality Management Committee**
Inter-Agency network	Climate Change Focal Point Network	
Vision 2030 Jamaica/Planning Institute of Jamaica	Vision 2030 mechanism – Review of Progress towards the 2030 Sustainable Development Goals	Vision 2030 mechanism – Review of Progress towards the 2030 Sustainable Development Goals
Thematic Working Groups (TWGs)	TWGs – Hazard Risk Reduction and Adaptation to Climate Change/ Energy	TWG – Natural Resources and Urban and Rural Development
Academia	Climate Studies Group, Mona Caribbean Policy Research Institute (CaPRI) Caribbean Sustainable Energy and Innovation Institute (CSEII), University of Technology (UTECH)	CSEII, UTECH
Private Sector entities	Private Sector Energy and Environment Committee	
NGO/CBO	Local Forest Management Committees	CBOs and Environmental NGOs Bloggers on the environment
Youth organizations	Climate change ambassadors Youth Environmental Advocacy Programme (YEAP) (MEGJC)	YEAP (MEGJC)

Some matters such as policies on electric vehicles involve several entities including the Ministries responsible for transport, energy, environment, climate change response, commerce and finance. In such cases, coordination and collaboration are essential for effective use of resources in the best interest of the country. It is also important to keep the private sector and communities involved and aware, especially of developments that will affect them.

2.3. Regional and Global Agreements relating to Climate Change and Air Quality

There are several global agreements and programmes which address the reduction of harmful emissions. Parties to these agreements often have to meet commitments, bearing in mind their national circumstances (Box 2).

Of particular note are the Sustainable Development Goals (SDGs) under the 2030 Agenda for Sustainable Development which require all countries to 'take the bold and transformative steps which are urgently needed to shift the world onto a sustainable and resilient path.' The main goals, targets and indicators of the SDGs relevant to emissions (Appendix 2) relate to good health and wellbeing, reducing pollution and the adverse environmental impact of cities - paying special

Box 2

Reduction and Phase-out of Emissions – Global and Regional Agreements

Reduction of emissions of greenhouse gases

- The United Nations Framework Convention on Climate Change (UNFCCC), 1994
- The Kyoto Protocol, 2005
- The Paris Agreement, 2015
- 2030 Agenda for Sustainable Development, 2015 - Sustainable Development Goals (SDGs) 7, 13, 15)
- Global Fuel Economy Initiative,

Phase-out of Ozone-Depleting Substances (ODS) and alternatives that contribute to global warming

- Montreal Protocol on Substances that Deplete the Ozone Layer, 1997
- The Kigali Amendment,2016

Reduction of emissions of air pollutants

- Stockholm Convention on Persistent Organic Pollutants. 2004
- Minamata Convention on Mercury, 2013
- Regional Plan of Action on Atmospheric Pollution, 2014
- International Convention for the Prevention of Pollution from Ships (MARPOL) – Annex VI: Prevention of Air Pollution from Ships, 2008
- 2030 Agenda for Sustainable Development -SDGs 3 (Health), targets 3.9; 11 (Cities), target 11.6; 12(Sustainable Consumption and Production), target 12.4.
- 68th World Health Assembly – Resolution on Air Pollution, May 2015
- Geneva Action Agenda to Combat Pollution (WHO), 2018
- United Nations Convention to Combat Desertification (UNCCD)

attention to air quality and waste management, ensuring access to affordable energy for all and increasing renewable energy and energy efficiency. The timeline for achieving environmentally sound management of chemicals and waste and the reduction of their release to air, water and soil, is the year 2020. Goal 13 of the SDGs requires that countries take urgent action on climate change and refers to the special situation of small island developing states. This goal is qualified by the acknowledgement of the primary role of the UNFCCC in negotiating the global response to climate change and its impacts.

In 2009, CARICOM Heads of State and Government made the Liliendaal Declaration on Climate Change and Development in which they declared their 'strong determination to overcome technical, economic and policy barriers to facilitate the development, diffusion and deployment of appropriate and affordable low- and zero-emission technologies and renewable energy services.' They also recognised the need for energy efficiency and conservation and for increased technical and financial support for the development of renewable energy in the Caribbean. CARICOM prepared the Regional Framework for Achieving Development Resilient to Climate Change, 2009 which included the strategy to 'promote actions to reduce greenhouse gas emissions through fossil fuel reduction and conservation and switching to renewable and cleaner energy sources.' The Implementation Plan for the Framework – Delivering Transformational Change, 2011-2021 – was approved by CARICOM Heads in 2012.

The Regional Plan of Action on Atmospheric Pollution was approved at the 19th Meeting of the Forum of Ministers of Environment for Latin America and the Caribbean in 2014. The Action Plan is designed to foster collaboration at regional and national levels towards achieving the adoption/creation of national and local policies and programmes to significantly improve air quality and protect public health and the environment while contributing to mitigate climate change, enhance the quality of life and other co-benefits.[28]

At the national level, progress in achieving the SDGs is monitored through the Vision 2030 Jamaica Secretariat. The SDGs have been aligned with the goals of Vision 2030 Jamaica National Development Plan and the priorities of the Medium Term Socio-Economic Policy Framework. Jamaica's Voluntary Review Report on the implementation of the 2030 Agenda was presented to the High Level Political Forum on Sustainable Development of the United Nations in June 2018.

As regards multilateral environmental agreements with provisions on emissions and to which Jamaica is a Party, focal points have been designated in the Ministry responsible for the environment and climate change (Stockholm Convention on Persistent Organic Pollutants, Minamata Convention on Mercury, Montreal Protocol on Ozone Depleting Substances, UNFCCC); Maritime Authority of Jamaica (MARPOL Convention); Ministry of Local

[28] http://www.pnuma.org/forodeministros/19-mexico/documentos/decisiones/Contaminacion_Atmosferica/Decision_on_Air_Pollution.pdf

Government and Community Development (UNCCD). In some cases, National Implementation or Action Plans have been prepared, for example, on the Stockholm Convention on Persistent Organic Pollutants. Jamaica is a party to the International Maritime Organization and the International Civil Aviation Organization of the United Nations which have been working to reduce the emission of air pollutants and greenhouse gas emissions in the sea and air transport sectors respectively.

2.4 Current Programmes and Activities that Address Reduction of Emissions

2.4.1 Air Quality Management Programme

The National Environment and Planning Agency prepared a six-year air quality management programme in 2010, with the following goals:

- To protect public health and welfare
- To prevent degradation of air quality in unpolluted areas in the country
- To control the emission of greenhouse gases and priority pollutants
- To provide data and information to guide policy development and decision-making
- To provide information to the public on the status of priority air pollutants to guide personal and business decisions as well as educational initiatives
- To control pollution and satisfy environmental requirements
- To comply with Government of Jamaica's obligations regarding international Agreements

The Jamaica Air Quality Management Programme is currently under review by the Agency.

2.4.2 Initiatives from the Transport, Energy, Climate Change Mitigation and Forestry Sectors

There are also several initiatives for reduction of emissions related to climate change mitigation.

1. Reducing Emissions from Deforestation and Forest Degradation (REDD+) – a global carbon offset programme in which Jamaica will participate through which the Forestry Department
2. Jamaica's Nationally Appropriate Mitigation Actions (NAMA)
3. Jamaica's Nationally Determined Contribution (NDC)
4. Projects under the Energy Sector
5. Projects under the Transport sector, including land, air and sea transport

Details on these programmes are at Appendix 3. Several initiatives are also underway involving the private sector, academia as well as local community groups and NGOs.

3. SUMMARY OF MAJOR GAPS AND RECOMMENDATIONS

The main areas which need to be addressed for effective emissions management include gaps in legislation and policy, enforcement and compliance, public awareness initiatives, technical and financial resources, capacity building, inter-agency collaboration and data acquisition and management systems. The strategies of this Policy Framework outline a number of actions to address these gaps.

3.1 Legislation and Policy Gaps

For regulatory and control purposes, emission sources may also be classified as follows: mobile sources (transport sector); stationary or point sources (industrial facilities and factories); area or nonpoint sources, which include small operations such as dry cleaning facilities and open sources such as agriculture, construction operations, dust from paved and unpaved roads, waste disposal sites and open burning. Currently, legislation is mostly focused on point sources. Conditions related to reduction of dust from construction sites are usually included in permits issued through the Natural Resources Conservation (Permit and Licences) Regulations, 1996 (amended 2015) and in relation to road works.

The following are matters to be addressed:

a) Need for inclusion of small facilities under the Natural Resources Conservation (Air Quality) Regulations

One of the gaps in the coverage of air pollution sources in current legislation is that emissions from smaller facilities which can have localized impact on communities are not addressed. Among the categories under consideration for inclusion in coverage are dry cleaning businesses which use small industrial boilers to provide steam, most municipal waste incinerators, cremation units, batching plants, quarry material stockpiling businesses, emergency generators of a specific size (recommended 200kwh), tyre re-treading facilities.

NEPA has, however, identified[29] several possible challenges for minor air pollutant sources to be regulated:

1. Lack of reliable air quality information for the different areas of the country, to assess the current and past air quality status. Current air quality data are insufficient and limited as it relates to the parameters measured. Additionally, there is no available information on domestic minor source emissions.

[29] Issues Paper on Emissions – National Environment and Planning Agency, 2018

2. Difficulty in obtaining reliable and up-to-date information to determine air pollutant emissions (e.g. number and types of sources being operated within the country at a given time), through suggested estimation methodologies

3. Lack of the proper monitoring infrastructure such as equipment, and other tools needed to carry out data collection

4. Lack of a proper database management infrastructure, to organise and store data. This includes but is not limited to monitoring data.

5. The difficulty of changing cultural practices associated with certain air pollutant emission activities such as open burning, road-side jerk food vending and other minor activities; as well as the limited public awareness of the environmental and health risks associated with these commonly practiced activities.

b) Need for updating of the Ambient Air Quality Standards

The NRCA (Ambient Air Quality Standards) Regulations, 1996 need to be updated and, among other things, a standard for particulate matter of 2.5 micrometres ($PM_{2.5}$) must be developed and included. The table below shows the Jamaican standards in relation to the WHO guidelines (2005) and the standards in the US and Canadian jurisdictions. The WHO guidelines are under revision and expected to be published in 2020.

While the Jamaican standards do not include $PM_{2.5}$, in 2014, NEPA started to monitor $PM_{2.5}$ as one of the strategies under the urban air quality monitoring plan and has reported on the findings since its 2015 national annual ambient air quality report. In the 2017 report reference was made to the use of the US Environmental Protection Agency (EPA) standard for $PM_{2.5}$. US EPA standards will be used until local $PM_{2.5}$ are established. In 2020, NEPA prepared a draft report outlining its recommendations for the development of a local $PM_{2.5}$ standard as well as the updating of existing standards.

Table 7 – Jamaica Ambient Air Quality Standards and the WHO guidelines - NEPA

Parameter µg/m^3	Averaging time	USA Standard) (µg/m^3)	Canadian Standard (µg/m^3)	WHO guideline (µg/m^3)	Jamaica Ambient Air Quality Standard (µg/m^3)
PM_{10}	Annual 24 hours	n/a 150	n/a 50	20 50	50 150
$PM_{2.5}$	Annual 24 hours	15 35	n/a 30	10 25	-
SO_2	Annual 24 hours 1 hour	n/a 500 (3 hr avg) 75	 50 200	 20 500 (10 mins average)	60 280 700

NO_2	Annual 24 hours 1 hour	53 n/a 100	60 n/a 188	40 n/a 200	100 n/a 400
VOC	1 hour	n/a	n/a	(1-17)	n/a

c) Adequacy of the Clean Air Act, 1964

The Technical Support Document for the Regulatory Impact Analysis of the Air Quality Regulations, prepared in 2002 noted that the Clean Air Act and the Public Health Act, 1985 were not adequate as legislative means to manage and control industrial sources to address existing and future air quality issues. The Public Health (Nuisance) Regulations, 1995 also preceded the NRCA (Air Quality) Regulations, 2006.

There is need for a review of the legislation to determine how the roles of the environmental and health agencies may be rationalized and how most effectively to address matters such as backyard burning, including how to change behaviour and obtain compliance with the provisions of the laws. The Natural Resources (Environmental Protection Measures) Order, 2016 prohibiting open burning in certain circumstances would also have to be considered.

d) Adequacy of the Country Fires Act, 1942 (amended 1995)

The provisions of the Country Fires Act relate primarily to agricultural practices as regards the burning of trash. The Act prohibits the burning of trash - defined as dried cane leaves, straw, cut plants, etc. without a permit, but makes it lawful for any plant or trash to be burned for the purpose of eradicating or preventing any disease as defined under the Plants (Protection from Disease) Act and for lime or charcoal kilns to be operated.

These provisions need to be reviewed, taking into account, also, that the burning of sugar cane releases particulate matter, dioxins, furans and greenhouse gases and that Jamaica has a commitment under the Stockholm Convention on Persistent Organic Pollutants (POPs) to eliminate pollutants such as dioxins and furans.

e) Lack of legislation for control of emissions from mobile sources

This is a major gap in the control of emissions as road traffic is one of the biggest contributors to air pollution especially in certain urban areas. The standards for motor vehicle emissions need to be included in legislation and testing of emissions from vehicles instituted. The implementation of motor vehicle emissions testing should take into account year of manufacture and class of vehicle. [Jamaica also has specific targets to meet as regards reduction of emissions from motor vehicles under the Global Fuel Economy Initiative.]

Additionally, the lack of a tax regime for electric vehicles significantly hinders the introduction of these vehicles.

f) Need for updating of the energy and transport policies and review of the impact of the Motor Vehicle Import Policy, 2014

There is need to review of the Motor Vehicle Import Policy in relation to the National Transport Policy, 2007 (being updated in 2020) and the National Energy Policy, 2009 and in terms of the targets under the GFEI, SDGs and the Paris Agreement, 2015. The National Transport Policy being updated also needs to take these initiatives into account.

g) Need for Climate Change Legislation

In accordance with the Climate Change Policy Framework, legislation is to be prepared which will, *inter alia*, institutionalize the role of the Climate Change Division in climate change response, as well as provide a framework for the mitigation of and adaptation to climate change across sectors. Such legislation will be important in achieving the following:

1. mandating information sharing across sectors for:
    a. the effective monitoring of climate adaptation and mitigation measures by the responsible entity
    b. populating and updating of national climate change databases
    c. informed decision-making across sectors and ;
    d. facilitating Jamaica's meeting of its reporting requirements

This legislation could also significantly improve data sharing across the public sector.

h) Enforcement and compliance

There are still a number of sources that may possibly meet the significant emission source threshold under the Air Quality Regulations which are currently unaccounted for (see Table 1) . The gaps that still exist in the execution of the Regulations have to be addressed. Enforcement of other relevant laws is also critical such as the Public Health Act and its regulations and the Road Traffic Act, for example.

3.2 Gaps in Institutional Arrangements

There is need for an updated comprehensive air quality management programme and appropriate mechanisms for inter-agency cooperation and collaboration on control of emissions.

i) Capacity and Resource Needs

The agencies required to monitor and enforce air quality legislation have capacity needs in terms of the availability of technical staff, training and equipment and software for monitoring. Capacity building is needed in areas such as equipment maintenance, data management (including software management).

The Air Quality Index proposed by NEPA which would make information available to the public has not yet been established.

There is also need for epidemiological studies especially in areas where communities are exposed to pollutants from mobile and fixed sources.

ii) Improved Systems for Data Acquisition and Management

Resources in terms of funding, equipment and training are needed as well as the formalization of agreements for the sharing of information.

Low data recovery rates from the ambient air quality monitoring network limit the ability of NEPA to establish trends and provide meaningful insight into the air quality conditions at the different monitoring locations island wide.

The Open Data Platform of the Ministry of Science, Energy and Technology should be developed as it would be a central part of improving the availability of data.

iii) Monitoring of Greenhouse Gas Emissions

The Climate Change Division needs capacity and technology for monitoring greenhouse gases and climate modelling and data acquisition. More Impact modelling is needed to give the opportunity to test what the future would look like without physical experimentation, which is costly.

The Meteorological Service needs to acquire long time series of data for analysis.

3.3 Communication and Collaboration

There is need for improvements in communication between public sector entities and also with the private sector and communities. Given the inter-relatedness of the subjects, there should be opportunities for planning and working together without necessarily creating new or burdensome institutional arrangements.

There should also be channels for communication by Government entities with the regulated community and the private sector as well as with communities who have concerns about air quality.

Many of the environmental conventions to which Jamaica is a Party require the submission of reports, in the format prescribed by the Convention secretariat, which are usually posted online. These reports are not always accessible in a clear, basic format for members of the public, nor is their existence necessarily known.

Some legislation such as the Air Quality Regulations, for example, now requires the submission of reports to Parliament, and there should be discussion on the issue of air quality on such occasions.

3.4 Public awareness

There should be improved communication with the public regarding good practices to reduce emissions, the impacts of certain cultural practices such as backyard burning and ways to protect themselves from harmful emissions.

Epidemiological studies should be undertaken to identify the linkages between air quality and non-communicable diseases. These linkages should be stressed in public awareness campaigns and interventions tailored to encourage behavioural change.

3.5 Human settlements/communities and Buildings

Special programmes should be developed and implemented in areas identified by the current monitoring as compromised in terms of air quality. NEPA's Air Quality Management Programme includes the concept of the Community Right-to-Know. Communities need to be involved not only on air quality issues which affect them, but also to be given more information on how they can make a difference.

The building code should be enacted and the construction of net zero energy buildings such as the model at the University of the West Indies should be encouraged.

3.6 Waste sector

The Government should move towards sanitary landfills which gas capture facilities, and use the methane generated to power the landfill and surrounding communities. Recommendations on waste minimization and alternatives to burning should also be developed. The matter of burning of tyres should be specially addressed by the regulatory authorities.

3.7 The Energy Sector

Among the recommendations for this sector are that biofuels should be brought into the market as soon as possible, that the petroleum refinery should be upgraded to match global standards and importers should be required to bring in low sulphur fuel. The IMO's deadline of 2020 for ships to meet low-sulphur diesel levels of 0.50% should be taken into account, as should meeting the 2030 targets of the Global Fuel Economy Initiative to which Jamaica is commited.

4. THE POLICY FRAMEWORK

The Vision and Goal of this Emissions Policy Framework for Jamaica are in keeping with the Constitution of Jamaica Chapter III - Charter of Fundamental Rights and Freedoms, Section 13 (3) (l)[30]. This Policy Framework is also in accordance with Vision 2030 Jamaica: National Development Plan, specifically Goal 4 '*Jamaica has a healthy natural environment,'* and takes into account the Sustainable Development Goals, in particular Goals 3 (Good Health and Well-being); 7 (Affordable and Clean Energy);11 (Sustainable Cities and Communities); 12 (Responsible Consumption and Production); and 13 (Climate Action).

VISION

A healthy and productive Jamaica with clean air in keeping with a low carbon development pathway in support of economic growth, social well-being and environmental sustainability.

GOAL

Effective and coordinated systems for the reduction of emissions from key pollutant sources and maintenance of good air quality throughout Jamaica.

PRINCIPLES

- **Sustainable development**
  Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature

- **Environmental stewardship**
  Government, the private sector, civil society and individuals should conserve resources, reduce waste and increase efficient use of energy.

- **Polluter pays principle**
  The polluter should, in principle, bear the cost of pollution, with due regard to the public interest.

- **Precautionary Approach**
  In order to protect the environment, where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

[30] As set out in the Charter of Fundamental Rights and Freedoms (Constitutional Amendment) Act, 2011, section 2 which repealed and replaced the original Chapter III of the Constitution. The provisions of the amended Chapter include " the right to enjoy a healthy and productive environment free from the threat of injury or damage from environmental abuse and degradation of the ecological heritage.'

- **Coherence and collaboration**
  Policy coherence and collaboration among Government entities are essential for effective governance, as are partnerships with academia, the private sector, CBOs, NGOs and development agencies.

- **Public right to information and public participation**
  Environmental issues are best handled with the participation of all concerned citizens. Appropriate access to information on the environment held by public authorities, shall be provided to citizens, including information on hazardous materials and activities in their communities and an opportunity shall be given for participation in decision-making processes. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

- **Accountability and transparency**
  There must be commitment to the principles of transparent, responsive, and accountable governance, providing measures to enforce the Policy Framework and indicators for performance against desired results.

- **Best science**
  The Government will apply sound technical and scientific analysis and principles and new scientific findings in the decision-making process.

- **Adherence to global commitments**
  The Government will incorporate in its medium- and long- term plans and programmes its commitments made at the global level and pursue the commitments for capacity-building, technology transfer and technical and funding support to developing countries made at the global level which are essential for achieving agreed goals and targets.

OBJECTIVES

The timeline for implementation of the objectives and related strategies is outlined in a five-year Action Plan attached as Appendix 1 of this Policy Framework:

1. **To coordinate approaches to the reduction of emissions**
   Strategies
   1.1 Improve communication among the public agencies that guide policies that may have a direct or indirect impact on emissions

   Actions

   a) Develop and implement an inter-agency communication strategy for the public sector on matters related to air quality

b) Ensure that current information and data on emissions, including the approved National Communications, Biennial Update Reports and Jamaica's Nationally Determined Contribution under the UNFCCC; the State of the Jamaican Climate Reports and the State of the Environment Reports are available and are widely circulated to public libraries, and other relevant public entities, particularly Municipal Corporations and on the websites of the key public sector agencies.

1.2 Establish institutional arrangements for coordinated approaches to the prevention and reduction of emissions

Actions

a) Prepare reports and presentations to Cabinet and Parliament, as appropriate, on matters related to the emission of air pollutants including greenhouse gases, their impact on the population and progress on achieving national and global emission reduction goals and targets.

b) Based on Cabinet approval, the Ministry with responsibility for environment and climate change will establish a National Air Quality Management Board. This Board would be co-chaired by the Ministries with responsibility for the environment and health to address, *inter alia*, emissions issues requiring joint and harmonized action for effectiveness. The Board would comprise representatives of the relevant Ministries, Departments and Agencies, the private sector, including the medical sector; academia and civil society.

c) Establish clear relationships and strengthen linkages between the National Air Quality Management Board , the Climate Change Advisory Board, Air Quality Management Committee and relevant Thematic Working Groups under Vision 2030 and other government-led committees, as appropriate to minimize duplication of efforts and to achieve common objectives.

d) Strengthen environmental stewardship activities within the public sector (for example the institution of environmental management systems), utilizing existing networks such as the Climate Change Focal Point Network, with a view to improving air quality and reducing greenhouse gas emissions.

e) Strengthen the capacities of the Ministries, Departments and Agencies (MDAs) with responsibility for health, environment, climate change, transport, mining, waste, agriculture and industry to monitor and regulate emissions-producing activities.

f) Expand the ambient air quality monitoring network through the inclusion of and partnership with the relevant regulatory agencies, particularly health, transport, solid waste and environment entities, local authorities, and other competent stakeholders to facilitate, *inter alia,* the development of a comprehensive and current emissions database.

1.3 Enhance policy coherence through the consultative process including the active engagement of the private sector and local communities.

Actions

a) To ensure policy coherence, the necessary consultations with key stakeholders must be held to inform decision- making.

b) Include air quality considerations and modelling in the revision of development orders and local sustainable development plans, taking into account the need to prevent pollution of areas with good air quality as well as to improve the quality of the air in more polluted areas.

c) Promote the use of the Development and Investment Manual in decision-making with respect to air quality and climate change considerations in development planning.

1.4 Further identify and implement critical actions for reducing emissions including the use of incentives related to environmentally friendly equipment and practices

Actions

a) Given the strong linkage between motor vehicle emissions and fuel quality and the implications for air quality, establish and enforce standards to allow for improved fuel quality for the local market within the short to medium term.

b) Used motor vehicle imports must comply with specified emission standards for vehicles and engines (taking into account class and year of manufacture).

c) Ensure that decisions relating to energy sources take into account Jamaica's commitments under, *inter alia,* global agreements with regard to emissions.

d) Increase support for reforestation and afforestation programmes.

e) Develop and implement projects and programmes (for example, the Global Fuel Economy Initiative[31]) which are intended to promote the use of cleaner, more efficient fuels with a view to reducing emissions that contribute to climate change and are harmful to health.

f) Pursue the use of incentives and disincentives to encourage the use of best available technologies and best environmental practices to prevent or reduce emissions within the private sector (including the use of modern pollution control technologies in plants and factories).

g) Explore the further development of an Energy Service Companies (ESCOs)/Energy Performance Contract (EPC) model.

h) Amend relevant legislation to include a tax incentive to facilitate the introduction of electric vehicles island wide

1.5 Active engagement of non-State actors in approaches to reduce emissions

Actions

a) Establish channels for communication with the private sector on issues related to emissions control.

b) Engage the scientific and academic communities in developing innovative approaches, including the development of technology, to emissions reduction and in communicating information on emissions.

c) Sensitize and actively engage the public, on actions that may be taken at the individual or community levels to reduce or prevent harmful emissions

d) Further promote economic viability and benefits to be derived from the pursuit of low emission/low carbon development.

e) Encourage private sector entities to calculate, monitor and reduce their emissions.

f) Facilitate the monitoring of community-based initiatives that result in emissions reduction and share this information with government entities that monitor emissions.

[31] The objective of the GFEI is a 50% improvement in average fuel economy in all motor vehicles by 2050 which would lead to reduced urban air pollution, fuel savings and reduction of carbon dioxide emissions.

2. To strengthen the mechanisms for the effective management of emissions that affect human health and the environment

Strategies

2.1 Review existing laws and promulgate, as necessary, new or amended legislation to address the sources of emissions of air pollutants

Actions

a) Review and amend the Natural Resources Conservation Authority (Air Quality) Regulations, 2006 and the Natural Resources Conservation (Ambient Air Quality Standards) Regulations, 1996 to include provisions that govern, *inter alia*, the community right-to-know, sources of emissions not presently covered, including minor sources, updating of standards in line with recognized global standards and inclusion of additional parameters (e.g. $PM_{2.5}$).

b) Review the scoping study[32] on emissions from minor sources[33] and develop a programme to address these sources, including a monitoring plan and emissions inventory.

c) Finalize and promulgate, in the short term, the legislation governing emissions testing of motor vehicles.

d) Review the Clean Air Act, 1964, the Country Fires Act, 1942[34], as well as the Public Health (Nuisance) Regulations, 1995 and other relevant legislation as to their effectiveness and the level of implementation, with a view to determining whether they should be amended or repealed.

e) Finalize the proposed legislation regarding emissions from ships.

f) Levy taxes on high emitting equipment.

[32] Scoping Study for Minor Air Pollutant Sources (NEPA, 2015)

[33] Minor sources are sources that emit less than the following: 25 tonnes of particulate matter, sulphur dioxide, carbon monoxide and nitrogen oxide; 1 tonne of lead of any priority air pollutant; 5 tonnes of any combination of priority air pollutants (Natural Resources Conservation Air Quality Regulations, 2006)

[34] Last amended in 1995, *inter alia,* to incorporate references to the Rural Agricultural Development Authority.

g) Amend the Procurement Act, 2011, to take into account the mandatory procurement of energy efficient, low emissions goods, services and works, in support of clean air.

h) Issue air quality advisories and bulletins to the public to, *inter alia*, inform about degraded air quality and reduce public exposure, particularly vulnerable communities, to elevated concentrations of toxic air pollutants

2.2 Develop and implement strategies, action plans and medium term programmes that focus on reducing the emission of air pollutants taking into account effects on natural resources and human health

Actions

a) Require high emitters to prepare and implement action plans relating to their emissions and to periodically advise communities within the environs of these sources and any remediation measures that will be taken.

b) Finalize and implement the National Air Quality Management Programme, incorporating public health considerations and specifying the roles of the relevant national institutions related to emissions reduction

c) Develop and implement of programmes geared towards the control of emissions from mobile sources.

d) Update of the National Implementation Plan for Persistent Organic Pollutants (POPs) under the Stockholm Convention.[35]

e) Develop an implementation plan for new and existing sources of emissions of mercury and mercury compounds using best available techniques and best environmental practices to control and, where feasible, reduce emissions by 2022 and 2027 respectively. Develop an inventory of mercury emissions from relevant sources by 2022.

[35] According to Article 5 of the Stockholm Convention, Parties are required to identify, characterize, quantify and prioritize sources of releases of unintentional persistent organic pollutants (UPOPs) listed in Annex C Part I and develop strategies with concrete measures, timelines and goals to minimize or eliminate these releases. UPOPs are created as a by-product of industrial process or unintentionally through combustion but have no commercial use or function. UPOPs can travel long distances, remain in the environment for a long period and bioaccumulate in the fatty tissue of animals and are among the most carcinogenic chemicals.
(https://www.sprep.org/attachments/Reports/GEFPAS_Pollutant_Awareness_Camapign.pdf)

f) Pursue activities focused on land-use and forestry, utilizing forests as carbon sinks as outlined in Jamaica's updated Nationally Determined Contribution (NDC) to the UNFCCC.

g) Strengthen national health systems and schemes to facilitate effective response to cases of respiratory illness and other diseases that result from exposure to poor air quality.

h) Explore mechanisms for liability and compensation for persons exposed over long periods to high levels of air pollutants.

i) Improve garbage collection and disposal to reduce and where possible eliminate open-burning within residential communities.

j) Identify and assess pollution from emissions sources and its impact on the built environment, including cultural heritage sites.

k) Finalize and implement the bushfire index for Jamaica to allow for preemptive work to prevent or curb potential fires bush and forest fires from natural causes (lightning strikes, etc.).[36]

2.3 Update and effectively implement the Air Quality Management Programme

a) Develop and implement an Air Quality Index including meteorological and climate data

b) Prepare air shed management plans.

c) Prepare a comprehensive assessment, including the necessary implementation strategies, of the technical (including equipment) and human resources needs of NEPA and other relevant state agencies to facilitate a robust air quality

[36] Forest and bush fires release large amounts of carbon dioxide, black carbon, brown carbon and ozone precursors and can also emit substantial amounts of volatile and semi-volatile organic materials and nitrogen oxides that form ozone and organic particulate matter. These emissions affect radiation, clouds, air quality and climate on regional and global levels. In addition, the formation of other pollutants as the air is transported can lead to harmful exposures for populations in regions far away from the fires (adapted from the National Oceanic and Atmospheric Administration https://www.esrl.noaa.gov/csl/factsheets/csdWildfiresFIREX.pdf)

monitoring programme and the expansion of the monitoring network to obtain greater coverage across the island.

d) Develop, in partnership with tertiary institutions and other stakeholders, training programmes for the maintenance and repair of monitoring equipment as well as programmes for air sampling.

e) Carry out epidemiological studies, with priority given to those communities exposed to high levels of air pollutants and disseminate the results to the stakeholders concerned.

f) Investigate and actively promote the use of advanced monitoring equipment and technology (including drones and portable devices) so as to enhance the monitoring capacity of the national ambient air quality monitoring network.

3. **To increase education and awareness on air quality issues to facilitate public participation in the protection of their health and the natural and built environment**

Strategies:

3.1 Increase public education and awareness of the impacts of emissions on human health and the natural and built environment

Actions

a) Develop public awareness and education materials on emissions that affect health, natural resources, the built environment and climate change and carry out continuous campaigns to increase awareness including the use of the news media and social media; and the convening of town hall meetings and other fora to increase the public's knowledge of the causes and effects of air pollution, Jamaica's commitments and the role which the public can play in reducing emissions.

b) Collaborate with environmental NGOs and CBOs on outreach to the public on issues related to emissions.

c) Review and update public awareness material on the impact of open burning and other sources of emissions and establish and publicize means of contacting the relevant organizations on issues relating to open burning for resolution to the extent possible.

d) Sensitize the general public and other stakeholders to legislation governing open-burning, including the Natural Resources Conservation (Environmental Protection Measures) Order, 2016 to facilitate greater compliance.

e) Promote the composting of household organic and yard cuttings as an alternative to the burning of such waste as well as the use of green roofs, as appropriate, within communities.

f) Publicize and broaden the availability and accessibility of the Pollutant Release and Transfer Register.

g) Include air quality-related issues in the school curricula at all levels.

3.2 Provide and make available data and information on emissions of air pollutants including the annual ambient air quality reports

Actions

a) Prepare and submit annual reports on the country's air quality, including the impact of emissions on human health and climate change, to the Minister with portfolio responsibility for environment and climate change and to Cabinet and at least once every three years to the Houses of Parliament.

b) Prepare and make available information (including the air quality index) on a periodic basis geared towards the general public as well as specific target audiences.

c) Publish scientific peer reviewed annual ambient air quality reports on the websites of the relevant public sector agencies, including the Jamaica Information Service's website, in a timely manner and disseminate these reports to the relevant agencies and organizations as appropriate.

4. To increase advocacy for the reduction of emissions in regional and international fora

Strategies

4.2 Provide support to regional institutions and civil society for enhanced advocacy

Actions

a) Continue interventions through CARICOM and the Caribbean Community Climate Change Centre as well as the Alliance of Small Island States on the urgency for reduction of greenhouse gases and the resultant impact of climate change on Small Island Developing States, including Jamaica.

b) Support scientific research by local and Caribbean institutions such as the Climate Studies Group, Mona on emissions reduction, the impacts of climate change and the need for transformational change.

c) Continue to promote the involvement of community groups in climate change discussions and negotiations to assist in building their capacity and facilitate the sharing of experiences and best practices.

5. To identify and pursue opportunities for funding and technical assistance for the management of air quality

Strategies

5.1 Develop a framework for identifying funding opportunities for reduction of emissions

Actions

a) Prepare a national financing and technical assistance strategy to support activities towards the reduction of air pollutants including short-lived climate pollutants, such as black carbon.

b) Pursue opportunities for the use of internationally transferred mitigation outcomes[37] to achieve the targets outlined under Jamaica's nationally determined contributions under the Paris Agreement.

[37] An internationally transferred mitigation outcome (ITMO) is the subtraction of a given absolute quantity of greenhouse gas emissions measured in tonnes of carbon dioxide equivalent from the emissions account of a given Party to the UNFCCC and the addition of an equivalent amount to the emissions account of another Party. Under Article 6, nations can agree to "cooperative approaches" to achieve their NDCs which can include ITMOs —which can be undertaken through bilateral, regional or multilateral emissions credit trading scheme or relevant mechanisms. (adapted from the International Emissions Trading Association, November, 2017).

c) Further engage development partners in facilitating technological development and technological transfer in emissions reduction.

d) Participate in initiatives for carbon offsets such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)[38] under the International Civil Aviation Organization as well as other regional and international carbon offset initiatives, where appropriate.

e) Review the effectiveness of the implementation of the carbon tax in reducing greenhouse gas emissions.

f) Develop and present to the Ministry with portfolio responsibility for finance, proposals for incentives to encourage the procurement of modernized equipment and technologies that will support the reduction of emissions of greenhouse gases and air pollutants.

g) Promote the development and use of investment tools to finance environmentally friendly projects including, *inter alia*, green bonds

6. To establish effective systems for research and data collection

Strategies

6.1 Improve and maintain the national air quality database.

Actions

a) Undertake assessment of air pollution levels using modeling, measurements and other empirical techniques.

b) Update and maintain the national ambient air quality database, including the GHG inventory, to inform decision-making.

c) Facilitate the development of targets and indicators in alignment with the goal of the Paris Agreement which, *inter alia* seeks to pursue efforts to limit global temperature rise in this century to 1.5 degrees Celsius above pre-industrial levels. Targets must take into consideration relevant policy directives per the National Energy Policy on renewable energy and energy efficiency

[38] The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is a global market based mechanisms for carbon offsetting which addresses any annual increase in total CO2 emissions from international civil aviation (i.e. civil aviation flights that depart in one country and arrive in a different country) above the 2020 levels, taking into account special circumstances and respective capabilities. (International Civil Aviation Authority)

d) Strengthen links with regional databases on air quality and climate change.

6.2 Strengthen the National Environment and Planning Agency's capacity to collect data to facilitate, *inter alia*, reporting under environmental agreements, including on greenhouse gas emissions

Actions

a) NEPA to collaborate with STATIN and other relevant agencies in streamlining the methodology for data collection and management towards an improved air quality database.

b) Collaborate with the scientific community on the acquisition of data on emissions, their impacts and long-term projections.

c) Build capacity, where necessary, within the Bureau of Standards, Jamaica, to support the quality assurance requirements of the air quality monitoring initiatives

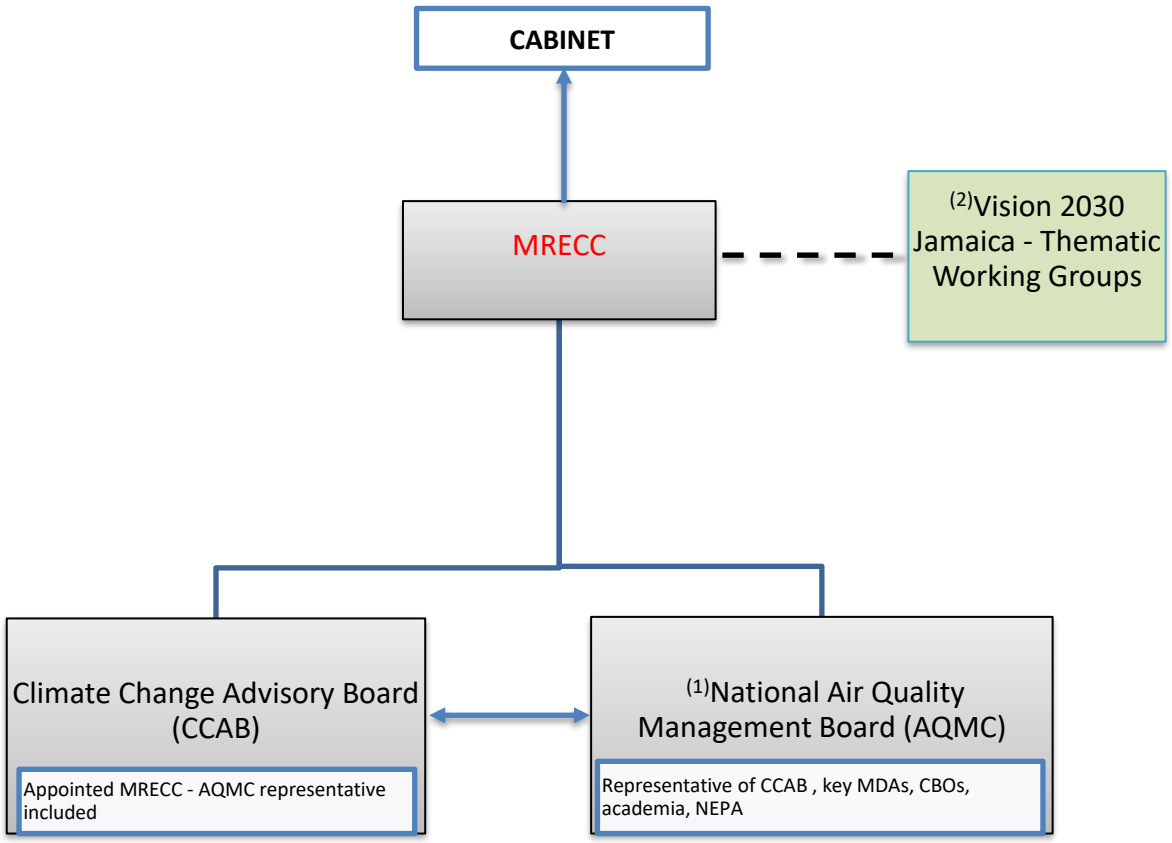
5. INSTITUTIONAL ARRANGEMENTS

To enable coordination amongst the relevant Ministries, Departments, Agencies, private sector and civil society stakeholders, Cabinet may establish a National Air Quality Management Board. This Board would include the MRECC, the Ministry of Finance and the Public Service, Ministry with responsibility for health (Epidemiology and Environmental Health Units), the respective Chairs of the Climate Change Advisory Board (CCAB), the NEPA's Air Quality Management Committee, representatives from major sector emitters (waste, transport, energy, agriculture, tourism), academia and civil society. The National Air Quality Management Board would report, through the MRECC, to the Cabinet, as appropriate, on its assessment of the state of the country's air quality, progress towards relevant national, regional and international targets related to air quality and climate change to which Jamaica is committed.

As considered necessary, but at least every three years, a report should be made to Parliament on the state of air quality and the status of meeting commitments under environmental and other treaties. The public may be invited to Parliamentary Committee meetings to consider matters related to emissions and associated health and environmental concerns.

It is recommended that the Vision 2030 Jamaica Thematic Working Groups on Energy, Hazard Risk Reduction and Adaptation to Climate Change, Natural Resources and Urban and Regional Development coordinate and collaborate on national air quality and climate change issues within the context of their respective mandates and work agenda. Figure 3 shows the arrangements for this coordination and maintaining focus on the matter of emissions.

Figure 3 - Arrangements for Coordination and Reporting of Emissions Reduction Targets



1. The National Air Quality Management Board would comprise the Ministry responsible for the Environment and Climate Change (MRECC) , the Ministries with responsibility for finance and health, NEPA, the CCAB and representatives of major emitter sectors .This body would report through the MRECC to the Cabinet on assessments of the state of the country's air quality.

2. The Thematic Working Groups on Energy, Hazard Risk Reduction and Adaptation to Climate Change, Natural Resources and Urban and Regional Development will also be involved in the consideration of matters related to emissions of air pollutants and greenhouse gases.

6. GLOBAL AND REGIONAL AIR QUALITY/CLIMATE CHANGE TARGETS

Several global targets and goals are based on fulfilment by the year 2030. In terms of climate change mitigation, carbon dioxide emissions are expected to peak by 2020, major changes in technology and fuel types in the transport and other sectors would have been in place and Jamaica would have prepared its fourth Nationally Determined Contribution (NDC) in 2023.

By 2030 as well, under the 2030 Agenda for Sustainable Development - the plan of action for people, planet and prosperity - bold and transformative steps should have been taken by all countries to eradicate poverty and heal and secure the planet. Implementation of Jamaica's National Development Plan, Vision 2030 should help to make made Jamaica 'the place of choice to live, work, raise families and do business.'

At the regional level, the Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (the Escazú Agreement) was adopted in 2018 and is open for ratification up to 2020. Jamaica signed the Escazú Agreement in 2019. In addition, there are regional policies and plans such as the Regional Plan for Action on Atmospheric Pollution and the draft Caribbean Community Environmental and Natural Resources Policy Framework and action plan. In short, the goals for the next thirteen years at the global and national levels are based on high ambition and rapid transformative change. In order to be successful in achieving the various goals, collaboration and involvement of all parties - from the public and private sectors and civil society at the national and local levels – is critical.

1. Climate change mitigation targets

The major milestones with regard to reduction of greenhouse gas emissions up to the year 2030 are set out below:

The Talanoa Dialogue was held in 2018 in preparation for the Global Stocktake 2023 of collective efforts of Parties in relation to progress toward the long- term goal of the Paris Agreement. The outcome is to be used by Parties in reviewing current NDCs before 2020. At the 24th meeting of the Conference of the Parties to the UNFCCC in 2018, the IPPC – Special Report on the impacts of 1.5°C of global warming above pre-industrial levels and related global greenhouse gas emissions pathways was released.

The timelines of note for 2019-2021 include:

- Revised NDC (due in advance of the 2020 Conference of the Parties to the UNFCC in November-December 2020) - due in 2020

- In accordance with the Paris Agreement, the development of long-term low-emissions development strategies aimed at 2050 – due in 2020.
- New standards for bunker fuel to come into force in 2020 under Annex VI of MARPOL
- Environmentally sound management of all wastes by 2020 (Target 12:4 Sustainable Development Goal 12) through, *inter alia*, the implementation of various projects and programmes by the relevant public sector agencies, the private sector and civil society.
- Phase-out of the import/export/manufacture of compact fluorescent lamps (CFLs) to reduce mercury emissions in keeping with the 2020 phase-out date as outlined in the Minamata Convention on Mercury.

2. Air quality goals

The main goals for air quality management relate to:

- the review and updating of the Air Quality Management Programme
- increased collaboration between the public sector agencies responsible for the environment and health for more effective response by the agencies to issues related to emissions, for example, through the carrying out of epidemiological studies,
- the implementation of a system for the testing of motor vehicle emissions as part of the annual motor vehicle fitness requirements under the Road Traffic Act,
- implementation of standards for the transport sector based on fuel efficiency and the use of cleaner fuels in the public transport system,
- implementation of energy efficiency and conservation and renewable energy projects in the public sector, and
- enforcement of standards for international shipping for the reduction of emissions.

The Action Plan for a 5 year period is set out at Appendix 1.

3. Public participation

The MRECC will pursue ratification of the Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (Escazú Agreement) with the support of key stakeholders. Ratification will require strengthening of local legislation to meet the obligations set out in the Agreement. The MRECC will continue discussions with stakeholders to this end.

7. MONITORING, REPORTING AND VERIFICATION (MRV) FRAMEWORK

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
1. **COORDINATION AND COMMUNICATION**			
1.1 Establish systems for ensuring that Jamaica meets its commitments regarding climate change mitigation and environmental and air quality matters.	Prepare an annual report to the Cabinet on: - the state of the country's air quality; and - progress towards achievement of relevant targets related to air quality and climate change under national, local, regional and global instruments/arrangements to which the country is committed, including the SDGs, Paris Agreement, the Stockholm Convention on Persistent Organic Pollutants and the Minamata Convention on Mercury.	# of annual reports prepared and submitted to the Cabinet in accordance with applicable standards in the specified time	Annual Reports prepared and submitted to Cabinet
	Report to Parliament at least once every three years on the state of Jamaica's air quality	At least one report prepared and tabled in the Parliament in accordance with applicable standards in the specified time	Progress Report prepared and tabled in Parliament
1.2 Establish inter-agency co-ordination mechanisms	Convene the Air Quality Management Committee with the mandate specified in Section 2 of the Policy Framework.	Air Quality Management Committee (AQMC) convened and at least 2 meetings held within first year of policy implementation	AQMC meeting minutes

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
	Update and publicize the Air Quality Management Programme (AQMP)	AQMP updated in accordance with applicable standards; AQMP publicized on at least 2 media platforms within 3 years of policy implementation	Updated AQMP; AQMP information shared on 2 platforms
2. DEVELOPMENT AND MAINTENANCE OF ROBUST AIR QUALITY MONITORING PROGRAMMES	Expand NEPA's air quality monitoring network by adding new stations, acquisition of equipment, software and modern technologies	Air quality monitoring network expanded within 3 years of policy implementation	Expansion of air quality monitoring network
	Include priority actions related to air quality in the 2021-2024 Medium -Term Socio Economic Policy Framework (MTF).	Priority actions on air quality included in updated MTF	MTF published with priority actions related to air quality issues
	Develop the infrastructure for monitoring weather patterns which impact on air quality, including the installation of meteorological stations	The number of meteorological stations installed in appropriate locations within 5 years of policy implementation	Installed and operational meteorological stations
	Establish an electronic or remote sensing monitoring system for air pollution.	Electronic or remote sensing monitoring system established within 4 years of policy implementation	Access to operational monitoring system by relevant MDAs

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
3. STRENGTHENING OF LEGISLATION, POLICIES AND PLANS TO ADDRESS THE REDUCTION OF EMISSIONS			
3.1 Review the laws and regulations related to emissions of pollutants for updating and harmonization.	Conduct joint reviews of the NRCA Act and its Regulations on air quality, the NRC (Environmental Protection Measures) Order, the Clean Air Act, the Public Health Act and its Public Health (Nuisances) Regulations, the Country Fires Act, and the National Solid Waste Management Act, with a view, *inter alia,* to*:* - rationalizing the roles of the environmental and health agencies with respect to emissions - identify and address gaps in the legislative framework (revising fines and penalties, expanding the regulatory mandate of authorized officers, repealing outdated legislation, etc)	Joint review conducted within in 3 years of policy implementation	Report summarizing legislative gaps and recommendations for amendments
	Undertake consultations on legislation governing climate action	2 consultations held within 2 years of policy implementation	Consultation reports
	Promulgate legislation governing climate action	Act promulgated within 3 years of policy implementation	Act available on relevant websites
	Review the NRC (Ambient Air Quality Standards) Regulations, 1996 and carry out studies with a view to updating the standards to include $PM_{2.5\mu m}$ as appropriate	Review conducted within in 3 years of policy implementation	Report summarizing legislative gaps and

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
			recommendations for amendments; Report on outcome of $PM_{2.5\mu m}$ studies
3.2 Review/updating of the policies of the sectors which involve major sources of emissions	Review or update policies and plans related to the transport, energy, agriculture, tourism, waste management, housing, climate change response and health to take into account the impact of emissions on health and the environment and seek to include directives/measures aimed at the reduction or prevention, where possible, of such emissions.	At least 1 review of policy/plan conducted within 2 years of policy implementation	Report on outcomes of policy review
3.3 Update and Implement the National Implementation Plan (NIP) on persistent organic pollutants	Update the NIP on Persistent Organic Pollutants, particularly UPOPs	NIP reviewed and updated, as appropriate, on a periodic basis	Updated NIP
4. **CAPACITY BUILDING OF AGENCIES/STAKEHOLDERS**	Increase the capacity of staff of the relevant regulatory authorities related to air quality through ongoing training programmes including in the maintenance of air quality monitoring equipment, basic air pollution meteorology, dispersion modelling, etc.	At least 1 training programme/course held with the relevant regulatory authorities within 2 years of policy implementation	Relevant certification of staff; Training programmes included in training plans of relevant regulatory authorities (NEPA, Ministry of Health and its Regional Authorities, Ministry of Labour, Jamaica Bauxite Institute)

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
	Increase the complement of staff involved in air quality management and increase the capacity of the laboratories.	Complement of staff involved in air quality management increased in at least 1 regulatory agency within 5 years of policy implementation; Capacity of at least 1 key laboratory increased through training and acquisition of relevant equipment within 5 years of policy implementation	Increased staff complement of 1 regulatory agency; Increased capacity of 1 relevant laboratory
4.1 Increase the use of epidemiological studies in decision-making	Monitor the impact of emissions on health through epidemiological studies, with priority given to those communities exposed to high levels of air pollutants	At least 1 epidemiological study undertaken in a priority community within 3 years of policy implementation	Epidemiological study provided by relevant MDAs and made publicly available, as appropriate
	Develop and implement plans of action to monitor and address the impact of emissions on public health including conducting and making publicly available epidemiological studies	At least 1 comprehensive plan developed to monitor and address the impact of emissions on public health and implemented within 3 years of policy implementation	Action plan to monitor and address the impact of emissions on public health
5. **ADDRESSING RISKS TO COMMUNITIES FROM AIR POLLUTION**	Sensitize the public on the PRTR when established.	At least 1 sensitization campaign undertaken by the NEPA within 3 months of establishment of the PRTR	Advertisements and/or notifications shared with the public via various printed and electronic media as well as social media platforms

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
	Develop and implement proposals for interventions in communities identified from current monitoring as being affected by air pollution	At least 2 Intervention proposals developed and implemented within 5 years of policy implementation	Intervention proposals; Report on outcomes of interventions
	Assess the feasibility of the declaration of areas as No Burn Zones by municipal corporations, as necessary and appropriate, and implement compliance and enforcement measures.	Analysis undertaken of feasibility of declaring No Burn Zones to include identification of possible areas to be so declared, conducted within 3 years of policy implementation	Analysis report provided by relevant MDAs
	Develop and implement the Air Quality Index programme	Air Quality Index programme developed within 3 years of policy implementation	Air quality index publicly available
	Provide information on the Air Quality Management Programme, emissions from licensed facilities, air shed monitoring for affected communities based on the principle of the 'Community's Right to Know'.	Information on Air Quality Management Programme, emissions and air sheds provided, as appropriate, within 5 years of policy implementation	Easily understood information available on user-friendly interface, including the relevant agency's website
6. REDUCTION OF EMISSIONS FROM ENERGY SOURCES	Explore the development of standards for petroleum imports to allow for low sulphur content for the domestic market	1 assessment conducted of internationally available petroleum products to determine suitability	Assessment report provided by relevant MDA

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
		for adoption in local market undertaken within 5 years of policy implementation; 1 pilot study undertaken within 5 years of policy implementation to determine suitability of relevant petroleum products with a view to determining potential standards for low sulphur petroleum imports;	Report on pilot provided by relevant MDA
	Enact Building Code under the Building Act to support energy efficiency in buildings	Energy efficiency requirements of the Building Code utilized within 2 years of policy implementation	Enactment of Building Code
	Promote the design and construction of net zero energy buildings within the public sector, such as the model at the University of the West Indies (Mona campus)	Promotion of design and construction of net zero buildings within the public sector through the sharing of information and data, within 2 years of policy implementation	Dissemination of information promoting net zero buildings and made publicly on relevant MDAs' websites

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
	Further develop the Energy Services Companies (ESCO)/ Energy Performance Contracting (EPC) model as a tool for accelerating the achievement of the national renewal energy target.	Position paper developed within 2 years of policy implementation	Information on ESCO/EPC model available on relevant MDAs' websites
	Explore the development of a public-private agreement (PPA) model for the deployment of ESCOs ;	Position paper developed within 2 years of policy implementation	Information on PPA model available on relevant MDAs' websites
	Encourage private sector entities to calculate and monitor their emission of GHGs using online services	Information on GHG emissions calculations, including methodologies for and benefits to the private sector, published through appropriate media within 2 years of policy implementation	Information on GHG emissions calculations published through appropriate media, including social media and relevant MDAs' websites
	Promote energy efficient lighting, cooling and heating in the retrofitting of existing buildings and facilities	Information on energy efficient retrofits for existing buildings and facilities published through appropriate media within 2 years of policy implementation	Information on energy efficient retrofitting published through appropriate media, including social media and relevant MDAs' websites.

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
	Update the National Renewable Energy Policy and the National Energy Conservation and Efficiency Policy	Updated policies within 4 years of policy implementation	Updated policies available on relevant MDAs' websites
	Support energy conservation through environmental stewardship programmes	# of environmental stewardship programmes developed across the public sector within 5 years of policy implementation	Environmental stewardship programmes
	Amend the Procurement Act, 2011, to take into account the mandatory procurement of energy efficient, low emissions goods, services and works, in support of clean air	Act amended within 5 years of policy implementation	Bill to amend the Procurement Act 2011 tabled in Parliament
	In the development of energy proposals, including additional generation capacity, take into account considerations of health and commitments under global agreements to reduce emissions, thereby moving to low carbon initiatives	# of project proposals taking into consideration health and relevant international commitments under global agreements, developed within 5 years of policy implementation	Approved projects proposals which include health considerations and relevant commitments under global agreements
7 REDUCTION OF EMISSIONS FROM TRANSPORT	Review the recommendations from programmes and projects such as the GFEI for cleaner energy sources and cleaner fuels and vehicles for implementation	Recommendations of at least 2 relevant programmes and projects reviewed within 2 years of policy implementation	Report summarizing key recommendations for implementation
	Implement pilot projects for cleaner fuel/electric vehicles in public passenger fleet	At least 1 pilot project for cleaner fuel/electric vehicles undertaken	Outcomes of pilot projects published and/or publicized

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
		within 4 years of policy implementation	
	Enact regulations under the Road Traffic Act, 2019, to regulate motor vehicle emissions	Draft motor vehicle emissions standards updated, as necessary, within 2 years of policy implementation	Bill to include regulations for motor vehicle emissions under the Road Traffic Act, 2019 tabled in Parliament
	Develop the necessary infrastructure and capacity within the relevant regulatory authorities to facilitate testing and analyses of motor vehicle emissions	Relevant equipment, hardware software and training programmes identified and procured within 5 years of policy implementation	Commencement of effective motor vehicle emissions testing island-wide
8 ADVOCACY FOR EMISSION REDUCTIONS AT THE REGIONAL AND GLOBAL LEVELS	Continue advocacy through CARICOM, the Alliance of Small Island States (AOSIS) and others for urgent action on climate change mitigation	Position papers prepared in consultation with the public, as appropriate, and active participation at relevant fora, as required	Summary of key outcomes of engagement with CARICOM, AOSIS etc. of importance to Jamaica as well as next steps made publicly available
	Support the work of regional research institutions on the impacts of climate change and collaborate with them in increasing awareness of decision-makers in the public and private sectors, schools and communities of the need to reduce emissions as well as to adapt to climate change.	At least 1 initiative developed and implemented in collaboration with relevant regional research institution(s) to raise awareness of decision-makers, schools and communities of the need to reduce emissions and adapt to climate	Outcomes of the initiative made publicly available

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
		change, within 5 years of policy implementation	
	Participate in regional networks to address air pollution including, as appropriate, the Intergovernmental Network on Atmospheric Pollution for Latin America and the Caribbean and networks implementing the Action Plan for Intergovernmental Cooperation on Air Pollution for Latin America and the Caribbean	At least 1 regional air pollution network identified and engaged, as appropriate, within 3 years of policy implementation	Decisions/agreements and other relevant outcomes from engagement with regional air pollution networks shared with relevant MDAs
	Support and comply with global initiatives for reduction of emissions from air and sea transport	At least 1 priority global initiative identified and relevant actions undertaken in support of emissions reduction from air and/or sea transport, within 3 years of policy implementation	Compliance reports made publicly available
9 STRENGHTENED PUBLIC AWARENESS PROGRAMMES	Develop and implement public education and awareness campaigns targeted at reduction of emissions and the impacts of emissions on non-communicable diseases	# of public education and awareness campaigns developed to address reduction of emissions and their impacts on non-communicable diseases within 5 years of policy implementation	Information addressing reduction of emissions and their impacts on non-communicable diseases available on websites of relevant MDAs
	Provide information/data for the public on the impact of ambient air emissions on vulnerable groups, including the elderly and children	At least 2 types of user-friendly information products /data provided via publicly available	Information addressing the impact of ambient air emissions on vulnerable

MAIN ELEMENTS	ACTIONS	INDICATOR	MEANS OF VERIFICATION
		platforms on impacts of ambient air emissions on vulnerable groups, including elderly and children, within 2 years of policy implementation	groups available on websites of relevant MDAs
	Carry out an aggressive campaign against open burning including provision of advice on alternatives to burning.	At least 1 public education and awareness campaign developed and carried out to address open burning within 2 years of policy implementation	Advertisements and/or notifications shared with the public via various printed and electronic media as well as social media platforms; User friendly forms of information addressing open burning on websites of relevant MDAs

APPENDIX 1

ACTION PLAN

MAIN ELEMENTS	ACTIONS	RESPONSIBLE ENTITIES	TIMELINE					INDICATIVE COSTS
			1	2	3	4	5	
1. **COORDINATION AND COMMUNICATION**	Prepare an annual report to the Cabinet on: - the state of the country's air quality; and							
1.1 Establish systems for ensuring that Jamaica meets its commitments regarding climate change mitigation and environmental and air quality matters.	- progress towards achievement of relevant targets related to air quality and climate change under national, local, regional and global instruments/arrangements to which the country is committed, including the SDGs, Paris Agreement, the Stockholm Convention on Persistent Organic Pollutants and the Minamata Convention on Mercury.	NEPA	**X**	**X**	**X**	**X**	**X**	**Staff time**
	Report to Parliament at least once every three years on the state of Jamaica's air quality	MRECC, Planning Institute of Jamaica/ Vision 2030 secretariat	**X**	**X**	**X**	**X**	**X**	**Staff time**
1.2 Establish inter-agency co-ordination mechanisms	Convene the Air Quality Management Committee with the mandate specified in Section 2 of the Policy Framework.	NEPA/MRECC	**X**	**X**	**X**	**X**	**X**	**Staff time**
	Update and publicize the Air Quality Management Programme	MRECC, MoH, NEPA and the Air Quality Management Committee	**X**	**X**	**X**	**X**	**X**	**$10M**

MAIN ELEMENTS	ACTIONS	RESPONSIBLE ENTITIES	TIMELINE					INDICATIVE COSTS
2. DEVELOPMENT AND MAINTENANCE OF ROBUST AIR QUALITY MONITORING PROGRAMMES	Expand NEPA's air quality monitoring network by adding new stations, acquisition of equipment, software and modern technologies	MRECC/NEPA/ Ministry with responsibility for health /Ministry of Finance		**X**	**X**			**$40M**
	Include priority actions related to air quality in the 2021-2024 Medium -Term Socio Economic Policy Framework (MTF).	NEPA/MRECC/ Vision 2030 Secretariat	**X**		**X**		**X**	**Staff time**
	Develop the infrastructure for monitoring weather patterns which impact on air quality, including the installation of meteorological stations	MRECC, Meteorological Service (Met. Service)		**X**	**X**	**X**	**X**	**$13M**
	Establish an electronic or remote sensing monitoring system for air pollution.	NEPA		**X**	**X**	**X**	**X**	**$25M**
3. STRENGTHENING OF LEGISLATION, POLICIES AND PLANS TO ADDRESS THE REDUCTION OF EMISSIONS								
3.1 Review the laws and regulations related to emissions of pollutants for updating and harmonization.	Conduct joint reviews of the NRCA Act and its Regulations on air quality, the NRC (Environmental Protection Measures) Order, the Clean Air Act, the Public Health Act and its Public Health (Nuisances)	Ministries with responsibility for health, agriculture and waste management and MRECC		**X**	**X**	**X**	**X**	**$5M**

MAIN ELEMENTS	ACTIONS	RESPONSIBLE ENTITIES	TIMELINE					INDICATIVE COSTS
	Regulations, the Country Fires Act, and the National Solid Waste Management Act, with a view, *inter alia* to*:* - rationalizing the roles of the environmental and health agencies with respect to emissions - identify and address gaps in the legislative framework (revising fines and penalties, expanding the regulatory mandate of authorized officers, repealing outdated legislation, etc)							
	Undertake consultations on legislation governing climate action	MRECC	**X**	**X**	**X**			**$3M**
	Promulgate legislation governing climate action	MRECC			**X**			**Staff time**
	Review the NRC (Ambient Air Quality Standards) Regulations, 1996 and carry out studies with a view to updating the standards to include $PM_{2.5\mu m}$ as appropriate	NRCA/NEPA; Portfolio Ministries responsible for environment and health	**X**	**X**	**X**			**$32M**
3.2 Review/updating of the policies of the sectors which involve major sources of emissions	Review or update policies and plans related to the transport, energy, agriculture, tourism, waste management, housing, climate change response and health to take into account the impact of emissions on health and the environment and seek to include directives/measures aimed at the reduction or prevention, where possible, of such emissions.	MRECC, the relevant MDAs, Cabinet Office	**X**	**X**	**X**			**$20M**

MAIN ELEMENTS	ACTIONS	RESPONSIBLE ENTITIES	TIMELINE					INDICATIVE COSTS
3.3 Update and Implement the National Implementation Plan (NIP) on persistent organic pollutants	Update the NIP on Persistent Organic Pollutants, particularly UPOPs	Portfolio Ministry – Environment/ NEPA				**X**	**X**	**Staff time with external support**
4. **CAPACITY BUILDING OF AGENCIES/STAKEHOLDERS**	Increase the capacity of staff of the relevant regulatory authorities related to air quality through ongoing training programmes including in the maintenance of air quality monitoring equipment, basic air pollution meteorology, dispersion modelling, etc.	NEPA, Ministry of Health and its Regional Authorities, Ministry of Labour, Jamaica Bauxite Institute	**X**	**X**	**X**	**X**	**X**	**$15M**
	Increase the complement of staff involved in air quality management and increase the capacity of the laboratories.	NEPA/MRECC/MoH	**X**	**X**	**X**	**X**	**X**	**$24M**
4.1 Increase the use of epidemiological studies in decision-making	Monitor the impact of emissions on health through epidemiological studies, with priority given to those communities exposed to high levels of air pollutants	NEPA/MRECC/Ministry with responsibility for health		**X**	**X**	**X**	**X**	**$100M**
	Develop and implement plans of action to monitor and address the impact of emissions on public health including conducting and making publicly available epidemiological studies	NEPA/MRECC/MoH		**X**	**X**	**X**	**X**	**$50M**
5. **ADDRESSING RISKS TO COMMUNITIES FROM AIR POLLUTION**	Sensitize the public on the PRTR when established.	MRECC/NEPA/Ministry of Health			**X**	**X**	**X**	**$1M**

MAIN ELEMENTS	ACTIONS	RESPONSIBLE ENTITIES	TIMELINE					INDICATIVE COSTS
	Develop and implement proposals for interventions in communities identified from current monitoring as being affected by air pollution	NEPA/MOH	**X**	**X**	**X**	**X**	**X**	**$50M**
	Assess the feasibility of the declaration of areas as No Burn Zones by municipal corporations, as necessary and appropriate, and implement compliance and enforcement measures.	NEPA, Portfolio Ministries – Environment, Health, Local Government; Municipal Corporations, Jamaica Constabulary Force	**X**	**X**	**X**	**X**	**X**	**Staff Time**
	Develop and implement the Air Quality Index programme	NEPA/Met. Service		**X**	**X**	**X**	**X**	**$63M**
	Provide information on the Air Quality Management Programme, emissions from licensed facilities, air shed monitoring for affected communities based on the principle of the 'Community's Right to Know'.	NEPA		**X**	**X**	**X**	**X**	**Staff Time**
6. REDUCTION OF EMISSIONS FROM ENERGY SOURCES	Explore the development of standards for petroleum imports to allow for low sulphur content for the domestic market	Portfolio Ministry – Energy/ Ministry of Finance		**X**	**X**	**X**	**X**	**Staff Time**
	Enact the Building Code to support energy efficiency in buildings	Ministry of Local Government		**X**	**X**	**X**		**Staff Time**

MAIN ELEMENTS	ACTIONS	RESPONSIBLE ENTITIES	TIMELINE					INDICATIVE COSTS
	Promote the design and construction of net zero energy buildings within the public sector, such as the model at the University of the West Indies (Mona campus)	Portfolio Ministries – Energy, Housing, Spatial Planning and Finance, NHT and HAJ	**X**	**X**	**X**	**X**	**X**	**$10M**
	Further develop the Energy Services Companies (ESCO)/ Energy Performance Contracting (EPC) model as a tool for accelerating the achievement of the national renewal energy target.	Portfolio Ministries – Energy, Finance		**X**	**X**	**X**	**X**	**$10M**
	Explore the development of a public-private agreement (PPA) model for the deployment of ESCOs ;	Portfolio Ministries – Energy, Finance	**X**	**X**	**X**	**X**		**Staff time**
	Encourage private sector entities to calculate and monitor their emission of GHGs using online services	Portfolio Ministry – Energy, MRECC	**X**	**X**	**X**	**X**	**X**	**Staff time**
	Promote energy efficient lighting, cooling and heating in the retrofitting of existing buildings and facilities	Portfolio Ministries – Housing, Local Government, Energy, Finance Environment and Climate Change	**X**	**X**	**X**	**X**	**X**	**Staff time**
	Update the National Renewable Energy Policy and the National Energy Conservation and Efficiency Policy	Portfolio Ministry - Energy		**X**	**X**	**X**	**X**	**$15M**
	Support energy conservation through environmental stewardship programmes	Portfolio Ministries – Environment/ Energy	**X**	**X**	**X**	**X**		**$40M**

MAIN ELEMENTS	ACTIONS	RESPONSIBLE ENTITIES	TIMELINE					INDICATIVE COSTS
	Amend the Procurement Act, 2011, to take into account the mandatory procurement of energy efficient, low emissions goods, services and works, in support of clean air	Ministry of Finance/Portfolio Ministry – Environment		**X**	**X**	**X**		**Staff time**
	In the development of energy proposals, including additional generation capacity, take into account considerations of health and commitments under global agreements to reduce emissions, thereby moving to low carbon initiatives	Portfolio Ministry – Energy/OUR	**X**	**X**	**X**	**X**	**X**	**Staff time**
7 REDUCTION OF EMISSIONS FROM TRANSPORT	Review the recommendations from programmes and projects such as the GFEI for cleaner energy sources and cleaner fuels and vehicles for implementation	Ministries responsible for transport, health and environment		**X**	**X**	**X**	**X**	**Staff time**
	Implement pilot projects for cleaner fuel/electric vehicles in public passenger fleet	Ministries responsible for transport, energy and environment		**X**	**X**	**X**	**X**	**$100M**
	Enact regulations under the Road Traffic Act, 2019, to regulate motor vehicle emissions	Ministries responsible for transport, energy and environment, NEPA		**X**	**X**	**X**	**X**	**Staff time**
	Develop the necessary infrastructure and capacity within the relevant regulatory authorities to facilitate testing and analyses of motor vehicle emissions	Ministry with responsibility for transport and the ITA		**X**	**X**	**X**	**X**	**$100M**

MAIN ELEMENTS	ACTIONS	RESPONSIBLE ENTITIES	TIMELINE					INDICATIVE COSTS
8 ADVOCACY FOR EMISSION REDUCTIONS AT THE REGIONAL AND GLOBAL LEVELS	Continue advocacy through CARICOM, the Alliance of Small Island States and others for urgent action on climate change mitigation	MRECC	**X**	**X**	**X**	**X**	**X**	**Staff time with external support**
	Support the work of regional research institutions on the impacts of climate change and collaborate with them in increasing awareness of decision-makers in the public and private sectors, schools and communities of the need to reduce emissions as well as to adapt to climate change.	MRECC	**X**	**X**	**X**	**X**	**X**	**Staff time with external support**
	Participate in regional networks to address air pollution including, as appropriate, the Intergovernmental Network on Atmospheric Pollution for Latin America and the Caribbean and networks implementing the Action Plan for Intergovernmental Cooperation on Air Pollution for Latin America and the Caribbean	NEPA,MRECC	**X**	**X**	**X**	**X**	**X**	**Staff time with external support**
	Support and comply with global initiatives for reduction of emissions from air and sea transport	Ministry with responsibility for transport, MAJ, JCAA		**X**	**X**	**X**	**X**	**Staff time with external support**
9 STRENGHTENED PUBLIC AWARENESS PROGRAMMES	Develop and implement public education and awareness campaigns targeted at reduction of emissions and the impacts of emissions on non-communicable diseases	Ministry with responsibility for health/MRECC/NEPA	**X**	**X**	**X**	**X**	**X**	**$40M**
	Provide information/data for the public on the impact of ambient air emissions on vulnerable groups, including the elderly and children	NEPA/MRECC	**X**	**X**	**X**	**X**	**X**	**$20M**
	Carry out an aggressive campaign against open burning including provision of advice on alternatives to burning.	NEPA/Ministry with responsibility for local government	**X**	**X**	**X**	**X**	**X**	**$40M**

APPENDIX 2

SUSTAINABLE DEVELOPMENT GOALS, TARGETS AND INDICATORS RELEVANT TO EMISSIONS

Goal	Target	Indicator
Goal 3: Ensure Healthy Lives and Promote Well-Being for All at All Ages	3.9**:** By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	3.9.1**:** Mortality rate attributed to household and ambient air pollution.
Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all	7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	7.1.1 Proportion of population with access to electricity 7.1.2 Proportion of population with primary reliance on clean fuels and technology
	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1 Renewable energy share in the total final energy consumption
	7.3 By 2030, double the global rate of improvement in energy efficiency	7.3.1 Energy intensity measured in terms of primary energy and GDP
	7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	7.a.1 International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems
	7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support	7.b.1 Investments in energy efficiency as a proportion of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable services
Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable	11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.	11.6.2: Annual mean levels of fine particulate matter (e.g. $PM_{2.5}$ and PM_{10}) in cities (population weighted).

Goal	Target	Indicator
Goal12: Ensure sustainable consumption and production patterns	12.4: By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.	12.4.2: Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment.

APPENDIX 3

CURRENT PROGRAMMES ADDRESSING THE REDUCTION OF EMISSIONS

Reducing Emissions from Deforestation and Forest Degradation (REDD+)

The Forest Policy for Jamaica, 2017, addresses climate change mitigation through reforestation and prevention of the degradation of forests as a part of the mandate of the Forestry Department. According to the Policy, the Ministry with portfolio responsibility for climate change would seek to facilitate different types of forest carbon offset projects in collaboration with the Ministry responsible for energy, which could generate offset credits.

Jamaica became a partner country to the REDD+ initiative in 2015 and has been involved in capacity building activities to become REDD+ ready. This process will, however, take several years.

Globally, deforestation and forest degradation account for approximately 17 per cent of carbon emissions, more than the entire global transportation sector and second only to the energy sector.

Transport Sector Initiatives

The Ministry of Transport and Mining has advised that there are several initiatives in the transport sector which include considerations of cleaner, more efficient fuels. Among them are the following:

a. **Public passenger transport system**

The Jamaica Urban Transit Company (JUTC) has been undertaking initiatives towards having a more fuel efficient bus company including through:

i. Utilization of low- sulphur fuel in the existing JUTC bus fleet;

ii. Undertaking of pre-feasibility analysis in respect of fuel options such as liquid petroleum gas (LPG) and compressed natural gas (CNG) that could be utilized to fuel the public transportation system. There is a proposed pilot project which involves the Montego Bay Metro bus service in Western Jamaica being outfitted with a fleet of up to 25 liquefied natural gas (LNG)-powered buses to replace the company's existing fleet of ageing buses. The Pilot will garner information on the following:

a. The undertaking of a business case modelling to determine the optimal use of natural gas or alternative fuels in specific heavy duty JUTC buses;
b. Addressing fundamental knowledge gaps regarding capacity, and economic and environmental benefits in the use of natural gas;

c. Development of a technical assistance strategy to ensure that JUTC end-users have the technical guidance and information they need to facilitate natural deployment for the purposes of the Pilot;
d. Identifying the long-term investment requirements to ensure that natural gas becomes self-sustaining over the long term within the JUTC;
e. Outlining key steps required for implementation and defining future energy-related needs led by the MSET within the transportation sector; and
f. Assisting the Government of Jamaica, through the MSET, to enhance energy diversification, develop cleaner energy solutions, meet greenhouse gas targets and foster stronger energy markets and support economic growth in the energy sector;

iii Conclusion of a Memorandum of Understanding with the Petroleum Corporation of Jamaica to undertake a pre-feasibility study to ascertain the natural gas options that could be used to fuel the public transportation system; and

iv. Implementation of a maintenance program, to improve the efficiency of the operating buses.

b. Multi-modal transport system

In keeping with the National Transport Plan under Vision 2030 Jamaica – National Development Plan, it is proposed to establish Jamaica as a major integrated multimodal logistics hub and to implement an island-wide public transport system including for schools, taking into consideration integrated multi-modal options for bus, rail, taxi, ferry and air transport.

c. Rail service

Proposals for the resuscitation of cargo and passenger rail service on a phased basis are being pursued by the Ministry of Transport and Mining. The reopening of Jamaica's public railway transport operations could serve to alleviate the problem of congestion, especially within the Kingston Metropolitan Transport Region. The freight and passenger trains will be powered by diesel with refined crude oil as its primary fuel source.

d. Maritime sector

Jamaica was selected as one of the ten (10) Lead Pilot Countries under the IMO/GEF/UNDP global maritime energy efficiency partnership project (GloMEEP), which aims to support increased uptake and implementation of energy-efficiency measures for shipping. The Maritime Authority of Jamaica (MAJ) is the National Lead Agency for this project, the outputs of which include the collection of data to identify the national fleet of ships and also forklifts and cranes which use diesel engines emitting sulphur oxides (SOx); the development of an energy efficiency strategy and the preparation of draft legislation. Jamaica is a party to Annex VI of the International Convention on the Prevention of Pollution from Ships (MARPOL) which requires a progressive reduction

globally in emissions of SO_X, NO_X, and particulate matter, the institution of emission control areas and the introduction of a fuel oil standard of 0.50%sulphur limit effective as of 1 January 2020. Amendments to the Shipping Act and new regulations under that Act have been drafted to address the provisions regarding emissions from ships effective on 1 January 2020.

e. Private motor vehicles

Jamaica participated in the United Nations Environment Programme (UNEP) project *Stabilizing Greenhouse Gas Emissions from Road Transport through Doubling of Global Vehicle Fuel Economy*. The aim of the UNEP-Global Fuel Economy Initiative (GFEI): Jamaica Country Project is to strengthen vehicle emission and fuel quality standards and promote fuel economy to support a more fuel efficient and cleaner light duty vehicle fleet.

The GFEI has set a target of 4.2 litres per gallon equivalent/100 kilometres (lge/100 km) for new vehicle fuel economy in the year 2030 and for all vehicles by 2050; the average global fuel economy in 2013 was 7.1 lge/100 km.[39] The GFEI also aims to have total emissions of carbon dioxide reduced by 50% by 2050. Under the GFEI project in Jamaica, diagnostic studies were carried out on the light duty fleet to establish a baseline. Recommendations were made regarding fuel quality and renewable and alternative energy vehicles, conservation and public awareness to meet the targets.

Energy Sector Initiatives

Renewable energy

The Ministry of Science, Energy and Technology have advised that energy generated from renewable sources stands at 10.5% of net electricity generation as of July 2017. In 2016, an additional 80 MW of generating capacity was connected to the national grid: 24 MW from the Wigton III wind farm, 36.8 MW from Blue Mountain Renewables (BMR) and 20 MW from Content Solar. The Eight Rivers Energy Company (EREC) has constructed and operates a 37 MW solar photovoltaic plant. This would bring the total amount of energy from renewable sources connected to the national grid to 152.6 MW, equivalent to a reduction of GHG emitted by approximately 457,800 tonnes of CO_2 per year. The megawatts of energy being generated by residential customers will also contribute to reduced GHG emissions.

Energy efficiency and conservation

The Government of Jamaica has undertaken two projects on energy efficiency and conservation, namely the Energy Efficiency and Conservation Programme and Energy Security Efficiency and Enhancement Project. As of July 2016, through energy efficiency mechanisms being implemented in 41 public sector facilities, a total of 1,954 barrels of oils, equivalent to 2,514 tonnes of CO_2,

[39] The Report on Existing Legislation and Policy Recommendations on Cleaner and More Efficient Transport Fuels and Vehicles for Jamaica. Authors: Ruth Potopsingh and Omar Alcock for CSEII / UTech, Jamaica.

have been reduced. A new programme jointly financed by the Inter-American Development Bank and the Japan International Cooperation Agency will be implemented in 2017 – the Energy Management and Efficiency Programme (EMEP). This Programme will, among other environmental aspects, consolidate and expand on the achievements of the previous projects to reduce carbon dioxide emissions.

A number of Energy Services Companies (ESCOs) have been offering services to businesses to increase energy efficiency with a view to installing renewable energy sources thereafter, or in some cases, in conjunction with energy efficiency measures. There is an initiative in the tourism sector to engage ESCOs in reviewing the efficiency of facilities.

Alternative energy

Liquified nitrogen gas (LNG) is a clean and efficient energy source that is more beneficial to the environment than fossil fuels. Under an agreement, the USA-based New Fortress Energy is supplying the JPSCo with LNG for its 114 MW combined cycle power plant at Bogue in Montego Bay, St. James and the 190 MW JPSCo/South Jamaica Power Company Liquefied Natural Gas-fired power plant in Old Harbour, as well as the 94 MW Liquefied Natural Gas Combined Heat and Power (CHP) Cogeneration Plant supplying JAMALCO Bauxite refinery.

Other proposals are to introduce biodiesel blends to increase environmental protection and reduce carbon emissions and to provide the enabling environment to encourage private sector participation in the development of indigenous non-renewable sources of energy such as energy-from-waste. Additionally, E10 gasoline (a mixture of 10% ethanol and 90% gasoline blendstock) and ultra-low sulphur diesel fuel are both imported for use on the Jamaican market.

Jamaica's Nationally Appropriate Mitigation Actions (NAMA)

Renewable Energy NAMA

The draft NAMA on Renewable Energy for Jamaica (RE NAMA) was developed in keeping with Vision 2030 Jamaica and the National Energy Policy (2009-2030). The objective of this RE NAMA is to (i) promote the incorporation of renewable energy-based power generation in Jamaica, and (ii) assist in the creation of a sustainable enabling environment that is adequate for early-stage development of the renewable energy (RE) industry in the country. It also addresses capacity building in the following areas: (i) removing identified barriers related to the perceived risks of RE investment in Jamaica, especially for local investors; (ii) carrying out technical studies on the absorptive capacities of the electric grid for RE integration and scaling up; and (iii) developing monitoring, reporting and verification (MRV) process for assessing the implementation of the NAMA. The MRV component was completed.

Water Sector NAMA

A NAMA for the water sector of Jamaica (Water NAMA) was developed and finalized. The objectives of this NAMA is to (i) improve energy efficiency in the water sector and (ii) increase the share of renewables used in all sub-sectors of the water sector (water supply, irrigation, and sewerage) with a specific focus on the electricity needed for pumping. The following specific targets were defined for the Water NAMA:

- Reduction of GHG emissions of 20% by 2030; and
- Increasing the share of renewable energy generation to 10% by 2030. This target will contribute to the overall target of 20% of renewable energy in the total energy mix by 2030 as set out in the National Energy Policy.

The water NAMA is aligned to the updated NDC target and will contribute to National Outcome #10 (Energy Security and Efficiency) of the Vision 2030 aimed at promoting demand-side energy management. This includes the implementation of energy efficiency projects in the public sector, particularly for water distribution. The water NAMA also supports the National Water Sector Policy and Implementation Plan of Jamaica.

Jamaica's Nationally Determined Contribution (NDC)

On 27 November 2015, Jamaica submitted its Intended Nationally Determined Contribution (INDC), which later transitioned as the first NDC on ratification of the Paris Agreement in 2017. The NDC communicated to the international community, the country's contribution to the reduction of global greenhouse gas levels. The country's First NDC was predicated on the projects, programmes, and initiatives of the energy sector.

Parties that are signatory to the Paris Agreement and whose NDCs contain a time frame up to 2030 are required to communicate new or updated ones – showing increased levels of ambition – by 2020.

Jamaica subsequently submitted its Updated of the NDC to the UNFCCC in June 2020. In this update, the scope of the NDC was broadened to include emissions from the land-use change and forestry sector and has identified opportunities to deepen the emission reductions from the energy sector. Jamaica's updated NDC will result in an overall reduction of emissions of between 25.4 percent (unconditional) and 28.5 percent (conditional) relative to a business-as-usual scenario (which takes into account policies in place as of 2005). This implies that emissions in these sectors will be 1.8 to 2.0 MtCO2e lower than the BAU compared with a range of 1.1 to 1.5 MtCO2e in the previous NDC.

GLOSSARY

1. AIR QUALITY

Air Pollutant - Any substance in the air that could, in high enough concentration, harm humans, other animals, vegetation, or material. Air pollutants may include almost any matter of natural or artificial composition capable of being airborne, whether in the form of solid particles, liquid droplets, gases, or a combination of these.

Air Quality Index - Real-time monitoring of specific gases and particulates to provide information on the state of the air quality in various air sheds.

Air shed - An area where the movement of air and air pollutants tends to be limited by topography or meteorology.

Ambient Air Quality - The quality of outdoor air in our surrounding environment. It is typically measured near ground level, away from direct sources of pollution. Ambient air monitoring is the systematic, long-term assessment of pollutant levels by measuring the quantity and types of certain pollutants in the outdoor air. (USEPA)

Criteria Air Pollutants (also referred to as common or classic air pollutants) - particulate matter (PM), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), and sulphur dioxide (SO_2). Ambient air quality standards for permissible levels of human exposure to these pollutants have been developed based on criteria related to scientific information on the effects of the pollutants on health and the environment.

Epidemiology - A branch of medicine dealing with the incidence, distribution, and possible control of diseases and other factors relating to health

Ischemic heart disease - the term given to heart problems caused by narrowed heart arteries that supply blood to the heart muscle, particularly by blood clot, constriction of a blood vessel, and, most often, by a build-up of plaque. (National Center for Biotechnology Information, United States National Library of Medicine)

Ozone-depleting substances (ODS), mainly man-made chemicals, which deplete the protective ozone layer, located about 10 to 50 kilometres above the surface of the earth. The ozone layer absorbs ultra violet (UV) radiation from the sun, reducing the transmission of harmful UV B rays and consequent effects on human health (increased risk of skin cancers and cataracts), plant life, marine ecosystems and certain materials (increased degradation of plastics and paints). The ODS, most of which are not toxic, are used mainly in refrigeration and air conditioning; as propellants in aerosol cans; for fire suppression; for fumigation of agricultural produce; as solvents in cleaning and as foams for insulation. The production and use of these chemicals are controlled under the Montreal Protocol on Ozone-Depleting Substances, 1986 and its amendments and adjustments which apply to all countries.

Mercury - The persistent toxic substance, **mercury** is covered under the Minamata Convention to which Jamaica became a party in July 2017. The objective of the Convention is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

Particulate matter (PM) - a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope. **PM_{10}** are inhalable particles, with diameters that are generally 10 micrometers and smaller; and PM2.5 are fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller (The average human hair is about 70 micrometers in diameter). (USEPA)

Fine particulate matter, $PM_{2.5\mu}$ damages the health of more people than any other air pollutant, through the deposit of particles in smaller airways and alveoli in the lungs and their penetration into the bloodstream.[40]

Persistent Organic Pollutants (POPs), man-made chemicals which affect human health and wildlife and are characterized by their ability to remain intact in the environment for long periods, travel long distances, and accumulate in the food chain (particularly in fish). POPs include some pesticides, industrial chemicals and unintended by-products of industrial processes or combustion such as dioxins and furans. POPs are controlled globally under the Stockholm Convention on Persistent Organic Pollutants, adopted in 2001. Jamaica as a party to the Convention has prepared a National Implementation Plan.

Priority Air Pollutants (or Toxic Air Pollutants) – are pollutants for which there is no human exposure limit; therefore no ambient air quality standards can be developed for them. This is mainly due to the inherent toxicity of these substances and the serious health risk they pose. Human exposure to these contaminants, for example - benzene, at sufficient concentrations and durations can result in cancer, poisoning, and rapid onset of sicknesses such as nausea or difficulty in breathing.

Saharan Dust – episodes of dust from Africa occur in the Caribbean. The dust can have impact on health and also causes haze and poor visibility. Saharan dust hinders the development of tropical storms.

[40] World Health Organization

2. CLIMATE CHANGE

Adaptation (to climate change) - Practical steps to protect countries and communities from the likely disruption and damage that will result from effects of climate change. (UNFCCC Secretariat website)

Anthropogenic – caused or influenced by humans

Carbon neutral - Achieving the total amount of greenhouse gas emissions equaling zero, which can be accomplished by reducing carbon emissions, creating or expanding carbon sinks and purchasing offsets for the remaining emissions. (Michael P. Vanenbergh and Anne C, Steinmann - The Carbon Neutral Individual, New York University Law Review, 1673, Seq: 1, 14-Nov-07 [adapted])

Climate Change - A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and is in addition to natural climate variability observed over comparable time periods. (UNFCCC)

The human induced change results from increased concentrations of greenhouse gases (GHG) (e.g. carbon dioxide (CO_2) and water vapour) in the atmosphere as a result of activities such as the burning of fossil fuels and deforestation. (Climate Studies Group, Mona (CSGM), 2012: State of the Jamaican Climate 2012: Information for Resilience Building (Summary for Policymakers). Planning Institute of Jamaica (PIOJ), Kingston, Jamaica.)

Fossil fuels - Carbon-based fuels from fossil carbon deposits, including coal, oil, and natural gas. (IPCC). These are non-renewable resources that were formed when prehistoric plants and animals died and were gradually buried by layers of rock. Different types of fossil fuels were formed - depending on what combination of organic matter was present, how long it was buried and what temperature and pressure conditions existed as time passed. (Department of Energy (USA)).

Global warming - caused mostly by the increasing concentrations of greenhouse gases in the atmosphere. Global warming is causing climate patterns to change. However, global warming itself represents only one aspect of climate change. (United States Environmental Protection Agency (US EPA).

Greenhouse Gases (GHG) - 'Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere and clouds. This property causes the green-house effect. Water vapour (H2O), carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4) and ozone (O3) are the primary greenhouse gases in the earth's atmosphere. Moreover, there are a number of entirely manmade green-house gases in the

atmosphere, such as the halocarbons and other chlorine and bromine-containing substances, dealt with under the Montreal Protocol. Besides carbon dioxide, nitrous oxide and methane, the Kyoto Protocol deals with the green-house gases sulphur hexafluoride, hydrofluorocarbons, and perfluorocarbons.' (IPCC, 2007)

Low Carbon Economy – Activities which generate products or services which themselves deliver low carbon outputs. It does not include the economic activity from the use of these goods and services, except where this represe3nts the primary revenue stream of the operator

Mitigation (of climate change): A human intervention to enhance the **sinks** of greenhouse gases or reduce the **sources** of greenhouse gases. Mitigation may also include reduction of other substances which may contribute directly or indirectly to limiting climate change, including, for example, the reduction of particulate matter emissions that can directly alter the radiation balance (e. g., carbon black)

Nationally Appropriate Mitigation Action (NAMA) - any mitigation action tailored to the national context, characteristics and capabilities, and embedded in national sustainable development priorities, and as a tool for developing countries to attract international support for achieving GHG reductions.

Nationally Determined Contribution (NDC) - the primary means for governments to communicate internationally the steps they will take to reduce emissions, taking into account their domestic circumstances and capabilities as required under the Paris Agreement. Parties to the Agreement must strengthen their NDCs and report regularly on their emissions and on their implementation efforts.

Some countries also address how they will adapt to climate change impacts, and what support they need from, or will provide to, other countries to adopt low-carbon pathways and to build climate resilience.

Paris Agreement – adopted in December 2015 at the 21st Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC), this Agreement requires all nations to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so. The long-term goals of the Agreement are: to hold the increase in global average temperature to well below 2°C above pre-industrial levels, to pursue efforts to limit the increase to 1.5°C, and to achieve net zero emissions of greenhouse gases in the second half of this century.

Sink - Any process, activity or mechanism which removes a GHG, an aerosol or a precursor of a GHG from the atmosphere. (UNFCCC). Forests and other vegetation are considered sinks because they remove CO_2 through photosynthesis.

Source - Any process, activity or mechanism that releases a GHG, an aerosol or a precursor of a GHG or aerosol into the atmosphere. (UNFCCC).

Transformational change - in the context of **NAMAs** means change that is permanent – which does not fall back to its point of departure, is radical and abrupt – happens in the shorter term and earlier than otherwise possibly expected.