

## NAVIGATING CLIMATE ACTION





MINISTRY OF ENVIRONMENT, SOLID WASTE MANAGEMENT AND CLIMATE CHANGE







## NAVIGATING CLIMATE ACTION

A Comprehensive Guide to Institutional Arrangement for Climate Governance, Stakeholders Engagement and Identification of Mitigation Actions

Developed under the Nationally Appropriate Mitigation Actions (NAMA) for Low Carbon Island Development Strategy for the Republic of Mauritius (NAMA Project)

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**Republic of Mauritius** NAVIGATING CLIMATE ACTION: A Comprehensive Guide to Institutional Arrangement for Climate Governance, Stakeholders Engagement and Identification of Mitigation Actions

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The Climate Change Act 2020 in Mauritius, which entered into force on 22 April 2021 lays the legal foundation for Climate Change governance in Mauritius. The Act establishes institutional arrangements, namely the Inter-Ministerial Council on Climate Change, the Climate Change Committee, and the Department of Climate Change.It assigns specific mandates and tasks to institutions to effectively manage climate change response measures at the strategic and institutional level, which will also require the fulfilment of duties by a multitude of public and private institutions and wider stakeholder engagement. Developing effective response measures to climate change will, in addition to the strategic and institutional direction, require clear guidelines for the roles of institutions and their responsibilities in the identification, prioritisation and formulation of the measures; their implementation; and monitoring and reporting on implementation progress, as well as clear guidelines for broad stakeholder engagement, including gender aspects. This manual provides further guidance and support to national institutions with methods, approaches, and descriptions of tasks needed to fulfiltheir roles and responsibilities mandated by the Climate Change Act 2020.

The manual is a consolidation of the following documents developed with funding from the Global Environment Facility and support from the United Nations Environment Programme and its UNEP Copenhagen Climate Centre:

- Institutional Arrangements for Climate Governance -Operational Guidelines for the implementation of the climate change mitigation provisions in the Climate Change Act 2020
- Stakeholder Engagement Plan
- Guidelines for Identifying and Prioritising Mitigation Actions

## Institutional Arrangements for Climate Governance

The Institutional Arrangements for Climate Governance provide operational guidelines for public and private institutions to meet their roles and responsibilities to complete the process of formulating, implementing, monitoring, and reporting on mitigation strategies and action plans as mandated by the Climate Change Act 2020. The Operational Guidelines first provide an overview of the institutional provisions of the Climate Change Act 2020, including a schematic representation (Figure 1) including roles, responsibilities, and reporting flows to facilitate understanding.



Figure 1. Schematic of Institutional Arrangements proposed in the Climate Change Act 2020 and Parallel Arrangements for Rodrigues

The apex body is an Inter-Ministerial Council on Climate Change, mandated to set national objectives, goals, and targets, determine policies and priorities for climate change adaptation and mitigation, and to monitor and review progress made by public departments on any aspect of climate change projects and programmes. The Minister responsible for Climate Change (Ministry of Environment, Solid Waste Management, and Climate Change) is to propose and develop policies on climate change based on the national objectives, goals, and targets set by the Council. The Department of Climate Change is responsible for making policies, formulating and implementing measures, coordinating, monitoring, and evaluating programmes and action plans relating to climate change is responsible for executing the climate change policy of the Ministry. The Department will collaborate with the Environment Commission to carry out the same tasks for Rodrigues.



Figure 2. Additional Structures Proposed in the CCA 2020.

The Climate Change Committee, constituted by public institutions, a professional body, civil society, and private sector representatives, is chaired by the supervising officer of the Ministry of Environment, Solid Waste Management, and Climate Change. It will adjourn at least once a month, has the mandate to establish subcommittees as may be necessary, and shall coordinate the implementation of activities related to greenhouse gas inventories, greenhouse gas emission reductions, climate change vulnerability assessments, adaptation, and compliance to enforcement of regulations, as well as monitoring climate change relevant targets of the Sustainable Development Goals. The Committee will have a Secretariat covered by a public officer, chosen by the Supervising Officer, and from the same ministry. The Committee is expected to chapter to the Minister on progress made in discharging its functions every 2 years.

A similar Committee structure is proposed for Rodrigues, where the Departmental Head of the Environment Commission has the mandate to appoint any officers to support the Rodrigues Climate Change Committee in discharging its functions, and the Officer in Charge of the Outer Islands Development Corporation is responsible for providing data on GHG emissions and sinks for the preparation of the annual GHG inventory report.

The operational guidelines further propose subcommittees to the Climate Change Committee to be established based on a structure guided by the sectoral definition of the Intergovernmental Panel on Climate Change (Figure 3).



AFOLU: Agriculture, Forestry and Other Land Use; IPPU: Industrial Processes and Product Use; LULUCF: Land Use, Land-Use Change and Forestry

Figure 3. Definition of Sectors in Alignment with the IPCC Sectoral Scope.

The operational guidelines further provide sectoral guidelines to guide institutions within the respective sectors for planning, implementing, monitoring, and reporting on mitigation strategies and a National Climate Change Mitigation Strategy and Action Plan under the coordination of the Committee (Figure 4).



Figure 4. Process Flow Linking Generic Sectoral Activities.

As part of the planning process, the guidelines highlight that stakeholder engagement through stakeholder consultation is a cornerstone of the Climate Change Act 2020 and is needed for the development of strategies and policies, and a broad stakeholder consultation, will be required for the formulation of Mitigation Strategies and Action Plans. The guidelines further refer to the Stakeholder Engagement Plan provided in this manual for approaches, methods, and frameworks for stakeholder consultation. In the planning phase, the identification and prioritisation of climate response measures will also be a central element, dedicated Guidelines for Identifying and Prioritising Mitigation Actions are also provided in this manual. Tools and approaches for establishing greenhouse gas emission scenarios and estimating and assessing the impacts of climate policies and measures are also referenced by the operational guidelines for the various sectors, including other complementary tools **(Table 1)**.

SECTOR / SUB-SECTOR	APPROACHES AND TOOLS
Energy Industries (Electricity generation and use)	System dynamics model customised for Mauritius. <sup>1</sup> Customisation was carried out in collaboration with the Central Electricity Board (CEB). The model has been transferred to CEB, and the purchase of necessary software to run (and update) the model and mitigation scenarios was funded by the GEF-financed NAMA project.
Transport (land)	Econometric modelling of travel demand for passengers and freight, <sup>2</sup> and allocation of total travel demand to different modes of land transportation. Disaggregation of travel demand by vehicle type is then converted to energy use and greenhouse gas emissions.
Solid Waste Management	Excel-based tool customised for Mauritius using the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. <sup>3</sup>
Wastewater Management	Excel-based tool customised for Mauritius using the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. <sup>4</sup>
Agriculture (food crops and livestock waste management)	Excel-based tool customised for Mauritius using the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. <sup>5</sup>
Forestry	Excel-based tool customised for Mauritius using the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. <sup>6</sup>
Refrigeration and Air Conditioning	Excel-based tool customised for Mauritius using the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. <sup>7</sup>

Table 1: Approaches and Tools used to carry out Mitigation Scenario Analyses in the NAMA Project

The established MauNDC Registry is referenced as the dedicated online Data Management System for monitoring and reporting on the implementation of climate interventions towards national targets, including aspects of support needed and received. A separate manual for the use of the MauNDC Registry is available as a separate document from this manual.

A specific guide is provided for each sector or sub-sector, including organisational structure with sector leads for each sector and identified stakeholders and their specific roles and responsibilities. Guidance on measurement, reporting, and verification indicators and responsible institutions is also provided.

#### Stakeholder Engagement Plan (SEP)

The Climate Change Act 2020 already lays the fundamentals for the roles and responsibilities of institutional stakeholders, further specified and guided by the Institutional Arrangements for Climate Governance. These documents provide and institutionalise the general approach to stakeholder participation. The national institutional structure for climate governance represents a cascading effect with increasing scope for stakeholder engagement, starting from predefined, narrowly focused groups of stakeholders and gradually expanding the locus of stakeholders involved, from the IMCCC to the DCC to the CCC and Government departments (Figure 3).



Figure 5. Illustration of the Cascading Effect of the Need for Stakeholder Engagement.

6 https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4\_Volume4/V4\_04\_Ch4\_Forest\_Land.pdf - accessed February 18, 2022.

<sup>1</sup> More details of the structure of the model can be found in: Bassi A.M., and Deenapanray, P.N.K. (2012). A green investment analysis using system dynamics modeling – The case study of Mauritius. Small States: Economic Review and Basic Statistics, 16(12):256-265; Deenapanray, P.N K., and Bassi, A.M. (2015). System dynamics modelling of the power sector in Mauritius. Environmental and Climate Technologies, 16(1):20-35.

<sup>2</sup> PNK Deenapanray, N Khadun (2021) Land transport greenhouse gas emission scenarios for Mauritius based on modelling transport demand, Interdisciplinary Perspectives in Transportation Research 9, 100299.

<sup>3</sup> https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5\_Volume5/V5\_3\_Ch3\_SWDS.pdf - accessed January 18, 2022.

<sup>4</sup> https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5\_Volume5/V5\_6\_Ch6\_Wastewater.pdf - accessed November 20, 2021.

<sup>5</sup> https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4\_Volume4/V4\_05\_Ch5\_Cropland.pdf; https://www.ipcc-nggip.iges.or.jp/public/2006gl/ pdf/4\_Volume4/V4\_10\_Ch10\_Livestock.pdf - accessed February 18, 2022;

<sup>7</sup> https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3\_Volume3/V3\_7\_Ch7\_ODS\_Substitutes.pdf - accessed February 15, 2022.

While the Climate Change Act 2020 and the Institutional Arrangements for Climate Governance provide a broad institutional framework for carrying out stakeholder coordination, they do not specify how stakeholder engagements would take place. The Stakeholder Engagement Plan serves as a guiding document for:

- i. identifying stakeholders;
- ii. proposing engagement approaches;
- iii. developing communication plans;
- iv. identifying resources required to carry out stakeholder engagements; and
- v. establishment of grievance redress mechanisms.

A participatory process for identifying stakeholders is advised, and a stakeholder classification and engagement selection process is provided.

The Stakeholder Engagement Plan provides guidance on the development of communication plans to inform the general public on the development of strategies and policies with respect to climate change and to allow the public to raise potential concerns.

In addition, the identified directly affected stakeholders should be consulted at the beginning of the process to design and formulate strategies and action plans through public meetings in affected communities and through focus groups, minutes should be taken and concerns raised during Climate Change Committee meetings. Feedback on how concerns have been addressed should be communicated in writing to stakeholder group representatives. Approaches for consultations with the private sector, civil society, and technical experts for the formulation of climate policies are provided, including workshops and written consultations.

Existing frameworks embedded in the Environmental Impact Assessment process under the Environment Protection Act and the Building and Land Use Permit Application system are proposed to be used as the grievance redress mechanisms to address grievances related to climate action in the built environment, while the Citizen Support Unit, and its portal are proposed as the general grievance redress mechanism for addressing grievances from the general public.

The Stakeholder Engagement Plan also provides guidance on the application of additional approaches to promote and enhance the participation of stakeholders through existing structures and proposed additional structures. This includes the description of sub-committees, related stakeholders, and related engagement approaches that could be established under the Climate Change Committee in order to effectively engage stakeholders relevant for planning and attracting climate finance, enhanced engagement of the business and industry communities, and effective engagement with civil society and NGOs. Each proposed sub-committee and initiative is provided with a description of its scope, relevant identified stakeholders, and proposed stakeholder engagement modality. These additional approaches are: • Climate finance coordination and resource mobilisation through the established Coordination Committee on Resource Mobilisation and Climate Finance.

• Financing of individual climate interventions through the National Environment and Climate Change Fund.

• The creation of a dedicated sub-committee on International Partners to enhance the efficiencyand effectiveness of the implementation and financing of climate action in Mauritius with assistance from the international community.

• The creation of a dedicated sub-committee for business and industry for effective climate action implementation and private sector investments

 Guidance for the establishment of a Civil Society Organisation/Non-Governmental Organisation network for wider civil society representation through the Civil Society Organisation representative in the Climate Change Committee

## Guidelines for Identifying and Prioritising Mitigation Actions

The identification and prioritisation of appropriate mitigation actions in Mauritius lays the foundation for the development of National Climate Change Mitigation Strategies and Action Plans, and Long Term Strategies, which ultimately are necessary for the communication of the National Determined Contributions under the Paris Agreement, and communication on the country's ambitions and needs to the United Nations Framework Convention on Climate Change secretariat. The Guidelines for Identifying and Prioritising Mitigation Actions first present the general processes and procedures for identifying and prioritising mitigation actions, including stakeholder inclusiveness (with approaches provided in this manual in the Stakeholder Engagement Plan) and gender mainstreaming aspects, followed by an overview of the specific methods that can be applied to first identify mitigation actions and then prioritise them. It is relevant to note that the process is equally valid for adaptation and mitigation actions.

The identification of mitigation actions is presented through different categories of mitigation actions, the potential source of information for their identification, and relevant institutional stakeholders for their identification. Several resources are provided to assist in the identification of potential mitigation technologies.

CATEGORY OF MITIGATION ACTION	SOURCE OF INFORMATION FOR TECHNOLOGY IDENTIFICATION	INSTITUTIONAL STAKEHOLDERS
Scaling up an existing mitigation action (e.g. adoption of a mitigation technology)	Existing sectoral policies, strategies, and action plans	Decision-makers in public and para- governmental institutions
Scaling up a mitigation action that is at the pilot stage or proof-of-concept (e.g. demonstration or diffusion stage of the technology lifecycle) OR Mitigation technologies that are under development in the country	<ul> <li>There can be several sources of information on this category of mitigation actions:</li> <li>Institutional knowledge captured in internal reports on pilots, proof-of-concept, or technology development</li> <li>Publications on the results of proof-of-concept and/or technology development in</li> </ul>	Academic and research organisations; public and para- governmental institutions; private sector organisations; civil society organisations; non-governmental organisations; independent researchers
Mitigation technology not currently available in the country	the public domain Information about this category of technology will emanate from expert knowledge and from thorough literature reviews	Academic and research organisations; public and para- governmental institutions; private sector organisations

Table 2: Categorisation of Mitigation Actions and their Sources of Identification

The process for prioritising mitigation actions is structured following the multi-criteria analysis approach, which is used to create consensus between different stakeholders and interests using eight decision steps.



**Step 1**, the context is given by the need to prioritise between a bundle of mitigation actions that can be used for developing Mitigation Strategy and Action Plans, Nationally Determined Contributions (NDC), Long Term Strategies, or other measures to implement the NDC.

**Step 2,** the identification of options to be appraised, is proposed through a pre-screening consisting of assessing a long list of mitigation actions (identified through the identification process and inspired by the references provided) against a small number of criteria in order to rate them from low applicability/technically feasible to high applicability based on expert knowledge.

Ratings should be structured through a qualitative scoring scheme using a combination of binary (yes, no) and colour (low, moderate, high) codes.

**Step 3.** the identification of assessment criteria and indicators, is proposed to be done through a stakeholder engagement process involving a combination of high-level policymakers and senior technicians / technical officers. Criteria should cover sustainable development priorities and should be measurable, either subjectively (rated qualitatively) or objectively using quantifiable indicators. A mix of subjective and objective indicators is advised and proposed.

CRITERIA	INDICATORS
Financing needs	- Direct costs - Indirect costs
Implementation barriers	<ul> <li>Ease of implementation</li> <li>Compliance with the required timing of policy intervention</li> </ul>
Climate-related	-GHG reduction (& black carbon emissions)
Economic	<ul> <li>Trigger private investments</li> <li>Improve economic performance</li> <li>Job creation (gender differentiated)</li> <li>Contribute to fiscal sustainability</li> </ul>
Environmental	<ul> <li>Protect environmental resources (quality &amp; stock)</li> <li>Protect biodiversity</li> <li>Support ecosystem services</li> </ul>
Social	<ul> <li>Poverty reduction (gender differentiated)</li> <li>Reduce inequity (gender differentiated)</li> <li>Improve health (gender differentiated)</li> <li>Preserve cultural heritage</li> </ul>
Political & institutional	<ul> <li>Contribute to political stability</li> <li>Improve governance</li> </ul>

Table 3: Criteria and Indicators from the MCA4Climate Framework

Figure 6. Steps of Multi-Criteria Analysis

**Step 4.** scoring options against indicators, involves assessing the performance of the actions against the chosen indicators by the stakeholders. Each action should be described in technology fact sheets addressing expected impacts related to the selected indicators to facilitate the assessment by the stakeholders. The Guidelines for Identifying and Prioritising Mitigation Actions provide the method for creating and normalising a performance matrix and propose scales for evaluating subjective indicators.

**Step 5,** consists of assigning weights to the criteria indicators and defining their relative importance. The weights should be assigned following discussions between the involved stakeholders. Different sets of weights can be identified to cover the views of all stakeholders.

**Step 6.** consists of combining the scores and relative importance of the criteria to get a ranking of the climate actions, which can further be examined in **Step 7**, through discussions between stakeholders and provide the opportunity to review earlier steps.

Lastly, **Step 8** describes how a sensitivity analysis can be performed to establish the robustness of the prioritisation results and ensure that small changes in performance scores and/or weights do not significantly change the ordinal ranking.

## INSTITUTIONAL ARRANGEMENTS FOR CLIMATE GOVERNANCE



OPERATIONAL GUIDELINES FOR THE IMPLEMENTATION OF THE CLIMATE CHANGE MITIGATION PROVISIONS IN THE CLIMATE CHANGE ACT 2020

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## A-LIST OF ACRONYMS

AFOLU	Agriculture, Forestry, and Other Land Use
AS	Agricultural Services
BM	Business Mauritius
BOD	Biochemical Oxygen Demand
CCA 2020	Climate Change Act 2020
000	Climate Change Committee
ССМ	Climate Change Mitigation
CDM	Clean Development Mechanism
CEB	Central Electricity Board
CH <sub>4</sub>	Methane
COD	Chemical Oxygen Demand
CO <sub>2</sub> e	Carbon Dioxide equivalent
CRPEM	Council of Registered Professional Engineers of Mauritius
DCC	Department of Climate Change
DCCB	Dangerous Chemicals Control Board
DMS	Data Management System
DOC	Degradable Organic Content
DQT	Data Quality Team
DWMRR	Department of Waste Management and Resource Recovery
ECD	External Communications Division
EE	Energy Efficiency
EEMO	Energy Efficiency Management Office
EF	Emission Factor
ETF	Enhanced Transparency Framework
EV	Electric Vehicle
FAREI	Food Agricultural Research and Extension Institute
FS	Forestry Service
GAP	Gender Action Plan
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GWh	Gigawatt hour
IA	Irrigation Authority
IMCCC	Inter-Ministerial Council on Climate Change
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IPPU	Industrial Processes and Product Use
ktCO2e	Kilo tonne of carbon dioxide equivalent
MAIFS	Ministry of Agro-Industry and Food Security
MARC	Marginal Abatement Revenue Curve
MARENA	Mauritius Renewable Energy Agency
M&E	Monitoring and Evaluation
MBEMRFS	Ministry of Blue Economy, Marine Resources, Fisheries, and Shipping
MCA	Mauritius Chamber of Agriculture
MCIA	Mauritius Cane Industry Authority
MEL	Metro Express Limited
MEPU	Ministry of Energy and Public Utilities
MESWMCC	Ministry of Environment, Solid Waste Management, and Climate Change
METEST	Ministry of Education, Tertiary Education, Science, and Technology
MFEPD	Ministry of Finance, Economic Planning and Development

MIDSMEC	Ministry of Industrial Development, SMEs, and Cooperatives
MLTLR	Ministry of Land Transport and Light Rail
MNICD	Ministry of National Infrastructure and Community Development
MRIC	Mauritius Research and Innovation Council
MRA	Mauritius Revenue Authority
MSB	Mauritius Standards Bureau
MSW	Municipal Solid Waste
Ν	Nitrogen
N <sub>2</sub> 0	Nitrous Oxide
NH <sub>3</sub>	Ammonia
NOx	Nitrogen Oxides
NAMA	Nationally Appropriate Mitigation Action
NCCMSAP	National Climate Change Mitigation Strategy and Action Plan
NLTA	National Land Transport Authority
NDC	Nationally Determined Contribution
NIR	National Inventory Report
NOS	National Ozone Unit
ODS	Ozone-Depleting Substances
PA	Paris Agreement
PAX-km	Passenger kilometre
РМО	Prime Minister's Office
PS	Private Sector
QA	Quality Assurance
QCF	Quality Control Framework
QMP	Quality Management Plan
RAC	Refrigeration and Air Conditioning
RCCC	Rodrigues Climate Change Committee
RE	Renewable Energy
SEP	Stakeholder Engagement Plan
STC	State Trading Corporation
SWDS	Solid Waste Disposal Site
SWM	Solid Waste Management
TESRD	Tertiary Education and Scientific Research Division
TMRSU	Traffic Management and Road Safety Unit
TNA	Technology Needs Assessment
TNC	Third National Communication
UNFCCC	United Nations Framework Convention on Climate Change
URA	Utility Regulatory Authority
USD	United States Dollar
MMA	Wastewater Management Authority
WTE	Waste-to-Energy

# INSTITUTIONAL ARRANGEMENTS FOR CLIMATE GOVERNANCE

### A-SUMMARY

A review of the institutional arrangements that are currently used for climate governance in Mauritius, including the formulation and updating of the Nationally Determined Contribution (NDC) has been carried out. The review has also covered the institutional arrangements proposed in the Climate Change Act 2020 (CCA 2020). The institutional arrangements proposed in the CCA 2020 can be categorised under the ministerial institutional model for climate governance. Under Section 14 of the CCA 2020, the country, through contributions from public and private institutions, is required to develop and review a National Climate Change Mitigation Strategy and Action Plan (NCCMSAP). The formulation of the NCCMSAP is linked with the requirement under Article 4 of the Paris Agreement for the formulation of long-term mitigation strategies, with which Nationally Determined Contributions (NDCs) have to be aligned. The alignment of successive NDCs with the long-term mitigation strategies provides visibility and transparency for the achievement of net-zero carbon emissions in the medium-to-long term.

The Operational Guidelines, at section A3, are provided for public and private institutions to meet their duties (roles and responsibilities) to complete the process of formulating, implementing, monitoring, and reporting on mitigation strategies and action plans. For this, a sectoral approach is adopted in alignment with the nomenclature of the Intergovernmental Panel on Climate Change (IPCC).

The Operational Guidelines are subdivided into two components, namely: (i) process-based guidance that is applicable to all sectors, and (ii) sector-specific guidance. The process-based guidance covers the generic processes that should be applied for the integrated policy planning process, involving planning, implementation, and monitoring and reporting. The sector-specific section of the Operational Guidelines defines the roles and responsibilities of institutions at the sector / sub-sector for all the steps in the process-based guideline. Also, the measurement, reporting and verification (MRV) systems for each sector / sub-sector are provided, including the data management framework that will need to be put in place to ensure the quality of the collected data for reporting purposes. The MRV systems cover activity parameters for mitigation analyses, support needed and received, and sustainable development benefits.

## A1. INTRODUCTION

The Climate Change Act 2020 (CCA 2020) 2020<sup>1</sup> provides the national-level climate change governance system. For the purposes of climate change mitigation, Section 14 of the CCA 2020 requires the formulation of a National Climate ChangeMitigation Strategy and Action Plan (NCCMSAP). The formulation and review of such a document will make use of the institutional arrangements discussed in Section 1.1 below and will require the fulfilment of duties by public and private institutions as per Section 16 of the Act. Further, Section 19 of the CCA 2020 calls for stakeholder inclusion in national climate change governance. All of these require clear guidelines for the roles of institutions and their responsibilities in theformulation of mitigation pathways, implementation of mitigation actions, and monitoring and prioritisation of mitigation actions, including technological options and human and institutional capacity for carrying out carbon accounting and mitigation scenario analyses. Besides technology transfer and capacity building, the implementation, and monitoring of mitigation actions, acomprehensive set of guidelines also needs to cover support. These fall squarely under the ambit of Article 4 (mitigationactions), Article 9 (climate finance), Article 10 (technology development and transfer), Article 11 (capacity building) and Article 13 (enhanced transparency framework for action and support) of the Paris Agreement.<sup>2</sup>

The guidelines for institutional roles and responsibilities need to cater for the requirements of the CCA 2020, which is nowthe main policy instrument for fulfilling the provisions of the Paris Agreement. Section 16 of the CCA 2020 on the 'duties of institutions' stipulates that the Director of the Department of Climate Change may issue directives to any public or private institution, wherein requiring the institution to:

- (i) Carry out vulnerability and risk assessments and implement measures for adaptation and mitigation;
- (ii) Take into account climate change in its strategies, action plans, and other policies;
- (iii) Implement measures specified in the National Climate Change Adaptation Strategy and Action Plan and the National Climate Change Mitigation Strategy and Action Plan; chapter on sectoral greenhouse gas emissions for the National Inventory Report;
- (iv)Establish a unit with adequate staff and financial resources, or appoint an officer, to implement the implementation of climate change measures;
- (v) Monitor and review, at such regular intervals as the institution considers necessary, the implementation of the measures referred to in subparagraph (iii); and
- (vi) Report, as and when required, to the Department on the status and progress of the implementation of the duties referred to in subparagraphs (i) to (vi).

The parts relevant to climate mitigation are highlighted in bold. Notwithstanding the fact that public and private institutions will need to have an appropriate organisational structure as per Section 16(1) (b) (v) of the CCA 2020, a cross-sectoral approach will be required to implement the requirements of the CCA 2020.

The duties of the institutions mentioned above are found in Sub-Part B of Part V of the CCA 2020 on Climate Change Measures. There are three sections in Sub-Part A that will require the participation and coordination of a multitude of local stakeholders for implementation. These are Sections 13, 14, and 15 on the National Climate Change Adaptation Policy Framework (NCCAPF 2021), National Climate Change Mitigation Strategy and Action Plan (NCCMSAP) and the National Inventory Chapter (NIR), respectively. This Operational Guideline focuses on the duties of institutionsrelated to the provisions of Section 14(3) as referenced below.

- (a) national development priorities;
- (b) policy formulation, including national policies and measures for mitigation and the enhancement of sinks;
- (c) an action plan and investment programme;
- (d) information on compliance with international commitments;
- (e) research and development;
- (f) climate data and information;
- (g) recommendations on education, training, and public awareness; and
- (h) approaches for monitoring, evaluation, and reporting."

<sup>1</sup> Republic of Mauritius (2020) the Climate Change Act 2020, Government Gazette of Mauritius No. 145 of November 28, 2020.2 UNFCCC (2016) FCCC/CP/2015/10/Add.1, 1/CP.21 Adoption of the Paris Agreement.

# INSTITUTIONAL ARRANGEMENTS FOR CLIMATE GOVERNANCE

#### A1.1. Structure of the Chapter

This chapter presents the institutional arrangements (section 2) for climate change governance in the Republic of Mauritius as provisioned in the CCA 2020. In so doing, the chapter translates the legal requirements into schematic forms that can be easily visualised for communication and to better relate the duties and obligations of public and private institutions to the broader climate governance structure.

Within the ambit of institutional arrangements discussed in Section 2, Section 3 provides guidelines for the roles and responsibilities of public and private institutions regarding climate change mitigation. The guidelines are developed from a sectoral emissions' perspective as defined by the Intergovernmental Panel on Climate Change (IPCC). Sectoral guidelines are established regarding the roles and responsibilities of public and private institutions related to the formulation, implementation, monitoring, and evaluation of mitigation actions. The emphasis is placed on the formulation, monitoring, and evaluation of mitigation actions that are under the purview of Section 14 of the CCA 2020. Nevertheless, a similar approach can be used for the institutional coordination of climate change adaptation (Section 13). Also, the measurement, reporting, and verification (MRV) systems that are contained in the guidelines can be used for the island of Mauritius. Two sets of guidelines are proposed, namely: (i)process-based guidelines related to mitigation planning, implementation, monitoring, and reporting that are common toall sectors/sub-sectors; and (ii) sector-specific guidelines that provide the roles and responsibilities of public and private institutions, and the monitoring, reporting, and verification (MRV) systems for each sector/sub-sector. The MRV systems can be embedded within the online MauNDC Registry.

## A2. INSTITUTIONAL ARRANGEMENTS

This section details the institutional provisions of the CCA 2020 for climate governance in the Republic of Mauritius. A schematic representation of the institutional mechanism proposed in the CCA 2020 is shown in **Figure B1**. The main organs of this institutional structure are:

• The apex body, the Inter-Ministerial Council on Climate Change (IMCCC) is established as per Section 4 of the CCA 2020. Section 5 of the Act mandates the IMCCC to set national objectives, goals, and targets, determine policies and priorities for climate change adaptation and mitigation, and monitor and review progress made by public departments on any aspect of climate change projects and programmes. Although not mentioned explicitly, it is understood that the objectives, goals, and targets set by the IMCCC will be used to formulate the National

Climate Change Mitigation Strategy and Action Plan (NCCMSAP)<sup>3</sup> and the corresponding NDCs. The IMCCC is composed of concerned Ministers, and it is chaired by the Prime Minister.<sup>4</sup> The Director of the Department of Climate Change will act as Secretary to the IMCCC; and

- Based on the national objectives, goals, and targets set by the IMCCC, the Minister (MoESWMCC) is to propose and develop policies on climate change (adaptation and mitigation) as per Section 7(1) of the Act. The Minister may set up Technical Advisory Committees on a needs basis
- A Department of Climate Change (DCC) is established under Section 8(1), and it will be headed by a Director (Section 9). The responsibilities of the Director are stipulated in Section 9(3). The Director is responsible for executing the climate change policy of the Ministry. In turn, the DCC shall be responsible for making policies, formulating and implementing measures, coordinating, monitoring and evaluating programmes and action plans relating to climate change, as well as conducting and coordinating research on climate change. The Departmentof Climate Change will collaborate with the Environment Commission to carry out the same tasks for Rodrigues. The institutional arrangements related to Rodrigues are given in Annex 2(a).

Reporting on progress made in the formulation and implementation of climate change strategies and action plans in order to achieve the goals and objectives set by the Council flows from the Department of Climate Change to the Minister to the Council. Section 9(3) is explicit that the Director of the DCC shall chapter to the Minister: (i) on an annual basis regarding the compliance with Section 16 of the CCA 2020 relating to the duties of public and private institutions (discussed in the next section), and (ii) on any such matters as may be required under the CCA 2020.

Since climate change is a developmental issue thatcuts across all socioeconomic systems, the CCA 2020 also makes provision for carrying out multi-stakeholder coordination. For this, a Climate Change Committee (CCC) is established under Section 11(1), which shall coordinate the implementation of activities related to greenhouse gas inventories, greenhouse gas emission reductions, climate change vulnerability assessments, and adaptation and compliance to enforcement of regulations, as well as monitoring climate change relevant targets of





3 The institutional arrangements for developing the NMSAP as per Section 15 of the Act are discussed in Section 4 of this chapter.

<sup>4</sup> The Chief Commissioner of Rodrigues can be invited to attend IMCCC meetings on a need basis.

Sustainable Development Goals (Section 11(3)). The CCC is chaired by the Supervising Officer (MESWMCC), and is constituted by representatives from 28 public institutions; 1 professional body; 1 civil society; 1 private sector, as per Section 11(1). This Committee is expected to chapter to the Minister on progress made in discharging its functions every 2 years (Section 11(4)). It is expected to adjourn at least once a month and has the mandate to establish sub-committees as may be necessary. The Secretariat of the CCC is a public officer of the MESWMCC chosen by the Supervising Officer.<sup>5</sup>The institutional arrangements, including the CCC and subsidiary bodies that may be established, are shown in **Figure A2**.

Similarly, the CCA 2020 proposes the setting up of a Rodrigues Climate Change Committee (RCCC), which shall consolidate the legal framework and mechanism towards making Rodrigues climate change-resilient and achieving a low-emission economy in line with the overarching Government objectives of developing a greener economy and Sustainable Development Goal (SDG) 13 on climate action. The analogy of Figure A2 for Rodrigues is given in Annex 2(b). The Departmental Head of the Commission (Environment) has the mandate to appoint any officers to support the RCCC in discharging its functions, and the Officer in Charge of the Outer Islands Development Corporation (OIDC) is responsible for providing data on GHG emissions and sinks for the preparation of the annual GHG inventory report. The CCA 2020 does not stipulate the secretarial mechanism for the RCCC.



Figure A2. Additional Structures Proposed in the CCA 2020.

5 The CCA 2020 does not explicitly state that the said Public Officer should be from the Department of Climate Change.

## A3. OPERATIONAL GUIDELINES

This section provides guidelines for public and private institutions to discharge their roles and responsibilities under the 'duties of institution' provisioned in Section 16 of the CCA 2020, with focua on the implementation of Section 14(3) as discussed in the introduction. First, the case is made for mitigation strategy planning, implementation, monitoring and evaluation to be made using the sectoral scope of the Intergovernmental Panel on Climate Change (IPCC). The generic activities that are common to all sectors for the process of strategy

formulation, implementation, and monitoring and evaluation are then discussed. The sector-specific roles and responsibilities of institutions in the implementation of the generic activities are then outlined.

In addition to references made to Sections 14 and 16 of the CCA 2020, the operational guidelines will also support the Department of Climate Change in fulfilling the following provisions of Section 8(2) of the Act:

- promote adaptation and mitigation measures to address climate change in relevant sectors;
- establish procedures and issue guidelines to reduce emissions of greenhouse gases;
- establish reporting mechanisms for public and private institutions, including statutory bodies, relating to climate change;
- establish and maintain a climate change database system to enable the assessment, monitoring, reporting, and verification of measures relating to climate change;
- promote and enhance the participation of stakeholders, including the business community, non- governmental organisations, and local communities, in climate change matters;
- monitor the level of greenhouse gas emissions and removal by sink to ascertain and ensure that greenhouse gas emissions are reduced as required under UNFCCC; and
- monitor the implementation of sectoral climate change mitigation policies and measures to ascertain that the National Climate Change Mitigation Strategy and Action Plan are complied with.

#### A3.1. Sectoral Approach -Contextualization

The definitions of sectors by the IPCC and by government institutions are not the same. The approach used in developing the operational guidelines has been aligned with the definition of emitting sectors in the IPCC as shown in **Figure A3**. For institutions to be able to discharge their duties as per the provisions of the CCA 2020, the IPCC sectoral scope is embedded within the institutional arrangements provisioned under the Act.



Figure A3. Definition of Sectors in Alignment with the IPCC Sectoral Scope.

Hence, the sectors are hosted as sub-committees of the Climate Change Committee (CCC) within the broader institutional architecture shown in Figure A2. The proposed sectoral scope is squarely aligned with the institutional structures that have been used in the recent past for implementing projects under the United Nations Framework Convention on Climate Change (e.g. Annex 1). In Figure A3, four broad sectors (green boxes) with several sub-sectors (blue boxes) are identified. Except for Industrial Processes and Product Use (IPPU, and more precisely related to refrigerants), the operational guidelines are developed at the level of the sub-sectors. One important element proposed in the operational guidelines is the interconnectedness between the subsectors for better horizontal linkages between them, and hence, for improved mainstreaming of climate change mitigation in Mauritius.

#### A3.2 Process-Based Sectoral Guidance

This section describes the process that all sectors should adopt for formulating, implementing, and monitoring and evaluating sectoral mitigation strategies and action plans. It is understood that the sectoral mitigation strategies and action plans will then be consolidated into a National Climate Change Mitigation Strategy and Action Plan under the coordination of the CCC. The process architecture for common sector activities is illustrated in **Figure A4**. The following sections provide guidelines on the implementation of the different elements of the process flow, while the accompanying sector-specific institutional roles and responsibilities and MRV systems are detailed in Section A4.3.



Figure A4. Process Flow Linking Generic Sectoral Activities.

#### A3.2.1. Planning

The first step is for each sector or sub-sector to integrate climate change mitigation into its strategy; that is, the mainstreaming of climate change mitigation. The steps and processes that can be used are detailed below, while noting that the guidance is not prescriptive in terms of tools that may be used for carrying out mitigation scenario analyses. For mitigation analyses, guidance provided by the UNFCCC is referenced.

The mitigation component in each sector / sub-sector strategy will be formulated based on the national objectives, goals, and targets established by the Inter-Ministerial Council on Climate Change (**Figure A1**). The mitigation strategy and action planning hinge on three interrelated activities, namely: (i) stakeholder engagement; (ii) identification and prioritisation of mitigation actions; and (iii) policy and mitigation analyses.

#### A3.2.1.1. Stakeholder Engagements

Stakeholder engagement is a cornerstone of the CCA 2020 both through Section 8(2) (I), and Section 19 on public consultation, where public institutions should carry out public consultations for the purpose of developing strategies and policies. As per Section 19 of the CCA 2020, the process of formulating the Mitigation Strategy and Action Plan requires broad stakeholder consultations, including cross-sectoral coordination between public institutions. A Stakeholder Engagement Plan (SEP)<sup>6</sup> has been developed to guide the facilitation of multi-stakeholder processes in order to achieve inclusiveness in participation. It provides a methodology for identifying stakeholders based on their interests7 in climate change mitigation and their influence on effecting change regarding emissions reductions. The SEP also proposes methods of engagement with stakeholders as well as channels of communication to engage with the identified stakeholders effectively.

## A3.2.1.2. Identifying and Prioritising Mitigation Actions

Using stakeholder engagements following the SEP described in Section 3.2.1.1, mitigation technologies or actions can be identified and prioritised using the technology needs assessment (TNA) process that has been applied for numerous climate mitigation initiatives in Mauritius, including the TNA project, Third National Communications, and the NAMA project. The process is carried out in three steps:<sup>8</sup>

- 1. To **identify and prioritise**, through countrydriven participatory processes, **technologies** that can contribute to the **mitigation** goals of the participating countries while meeting national sustainable development goals and priorities (TNA);
- 2. To **identify the barriers** (financial and nonfinancial) that hinder the acquisition, deployment, and diffusion of the prioritised technologies for mitigation; and
- 3. To develop Technology Action Plans (TAP) that specify activities and enabling frameworks to overcome the barriers and facilitate the transfer, adoption, and diffusion of selected technologies.

The framework and process used to implement the threesteps are shown in **Figure A5**.

<sup>6</sup> Ministry of Environment, Solid Waste Management and Climate Change (2022) Stakeholder Engagement Plan, MESWMCC, Mauritius.

<sup>7</sup> The 'interest' of a stakeholder may arise from different levers, including impacts (positive or negative) of emissions reductions and/or anticipated regulatory pressure to decarbonise.

<sup>8</sup> Haselip J, Narkevičiūtė R, Rogat J, Trærup S (2019) TNA step by step: a guidebook for countries conducting a technology needs assessment and action plan. UNEP DTU Partnership, Copenhagen. The TNA methodology also allows for bankable concept notes to be developed using the TAPs in order to mobilise international climate finance. Since this specific step is not necessary in the planning process, it has not been discussed here.



Figure A5. The TNA Process. from Technology Prioritisation to Action Plans.

(Source: Boldt J, Nygaard I, Hansen UE, Trœrup S (2012) Overcoming Barriers to the Transfer and Diffusion of Climate Technologies. UNEP Risø Centre, Roskilde) The NAMA project has developed a guiding document on how to identify and prioritise mitigation actions and technologies using a bottom-up approach.<sup>9</sup> In summary, the guiding document provides the following:

- 1. Methods and databases for identifying mitigation actions across all emissions sectors; and
- 2. Method for identifying a short list of mitigation actions for application in the local context; and
- 3. Step-by-step guidance on the use of multi-criteria analysis (MCA), including examples of criteria and indicators that have been used in Mauritius for prioritising mitigation actions.<sup>10</sup> Through the choice of appropriate indicators, the process also allows mitigation action plans to integrate the gender dimension. The indicators can also reflect the costs and benefits associated with each mitigation technology and can, therefore, be used for benefit-cost analyses<sup>11</sup>; and
- 4. An example of an Excel-based tool for carrying out MCA that can be adapted to the requirements of different sectors.

Since GHG emission reductions are a main indicator used in MCA, penetration targets would need to be defined for each technology within a bundle of sectoral mitigation actions in alignment with the overall objectives, goals, and targets set by the IMCCC (section 2). The overall targets should cover at least the period up to 2030. In order to ensure strategic coherence of mitigation actions to support an overall policy of net-zero carbon emissions to be achieved between 2050 and 2070, the TNA process can also be used to identify technologies that are most likely to be adopted after 2030. For example, one approach might be to carry out TNA for mitigation actions for different time periods, such as up to 2030, 2031 to 2040, and 2041 to 2050, using expert judgement.

Aco-benefit of the TNA process is that it allows identification of financial and non-financial barriers for the transfer, adoption, 12 and diffusion of mitigation technologies and hence, provides information on capacity building, technology transfer, and financial support needed.

<sup>9</sup> Ministry of Environment, Solid Waste Management and Climate Change (2022) Guidelines for identifying and prioritising mitigation actions, MESWMCC, Mauritius.

<sup>10</sup> The MCA4Climate framework is adopted. It provides a robust framework for developing climate change mitigation (and adaptation) plans and strategies. The MCA4Climate framework does this by providing a structured approach to assessing and prioritising climate options whiletaking into consideration associated social, economic, environmental, and institutional costs and benefits.

<sup>11</sup> This approach was adopted in the Mauritius TNA project that was completed in 2013. For example, of Mauritius (2013) TNA Chapter II: Barrier Analysis and Enabling Framework for Mitigation – Energy Industries, Ministry of Environment and Sustainable Development, Port Louis.

<sup>12</sup> Nygaard I, Hansen UE (2015) Overcoming barriers to the transfer and diffusion of climate technologies: second edition. UNEP DTU Partnership, Copenhagen.

#### A3.2.1.3. Policy and Mitigation Analyses

Once the mitigation options (technologies and measures) have been identified, baseline (i.e. in the absence of a mitigation strategy and action plan) and mitigation(i.e. with mitigation actions) scenarios will have to be developed to establish greenhouse gas (GHG) emission reductions. Alternative mitigation scenarios<sup>13</sup> can be developed using different penetration targets of different technological options to assess the emission reduction levels and costs associated with different levels of mitigation ambition.

For the purpose of National Communications under the UNFCCC, mitigation scenarios should cover a time period spanning 10 to 15 years. But, as mentioned earlier, pathways for low-carbon development should be developed for longer time periods in order to understand the technological, capacity-building, and financing implications for achieving a net-zero carbon society between 2050 and 2070.

For the purpose of mitigation analyses, the UNFCCC does not prescribe any tools for GHG scenario modelling. Nevertheless, the UNFCCC provides an overview of numerous tools that can be used for such analyses.<sup>14</sup> It has developed a manual covering the energy and nonenergy tools that can be used for mitigation analyses,<sup>15</sup> as well as an online interactive platform on these modelling tools.<sup>16</sup> Also, the GHG Management Institute has developed a Mitigation Modelling Tool Selection Guide to support mitigation analysts compare and choose modelling tools.<sup>17</sup> The Food and Agriculture Organisation (FAO) has developed the Ex-Ante Carbon Balance Tool (EX-ACT) for the AFOLU sector. It provides three tools that can measure GHG emissions and biodiversity impacts of projects and policies ex ante, in itinere and ex post; 18

Although UNFCCC guidelines are not prescriptive of the tools that should be used for mitigation scenario analyses, the use of integrated tools that can model sustainable development co-benefits as well as the macroeconomic impacts of mitigation pathways is recommended.

The modelling approaches and tools developed by the NAMA project for carrying out mitigation scenario analyses<sup>19</sup> are listed in **Table A1**. These tools have been developed as open-source products for informing the National Climate Change Mitigation Strategy and Action Plan (NCCMSAP) 2022-2030<sup>20</sup> and have been shared with institutional stakeholders. It is recognised that the institutionalisation of these tools for mitigation scenario analyses will require additional human and institutional capacity building.

<sup>13</sup> For instance, scenarios for unconditional and conditional mitigation actions can be developed.

<sup>14</sup> https://unfccc.int/topics/mitigation/workstreams/response-measures/modelling-tools-to-assess-the-impact-of-the-implementation-ofresponse-measures - accessed November 25, 2021.

<sup>15</sup> UNFCCC (2006) Training Handbook on Mitigation Assessment for Non-Annex 1 Parties; UNFCCC (2008) Resource Guide for Preparing National Communications of Non-Annex 1 Parties – Module 4: Measures to mitigate climate change.

<sup>16</sup> https://unfccc.int/resource/cd\_roms/na1/mitigation/index.htm - accessed November 25, 2021.

<sup>17</sup> https://ghginstitute.org/2021/07/27/mitigation-scenario-assessment-ghg-modelling-tool-selection-guide/ - accessed November 25, 2021.

<sup>18</sup> https://www.fao.org/in-action/epic/ex-act-tool/en/ - accessed November 25, 2021.

<sup>19</sup> PNK Deenapanray and AM Bassi (2022) Mitigation Scenarios Modelling for Strategic Planning in Mauritius.

<sup>20</sup> Republic of Mauritius (2022) National Climate Change Mitigation Strategy and Action Plan 2022 – 2030, Ministry of Environment, Solid Waste Management and Climate Change, Port Louis.

SECTOR / SUB-SECTOR	APPROACHES AND TOOLS
Energy industries (electricity generation and use)	System dynamics model customised for Mauritius. <sup>21</sup> Customisation was carried out in collaboration with the Central Electricity Board (CEB). The model has been transferred to CEB, and the purchase of necessary software to run (and update) the model and mitigation scenarios was funded by the GEF-financed NAMA project.
Transport (land)	Econometric modelling of travel demand for passengers and freight <sup>22</sup> and allocation of total travel demand to different modes of land transportation. Disaggregation of travel demand by vehicle type is then converted to energy use and greenhouse gas emissions.
Solid waste	Excel-based tool customised

management	for Mauritius using the 2006 IPCC Guidelines for National Greenhouse Gas
Wastewater management	Inventories. <sup>23</sup> Excel-based tool customised for Mauritius using the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. <sup>24</sup>
Agriculture (food crops and livestock waste management)	Excel-based tool customised for Mauritius using the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. <sup>25</sup>
Forestry	Excel-based tool customised for Mauritius using the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. <sup>26</sup>

Refrigeration and	Excel-based tool customised
air conditioning	for Mauritius using the 2006
	IPCC Guidelines for National
	Greenhouse Gas Inventories.27

Table A1: Approaches and Tools used to carry out Mitigation Scenario Analyses in the NAMA Project

23 https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5\_Volume5/V5\_3\_Ch3\_SWDS.pdf - accessed January 18, 2022.

24 https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5\_Volume5/V5\_6\_Ch6\_Wastewater.pdf - accessed November 20, 2021.

- 25 https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4\_Volume4/V4\_05\_Ch5\_Cropland.pdf; https://www.ipcc-nggip.iges.or.jp/ public/2006gl/pdf/4\_Volume4/V4\_10\_Ch10\_Livestock.pdf - accessed February 18, 2022;
- 26 https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4\_Volume4/V4\_04\_Ch4\_Forest\_Land.pdf accessed February 18, 2022.

27 https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3\_Volume3/V3\_7\_Ch7\_ODS\_Substitutes.pdf - accessed February 15, 2022.

28 https://climateactiontransparency.org/our-work/icat-toolbox/ - accessed June 16, 2022.

31 https://climateactiontransparency.org/our-work/icat-toolbox/caat/ - accessed June 16, 2022.

32 https://climateactiontransparency.org/our-work/icat-toolbox/assessment-guides/non-state-and-subnational-action/ - accessed June 16, 2022

**26** INSTITUTIONAL ARRANGEMENTS FOR CLIMATE GOVERNANCE

There are complementary tools that are available to support the process of mitigation policy planning. In particular, the Initiative for Climate Action Transparency (ICAT) has developed a toolbox containing a combination of Guides and Assessment Tools to support countries in the planning process:<sup>28</sup>

• *Policy Assessment Guides:* 29 Provide a set of state-of- the-art methodologies to help countries assess the climateimpacts of policies and actions. Assessments

can cover the impacts on greenhouse gas levels (e.g. renewable energy, transport pricing, forestry, building efficiency, and agriculture), sustainable development outcomes, the transformational change potential, and

the impacts of actions at the subnational level and by non-state actors. They can be used separately or in combination, the Guides can improve policy design and implementation, NDC revision and tracking of their progress, domestic or international reporting, and the mobilisation of finance by demonstrating the results of effective policies. The Guides therefore cut across the integrated policy process, including planning, implementation, monitoring, and reporting; and

- COMPASS toolbox:<sup>30</sup> The Climate Action Outcomes and Mitigation Policy Assessment (COMPASS) toolbox is a selection of climate scenario modelling tools to support decision-makers, analysts and civil society in assessing and understanding the impacts of climate action and policies; and
- Climate Action Aggregation Tool (CAAT)<sup>:31</sup> CAAT distils the step-by-step process laid out in the ICAT Non-State and Subnational Action Guide32 and was developed to support government experts, analysts, and policymakers to identify, quantify and aggregate the impact of non-state and subnational actions. As a result, they can be integrated into mitigation targets, projections, and scenarios in support of policy development, policy evaluation, and target-setting; and

<sup>21</sup> More details of the structure of the model can be found in: Bassi A.M., and Deenapanray, P.N.K. (2012). A green investment analysis using system dynamics modeling – The case study of Mauritius. Small States: Economic Review and Basic Statistics, 16(12):256-265; Deenapanray, P.N K., and Bassi, A.M. (2015). System dynamics modelling of the power sector in Mauritius. Environmental and Climate Technologies, 16(1):20-35.

<sup>22</sup> PNK Deenapanray, N Khadun (2021) Land transport greenhouse gas emission scenarios for Mauritius based on modelling transport demand, Interdisciplinary Perspectives in Transportation Research 9, 100299.

<sup>29</sup> https://climateactiontransparency.org/our-work/icat-toolbox/assessment-guides/ - accessed June 16, 2022.

<sup>30</sup> https://climateactiontransparency.org/our-work/icat-toolbox/compass-toolbox/ - accessed June 16, 2022.

· GHG Abatement Cost Model (GACMO): The tool can be used to support countries or regions in analysing their GHG mitigation options to prepare information for their NDCs. National Communications, or Low-Carbon Development Plans. It can be used to calculate and visualise a comparison of the business-as-usual scenario with selected mitigation scenarios to support the analysis of GHG mitigation options and their cost. Such information helps prepare, among others: revisions of NDCs, National Communications, and Low-Carbon Development Plans. The GACMO tool was used to develop a Marginal Abatement Cost Curve (MACC) for the mitigation actions contained in the NCCMSAP 2022- 2030.33

#### A3.2.1.4. Timelines

The timeline for formulating and reviewing the Mitigation Strategy and Action Plan should be aligned with the review process of the Nationally Determined Contribution (NDC) as shown in Annex 3.

#### A3.2.2. Implementation

Implementation of mitigation actions is sector-specific and is discussed in Section 3.3. Implementation will need to follow the NCCMSAP that is provisioned under Section 14 of the CCA 2020, and, in particular, the NDC Action Plan<sup>34</sup> and the NCCMSAP 2022 – 2030.<sup>35</sup>

#### A3.2.3. Monitoring

#### **Mitigation Actions**

Monitoring the implementation of mitigation actions contained in the sectoral/sub-sectoral mitigation strategies and action plans will be carried out as per the sector-specific MRV systems that are described in Section 3.3. For this, each institution that generates or collects data on mitigation actions needs to put in place a Data Management System (DMS) that will also capture the important feature of Quality Assurance (QA). The data management framework, including the DMS, is shown in **Figure A6**.



Figure A6. Data Management Framework.

The data Quality Control Framework (QCF) will be applied to the elements listed in **Table A2**.

<sup>33</sup> Republic of Mauritius (2022) National Climate Change Mitigation Strategy and Action Plan 2022 – 2030, Ministry of Environment, Solid Waste Management and Climate Change, Port Louis.

<sup>34</sup> Republic of Mauritius (2022) NDC Action Plan 2022 – 2025, Ministry of Environment, Solid Waste Management, and Climate Change, Port Louis.

<sup>35</sup> Republic of Mauritius (2022) National Climate Change Mitigation Strategy and Action Plan 2022 – 2030, Ministry of Environment, Solid Waste Management, and Climate Change, Port Louis.

ELEMENTS	ATTRIBUTES OF ELEMENTS		STEP	DESCRIPTION
OF QCF Data	<ul> <li>OF QCF</li> <li>Raw data (e.g. activity level, emission factors, etc)</li> <li>Secondary data (e.g. sources and quality assurance systems used to generate data)</li> <li>Quality control procedures to carry out high-quality data collection</li> <li>Improvements in data collection procedures</li> </ul>	Establish a Data Quality Team (DQT)	<ul> <li>Responsible for implementing the DMS and continually improving inventory quality</li> <li>Coordination between relevant units or entities in institutions, external entities providing secondary data, and independent verifiers</li> <li>The DQT will be constituted using existing staff in public and private institutions that generate data</li> </ul>	
Methods	<ul> <li>Technical aspects of calculations and tools used for calculations (e.g. grid emission factor for the national electricity system)</li> </ul>		Develop a Quality Management <u>Plan (QMP)</u> Perform generic checks Perform source- specific checks	<ul> <li>Outlining the steps taken by institutions to implement its DMS</li> </ul>
	<ul> <li>Selection, application, and updating of methodologies and tools for mitigation scenario analyses</li> <li>Research and methods to improve data quality</li> </ul>			<ul> <li>Developing appropriate quality checks for all data and calculations to generate indicators</li> <li>Developing guidelines for recalculation of indicators</li> <li>Establishing criteria / circumstances for data / indicators restatements</li> <li>Means of addressing uncertainty</li> </ul>
Systems	<ul> <li>Institutional and managerial procedures for developing data inventories</li> <li>Records of data, methods, systems</li> </ul>			
	processes, assumptions, and estimates related to mitigation inventories and scenario analyses	   i	Review final inventory data and reports	<ul> <li>in data</li> <li>Establishing a process of internal technical review of data inventory,</li> </ul>
Table A2: Elements of the Data Management Framework and their Attributes				rollowed by a process of internal managerial review for institutional approval of inventory - Establishing a process for
seven steps summarised in <b>Table A3</b> .			Institutionalise formal feedback loops	external auditing of inventory data - Establishing a process of feeding the results of reviews in 5 to the DQT for the continuous

Report,

document & archive

Table A3: Description of the Seven Steps to Implement the DMS

updating of the DMP

procedures, including how data is

- Establishing which information is kept for internal use and which information is reported to external

- Developing procedures for formal

record-keeping

- Developing

archived

parties

feedback

In general, data management systems will need to be put in place to cater for the following:

- Parameters, assumptions, definitions, data sources and models, metrics and IPCC guidelines
- Activity-specific assumptions, methodologies, and approaches consistent with IPCC guidance
- Methodologies used to:
  - Estimate the mitigation co-benefits of adaptation actions and/or economic diversification plans
  - Cooperative approaches that involve the use of Internationally Transferred Mitigation Options (ITMOs)
  - Track the progress of implementation of policies and measures
  - Related to the NDC, and conditions and assumptions relevant to the achievement of the NDCs
  - How the methodology in each reporting year is consistent with the methodologies used when communicating the NDC
  - Methodological inconsistencies with the Party's most recent NIR, if applicable

• How double counting of net GHG emission reductions has been avoide
The sector-specific guidelines assign institutional responsibilities regarding monitoring of the implementation of mitigation actions within the broader framework of operationalising the Mauritius NDC Registry (or MauNDC Registry), which will also be used for reporting purposes. A description of the MauNDC Registry is given in Section A 3.2.4.

#### **Support Needed**

Support needed for the implementation of mitigation actions typically take three forms: (i) capacity building<sup>36</sup> (human and institutional); ii) technology transfer<sup>37</sup>; and (iii) financing<sup>38</sup>.

*Capacity building*: Institutions have to carry out a capacity needs assessment to identify any human and institutional gaps and barriers that may prevent them from fulfilling their roles and responsibilities as provisioned in the CCA 2020. A Capacity Self-Assessment Tool has been developed by MESWMCC that institutions can use for capacity self-evaluation.<sup>39</sup>

Other tools that can be used for capacity assessments are:

- Global Climate Change Institutional Capacity Assessment Tool: <sup>40</sup> A structured tool for assessing an organisation's or institution's capacity to address climate change issues. It can be used as a baseline assessment tool to inform assistance and enable an evaluation of impact at a later date. It can also be used – in full or in part – as a performance monitoring tool
- to document progress. The tool is designed to measure the progress of formal organisations, including government ministries, non-governmental organisations (NGO), and civil society organisations (CSO) at the regional, national, or sub-national level.
- Initiative for Climate Action Transparency (ICAT) toolbox: The host of Guides and Assessment Tools is described in Section A3.2.1. Although they are not strictly related to capacity assessments, engaging with the ICAT toolbox can help institutions make a self-assessment of their capacities to apply knowledge products for mitigation planning, implementation, monitoring, and reporting.

#### **Technology Transfer**

The mitigation technologies that underpin mitigation actions can be identified by applying the TNA process described in Section A3.2.1.2.

#### Financing

Mitigation actions and measures can be categorised into unconditional (i.e. using country financing) and conditional (i.e. requiring international financial support) contributions, based on the principle of common but differentiated responsibilities and respective capabilities.<sup>41</sup> It is the country's prerogative, given its national context, to determine the level of financing that is made available nationally to implement unconditional mitigation actions.

<sup>36</sup> Article 11(1) of the Paris Agreement states that "(c)apacity-building under this Agreement should enhance the capacity and ability of developing country Parties, in particular countries with the least capacity, such as the least developed countries, and those that are particularly vulnerable to the adverse effects of climate change, such as small island developing States, to take effective Climate Change Act 2020ion, including, inter alia, to implement adaptation and mitigation actions, and should facilitate technology development, dissemination and deployment, access to climate finance, relevant aspects of education, training and public awareness, and the transparent, timely and accurate communication of information".

<sup>37</sup> Article 10(2) of the Paris Agreement states that "Parties, noting the importance of technology for the implementation of mitigation and adaptation actions under this Agreement and recognising existing technology deployment and dissemination efforts, shall strengthen cooperative action on technology development and transfer".

<sup>38</sup> Article 9(1) of the Paris Agreement states that "(d)eveloped country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention".

<sup>39</sup> The tool was applied in the NAMA and Institutional Gaps Need Assessment (IGNA) projects, and is available at the Department of Climate Change, Ministry of Environment, Solid Waste Management and Climate Change.

<sup>40</sup> https://ndcpartnership.org/toolbox/global-climate-change-institutional-capacity-assessment-tool - accessed 16 June 2022.

<sup>41</sup> For example, see Article 3 of the United Nations Framework Convention on Climate Change and Article 2 of the Paris Agreement.

#### **Support Received**

All institutions will have to collate support received for mainstreaming climate mitigation on an annual basis from two perspectives, namely: capacity building and technology transfer. The table (**Table A4**) gives an indication of information required.

#### **TYPES OF** SUPPORT **INFORMATION REQUIRED** RECEIVED Capacity The support received will be in Building relation to the barriers that were identified during the analysis of the support needed. Information can be provided for: (i) which capacity constraint was addressed, (ii) the number of persons benefiting from the capacity development, (iii) type of stakeholders reached, (iv) institutional restructuring received; and (v) tools deployed. It is understood that the capacity buildina received will cover activities related to the entire policy including planning, cycle, implementation, and transparencyrelated activities (monitoring and reporting). Technology Information should be collected on Transfer technical support provided through international climate finance (i.e. donor agencies, multilateral agencies/institutions, countries. and/or Parties to the UNFCCC) on the development, transfer, adoption diffusion of mitigation and technologies (hardware, software and orgware).42

Table A4: Information on Support Received

Support received in the form of international climate finance (donor agencies, multilateral agencies/ institutions, countries and/or Parties to the UNFCCC) will be endorsed by Implementing Agencies and the source of funding be it grant or budgetary funding will bereflected per adaption/mitigation action or project on the MauNDC Registry.<sup>43</sup>

## A3.2.4. Reporting

All information collected in Section A3.2.3 will be curated and uploaded onto the online MauNDC Registry using the protocol established by the Department of Climate Change (**Table A5**), Ministry of Environment, Solid Waste Management and Climate Change. To this effect, a description of roles and responsibilities is given in **Table A5**, with sector-specific guidance given in Section 3.3.

<sup>42</sup> Ministry of Environment, Solid Waste Management and Climate Change (2021) Guidelines for identifying and PRIORITISING mitigation actions, MESWMCC, Mauritius.

<sup>43 (</sup>i) All climate-related investments (including developmental aid) versus (ii) financial flows from developed countries (multilateral and bilateral funds) for climate mitigation activities versus (iii) 'incrementality' or 'additionality' of investments beyond a business-as-usual case.

INDE	X ROLE	DESCRIPTION	STAKEHOLDER TYPE	RESPONSIBILITY	SYSIEM INTERACTION	
1	System Administrators	Technical resources with system admin knowledge. (CISD Representative at MESWMCC).	Internal	<ul> <li>Make sure the platform runs smoothly.</li> <li>Provide technical assistance.</li> <li>Create users on the system.</li> <li>Provide on-site full-time support to MoESWMCC Coordinators.</li> </ul>	<ul> <li>System Configuration</li> <li>User Access Management</li> <li>Content Management</li> <li>Super User Access</li> <li>Support</li> </ul>	SEMENTS ANCE
2	Coordinators	Staff within the Department of Climate Change.	Internal	<ul> <li>Maintain the NDC Registry and generate reports.</li> <li>Ensure the data submitted is complete and accurate.</li> <li>Create users on thesystem.</li> </ul>	<ul> <li>Manage NDCs Registry</li> <li>Allocate Indicators</li> <li>Allocate QA tasks</li> <li>Generate reports</li> <li>Update lookup vocabularies</li> <li>User account management.</li> <li>Query management</li> </ul>	INSTITUTIONAL ARRANG FOR CLIMATE GOVERN
3	Thematic owners	Focal points in charge of different thematic/ Technical Working Groups.	External	<ul> <li>Take ownership of TWG and make sure accurate data is submitted on time.</li> <li>Conduct quality control on data submitted.</li> </ul>	<ul> <li>View Thematic User Groups</li> <li>View tasks allocated/ status</li> <li>Update QC Status</li> <li>Manage interventions, support, and indicators.</li> <li>Raise gueries</li> </ul>	
4	Thematic Contributors	Focal Point Users having technical and thematic knowledge of climate actions and Indicators.	External	<ul> <li>Responsible for managing and updating the NDC Registry Platform based on Indicators and interventions allocated.</li> </ul>	<ul> <li>Submit data on the platform</li> <li>Manage interventions,support, and indicators.</li> <li>Raise queries.</li> </ul>	
5	Verifiers	Independent users with knowledge of NDC reporting.	External	Conduct Quality Assurance on the data submitted to the system.	<ul> <li>View data submitted on the platform</li> <li>Update QC Status</li> <li>Raise queries.</li> </ul>	

 Table A5: Roles and Responsibilities of Internal and External Stakeholders in Interactions with the MauNDC Registry

 Source: Department of Climate Change

Beyond reporting on the implementation of climate actions and support received, the MauNDC Registry will also chapter on the broader sustainable development benefits of climate change mitigation (and adaptation). The key objectives of the MauNDC Registry are:

- → To improve engagement of stakeholders by providing a one-stop platform for data input, viewing past submissions, assigned tasks, and updating implementation status; and
- $\rightarrow$  To provide evidence-based and support transparent data management across the registry; and
- To facilitate the setting up of a Measuring, Reporting, and Verification (MRV) framework by allowing stakeholders to chapter progress on Indicators and ultimately on NDCs targets and pave the way for verification of the information reported; and
- → To provide a flexible common focal point for collating and analysing data by relevant organisational collaborations; and
- $\rightarrow$  To track and chapter on cross-cutting mitigation and adaptation policies and actions; and
- $\rightarrow$  To chapter on overall NDC progress versus the targets; and
- → To support proactive decision-making; and
- → To consolidate institutional memory and transparency around domestic legal and institutional organisational structures, systems, and capacities.

## A3.3. Sector-Specific Guidance

This section provides the sector-specific details that will be needed to implement the process-based sectoral activities. For each sector or sub-sector (**Figure A9**),the details correspond to: (i) institutional coordination structures, (ii) data requirements for MRV (GHG and non-GHG), and (iii) roles and responsibilities of institutions in the different parts of the process discussed in the previous section. The Fourth Schedule of the CCA 2020 identifies the stakeholders responsible for the formulation of the National Climate Change Mitigation Strategy and Action Plan. However, the stakeholders and their roles and responsibilities have to be defined for each sector.

For each sector or sub-sector, a set of stakeholders has been identified, and their roles and responsibilities have been established as far as achieving the requirements of Section 14 of the CCA 2020. It is an institutional arrangement that considers the need for cross-sectoral coordination for appropriate low-carbon development planning, implementation, and monitoring & evaluation. The cluster of identified institutions will form a Technical Working Group (TWG) that will be chaired by the institution mandated for policy and strategy planning for the sector or sub-sector. Importantly, the chairperson of the TWG is proposed to be the person who is also the representative to the Climate Change Committee (CCC). While the sectoral guidelines identify a number of institutions to comprise TWGs, additional institutional stakeholders can be co-opted on a needs basis at the discretion of the chairperson and members of each TWG. Since sub-committees have been established under the CCC, <sup>44</sup> the chairperson of the TWG may also be a member of the sub-committees. Each TWG will adjourn at least every 3 months for the purpose of planning and monitoring the implementation of mitigation strategies and actions. The chairperson and members of the TWG may decide to meet more frequently, depending on the circumstances. The chairperson will chapter to the CCC (and CCC sub-committees where applicable) on work carried out by the TWG at the next CCC (and CCC sub-committees where applicable) meeting following the meeting of the TWG.

The approach of linking the proceedings of each TWG with the CCC is proposed as an effective way for the latter to meaningfully accomplish its mandate under Section 11 of the CCA 2020.

The MRV architecture for each sector or sub-sector provides institutional responsibilities for data management related to parameters used for mitigation scenario analyses, as well as data related to support needed and received (Section 3.2.2 and **Table A4**). In some cases, the activity data can also be used for carrying out GHG inventories.

It is pointed out that each sector will be responsible for mainstreaming gender in its proceedings, as provided in the Gender Action Plan (GAP) accompanying the NCCMSAP.

<sup>44</sup> Discussions with the DCC on March 24, , 2023 revealed that three sub-committees to the CCC have been established, namely: mitigation, adaptation and finance.

## A3.3.1. Energy Industries

### A3.3.1.1. Organisational Structure

The institutional arrangement shown in **Figure A7** is proposed. The structure, thereafter called the Energy Industries (EI) TWG [EI-TWG], is proposed to be chaired by the representative of the Ministry of Energy and Public Utilities (MEPU) to the Climate Change Committee (CCC).

The EI-TWG may decide to establish ad hoc sub-TWGs to work on any technical issues that are material to the planning, implementation, monitoring, and reporting process (**Figure A4**).



Figure A7. Organisation Structure for the Energy Industries.

The duties and responsibilities of each institution as far as mitigation planning, implementation, monitoring, and evaluation are concerned are listed in **Table A6**. Additional technical considerations regarding the MRV system for monitoring the implementation of mitigation actions and support needed and received are discussed in subsection 3.3.1.2 (**Table A7**).

INSTITUTION(S)	ROLES AND RESPONSIBILITIES
Ministry of Energy and Public Utilities (MEPU)	<ul> <li>Overall responsibility for the formulation, implementation, and monitoring &amp; evaluation of climate change mitigation policies, strategies and actions related to the energy industries;</li> <li>Preside over the proceedings of the EI-TWG, as well as providing the Secretariat for theEI-TWG and</li> <li>Thematic Owner of data (GHG and non-GHG, and support needed and received) reported on the MauNDC Registry by the ministry and all technical bodies operating under it.</li> </ul>
Central Electricity Board (CEB)	<ul> <li>Responsible for integrating low-carbon and renewable energy sources and energy efficiency (in collaboration with EEMO) in the Integrated Electricity Plan, including ensuring the technical feasibility of such technologies;</li> <li>Developing mitigation scenarios for electricity production (in collaboration with other institutions);</li> <li>Thematic Contributor of data on electricity generation as per the MRV system detailed in <b>Table A7</b> and</li> <li>Collaborate with other technical bodies for reviewing and updating the Renewable Energy Roadmap for the Electricity Sector.</li> </ul>
Energy Efficiency Management Office (EEMO)	<ul> <li>Responsible for developing energy efficiency pathways for electricity end uses and an Energy Efficiency Roadmap;</li> <li>Carrying out TNA for energy efficiency technologies with the support of the DCC;</li> <li>Identify support needed for promoting electricity end-use energy efficiency;</li> <li>Developing mitigation scenarios for electricity end-use efficiency in the Energy Efficiency Roadmap;</li> <li>Thematic Contributor of data on electricity generation as per MRV system detailed in</li> <li>Table A7;</li> <li>Collaborate with other technical bodies for reviewing and updating the Renewable Energy Roadmap for the Electricity Sector and</li> <li>Collaborate with the CEB for the integration of energy efficiency in the Integrated Electricity Plan.</li> </ul>
Mauritius Renewable Energy Agency (MARENA)	<ul> <li>Responsible for developing pathways for the uptake of renewable energies, and a key contributor in the Renewable Energy Roadmap for the Electricity Sector;</li> <li>Investigating the technical and financial viability of new renewable energies in the local context;</li> <li>Carrying out TNA for renewable energies with the support of the DCC;</li> <li>Identify the support needed for promoting renewable energies for electricity production;</li> <li>Modelling the macro-economic and sustainable development benefits of adoptingrenewable energies and</li> <li>Thematic Contributor of data on the sustainable development benefits of renewable energies.</li> </ul>
Ministry of Blue Economy, Marine Resources, Fisheries and Shipping (MBEMRFS)	<ul> <li>Provide views on sea / marine-related activities or projects.</li> </ul>
State Trading Corporation (STC) Department of Waste Management and Resource Recovery	<ul> <li>STC, as a trading arm of the Government, has the responsibility for the importation of essential commodities, including petroleum products. As far as the energy industries are concerned, it is responsible for importing heavy fuel oil that is used for the thermal generation of electricity. Further, it will be responsible for importing natural gas as part of the government's strategy for low-carbon development of the power sector.</li> <li>Responsible for formulating alternative pathways for the management of solid waste, including waste energy recovery and</li> </ul>
(DWMRR)	Thematic Contributor on waste characteristics for electricity production.
Wastewater Management Authority (WMA)	<ul> <li>Responsible for formulating alternative pathways for the management of wastewater, including wastewater energy recovery and</li> <li>Provider of data to CEB on electricity production from wastewater management.</li> </ul>
Ministry of Land Transport and Light Rail (MLTLR)	<ul> <li>Responsible for developing land transport policies and strategies, including the promotion of electric modes of transportation and</li> <li>Thematic Owner of data on the uptake of different low-carbon emission modes of transport (please see the MRV table for the Transport sub-sector).</li> </ul>
Utilities Regulatory Authority (URA)	<ul> <li>Responsible for establishing electricity tariffs for different sources of electricity generation that can be used for modelling purposes (financial and economic) and</li> <li>Responsible for Technical Regulations in the sector.</li> </ul>

INSTITUTION(S)	ROLES AND RESPONSIBILITIES
Ministry of National Infrastructure and Community	<ul> <li>Responsible for establishing Energy Building Codes to improve the thermal efficiency of buildings;<sup>45</sup> and</li> </ul>
Development (MNICD)	<ul> <li>Overseeing mitigation scenario modelling for thermal efficiency gains in buildings based on Energy Building Codes (modelling carried out by the Construction Industry Authority).</li> </ul>
Ministry of Agro Industry and Food Security (MAIFS)	<ul> <li>Responsible for formulating the Biomass Framework that will support the phase- out of coal in electricity production through the use of renewable biomass.</li> </ul>
Mauritius Cane Industry Authority (MCIA)	Provider of data on the availability of renewable biomass for electricity production (that will be integrated into the Renewable Energy Roadmap for the Electricity Sector).
Independent Power Producers	<ul> <li>Investors in renewable energy projects for electricity generation and</li> </ul>
(IPPs)	• Providers of generation data (electricity and fuels used) to the CEB.
Business Mauritius (BM)	<ul> <li>BM is the apex body representing the private sector in Mauritius, and it promotes Sustainability and Inclusive Growth for business and</li> </ul>
	<ul> <li>Given its central position in the business landscape, BM has the capacity:</li> <li>→ to gather and make available quantitative and qualitative information withregards</li> </ul>
	to project implementation of mitigation actions;
	→ to coordinate analysis and research with universities and other agencies, such as the UN in order to provide pragmatic real-life' case studies
	$\rightarrow$ to support coordination among the private sector for any data collection; and
	$\rightarrow$ to implement and co-fund projects to fill the gaps in our mitigation plans.
Ministry of Industrial Development, Small and Medium Enterprises, and Cooperatives (MIDSMEC)	<ul> <li>Responsible for developing strategies and appropriate instruments (e.g. financial schemes) for the promotion of energy efficiency in industry, including SMEs and Cooperatives.</li> </ul>
Tertiary Education and Scientific Research Division (TESRD) [Ministry of	• As the main policy organ of METEST for supporting scientific research, the TESRD will be responsible for ensuring that the appropriate universities are invited to participate in the TWG in order to:
Science, and Technology	$\rightarrow$ carry out applied research that can be used to overcome barriers for the integration of energy efficiency and renewable energies in the electricity mix; and
	ightarrow carry out research on scenario modelling for low-carbon development, including mitigation and macroeconomic analyses and
	ightarrow develop and provide training modules / courses on energy efficiency and renewable energies.
Mauritius Research and Innovation Council (MRIC)	<ul> <li>Provide financial support for research projects on low-carbon development in the energy industries as a priority and</li> </ul>
	<ul> <li>Partner with different ministries on innovative low-carbon projects by providing support and seeking funds through the National Resilient Fund.</li> </ul>
(DCC)	<ul> <li>Overall responsibility for ensuring that long-term mitigation strategies and actions are formulated for the EI;</li> </ul>
	<ul> <li>Support institutional stakeholders to understand the reporting requirements under the global climate governance, namely the Paris Agreement;</li> </ul>
	<ul> <li>Provide support to institutional stakeholders on the use of the MauNDC Registry;</li> </ul>
	Provide technical support to institutions related to mitigation scenario modelling;
	<ul> <li>Provide technical support to institutions for carrying out TNA for mitigation in the EI and</li> </ul>
	• Provide technical support to institutions for identifying support needed and received.

Table A6: Roles and Responsibilities of Institutions in the EI Sub-Sector

## A3.3.1.2. MRV System (El Sub-Sector)

The MRV system indicates the roles of different institutions in the collection and validation of the different parameters that need to be measured in order to carry out mitigation scenario analyses of mitigation strategies and actions and to monitor the implementation of mitigation actions. **Table A7** provides the structure of the MRV system for the EI covering both activity parameters for mitigation analyses, support needed and received, and sustainable development benefits.

<sup>45</sup> The enforcement will most probably be carried out by local government authorities (Municipal and District Councils) as part and parcel of the process of issuing building permits.

ITEM	PARAMETER	UNITS
Grid Emission Factor	Share of Low Cost Must Run (LCMR) power plants/units in the electricity system in the past 5 years	% of total generation
	Annual data from each power plant/unit on power generation	MWh
	Annual data from each power plant/unit on fuel type	
	Annual data from each power plant on fuel/ unit consumption	t
	NCV of each type of fuel used in power plants/units	GJ/tonne fuel
	Emission factor of each type of fuel used in power plants/units	tCO <sub>2</sub> /GJ
	Annual electricity generated from renewable energy sources	MWh
Mitigation actions (electricity generation)	Annual data on renewable energy projects commissioned by type of renewable energy source, installed capacity, and electricity	MW; MWh
Mitigation action (demand side management / electricity end-use energy efficiency)	Avoided electricity from the adoption of energy-efficient equipment and appliances	MWh
	Avoided electricity from adoption of Building Energy Codes	MWh
	Number of buildings by type (residential, commercial, or industrial) and floor area	m <sup>2</sup> (floor area) by building type
Support needed and	Support needed	1. US\$
received	1. Finance	2. Types of technology
	<ol> <li>Technology transfer</li> <li>Capacity building</li> </ol>	3. Type of training needed for mainstreaming climate change mitigation in the EI
	Support received	1. US\$
	1. Finance	2. Number and type of technology transferred
	2. Technology transfer	3. Number of persons receiving training
	3. Capacity building	(gender disaggregated)
Sustainable	1. Reduced costs of energy imports	1. US\$/year
development benefits	<ol> <li>National and household energy savings</li> <li>Number of green jobs created in the electricity supply and demand value chains</li> </ol>	<ol> <li>US\$/year</li> <li>Number of jobs (gender disaggregated)</li> </ol>

REMARKS	RESPONSIBILITY
All the parameters are as defined in the CDM Methodological Tool 07, version 7 – "Tool to calculate the emission factor of an electricity system" (UNFCCC, CDM, PA Methodologies, 2021)	CEB
Data should be measured using calibrated metres and collected using the Quality Assurance System (QAS) established by the CEB.	CEB
The fuel type determines the fuels for which emission factors and net calorific values (NCV) are needed.	CEB
Data are recorded using the QA system established by the CEB.	CEB
Uses laboratory data from CEB for fuel oil and kerosene, and IPPs for coal.	CEB
Uses IPCC default values.	CEB
Data should be measured using calibrated metres and collected using the QA system established by the CEB	CEB
Data measured using calibrated metres and collected using the QA system established by the CEB	CEB
<ul> <li>Reduction in electricity use against the historical baselines</li> <li>Surveys carried out by CEB,EEMO OR MARENA</li> <li>Data collected during energy audits</li> <li>At the project level, the parameters defined in CDM Approved Small-Scale methodologies, such as AMS-II.C; II.D; II.E; II.J; II.L; II.N; II.O; II.Q; II.R; II.S need to be measured (UNFCCC, CDM, SSC Methodologies).</li> <li>Reduction in electricity use against historical baseline for different</li> </ul>	MEPU
<ul> <li>types of building envelopes</li> <li>Surveys carried out by CEB,EEMO OR MARENA</li> <li>Data collected during building energy audits</li> <li>At the project level, the parameters defined in CDM Approved Small-Scale methodologies II.Q need to be measured (UNFCCC, CDM, SSC Methodologies).</li> <li>Information collected during the process of issuing building permits</li> <li>Surveys carried out by CEB,EEMO OR MARENA</li> </ul>	MEPU (with support from CEB, EEMO, MARENA, CIA, BM) Local authorities MEPU (with support from
	CEB, EEMO, MARENA, CIA, BM)
<ol> <li>Obtained from investment plans in the Renewable EnergyRoadmap for the Electricity Sector and the Energy EfficiencyRoadmap</li> <li>Obtained from TNA</li> <li>Obtained from TNA and institutional gaps and need analyses</li> </ol>	MEPU (with support from CEB, EEMO, MARENA, CIA, BM)
<ol> <li>Public and private investments in renewables, energy efficiency, and international climate finance</li> <li>Obtained from project reports on technology transfer collated by MEPU</li> <li>Obtained from training reports collated by MEPU</li> </ol>	MEPU and MFEPD (with support from BM)
<ul> <li>Data obtained from Statistics Mauritius</li> <li>Data collected through surveys by CEB</li> <li>Data collected through surveys by MARENA and CIDB</li> </ul>	<ol> <li>Statistics Mauritius</li> <li>CEB</li> <li>MARENA, CIDB, BM</li> </ol>

Table A7: MRV Parameters and Institutional Responsibilities for the EI Sub-Sector

## A3.3.2. Transport

#### A3.3.2.1. Organisational Structure

As shown in Figure A8, A9 and A10, the transport subsector is subdivided into three broad types of travel, namely: (i) aviation (domestic) (ii) land and (iii) maritime (domestic).As far as mitigation planning is concerned, aviation and maritime travel are restricted to domestic needs - i.e. travel between Mauritius, Rodrigues and other Outer Islands. Since the modes of transport and technology implications vary significantly between the three types of travel, the implementation of the processbased sectoral guidance given in Section 3.2 is better carried out in travel-mode-specific TWGs. Also, the three sub- sectors fall under different institutions regarding policy planning, implementation, and monitoring and evaluation. Consequently, a TWG is proposed for each transportation sub-sector. Each TWG may decide to establish ad hoc sub-TWGs to work on any technical issues that are material to the planning, implementation, monitoring, and reporting process (Figure A4).

The structure of the land transport TWG (LT-TWG) is shown in **Figure A9**. It is proposed that the LT-TWG be chaired by the representative of the MLTLR to the CCC.



Figure A8. Organisational Structure for Aviation.

The organisational structure for the aviation TWG (Av-TWG) is shown in **Figure A8**. The Av-TWG will be chaired by the representative of the Prime Minister's Office (External Communications Division, ECD) to the CCC.



Figure A9. Organisational Structure for Land Transport

The organizational structure for the maritime transport TWG (MT-TWG) is shown in Figure A10. The MT-TWG willbe chaired by the representative of the MBEMRFS (Shipping Division) to the CCC. Maritime transport will cover only domestic transport of passengers and cargo to Rodrigues and the outer islands, and will not cover fishing vessels operating in the exclusive economic zone of the Republic of Mauritius.



Figure A10. Organisational Structure for Maritime Transport.

The duties and responsibilities of each institution asfar as mitigation planning, implementation, monitoring, and evaluation are concerned are listed in **Table A8**. Additional technical considerations regarding the MRV system for monitoring the implementation of mitigation actions and the support needed and received are discussed in subsection A3.3.2.2.

INSTITUTION(S)	ROLES AND RESPONSIBILITIES
	LAND TRANSPORT
Ministry of Land Transport and Light Rail (MLTLR)	<ul> <li>Overall responsibility for the formulation, implementation, and monitoring &amp; evaluation of climate change mitigation policy, strategy, and actions related to land transport;</li> <li>Carry out mitigation scenario analyses based on inputs from technical bodies operating under its aegis;</li> <li>Carry out TNA for decarbonisation of land transport;</li> <li>Preside over the proceedings of the LT-TWG, as well as providing the Secretariat for the LT-TWG; and</li> <li>Thematic Owner of land transport data (GHG and non-GHG, and support needed and received) reported on the MauNDC Registry by the ministry and all technical bodies operating under it.</li> </ul>
National Land Transport Authority (NLTA)	<ul> <li>Thematic Contributor of data used for the modelling of mitigation scenarios as listed in <b>Table A9</b>. In particular, the number of registered vehicles differentiated by type; annual distance travelled by different types of vehicles; the fuel economy of vehicles; passenger ridership on public modes of transportation; and</li> <li>Identify the support needed for data collection.</li> </ul>
Traffic Management and Road Safety Unit (TMRSU)	<ul> <li>Responsible for identifying and prioritising methods of traffic decongestion and the resulting fuel savings and GHG emissions reductions;</li> <li>Identify the support needed for developing and implementing traffic decongestion measures, including data collection; and</li> <li>Thematic Contributor of data for mitigation actions related to traffic decongestion.</li> </ul>
Metro Express Ltd. (MEL)	<ul> <li>Responsible for modelling the modal shift from public and private land transport to the trail system;</li> <li>Identify the support needed for data collection; and</li> <li>Thematic Contributor of data related to land transport by light rail.</li> </ul>
Central Electricity Board (CEB)	• Responsible for integrating all electricity demand requirements arising from the electrification of land transport through the adoption of electric vehicles and light rail systems.
Ministry of National Infrastructure and Community Development (Mechanical Engineering Section) – MNICD (MES)	<ul> <li>Ensure that all Government vehicles are properly maintained, and the fleet is economically and sustainably managed; and</li> <li>Support the adoption of electric vehicles by public institutions through the development of technical specifications for Electric Cars and Electric Sports Utility Vehicles on which Government decisions are informed.</li> </ul>
State Trading Corporation (STC)	• STC, as a trading arm of the Government, has the responsibility for the importation of essential commodities, including petroleum products.
Bus operators	<ul> <li>Implementation of mitigation actions related to the electrification of buses and the adoption of low-carbon fuels; and</li> <li>Provide data to the NLTA on parameters such as: annual passenger ridership for assigned routes; fuel economy of buses by type of technology; total annual amount of liquid fuel consumed; annual distance travelled for assigned routes.</li> </ul>
	MARITIME TRANSPORT
Ministry of Blue Economy, Marine Resources, Fisheries and Shipping (MBEMRFS, Shipping Division)	<ul> <li>Responsible for developing a low-carbon strategy and action plan for domestic maritime travel;</li> <li>Preside over the proceedings of the MT-TWG, as well as providing the Secretariat for the MT-TWG; and</li> <li>Thematic Owner of maritime travel data (GHG and non-GHG, and support needed and received) reported on the MauNDC Registry by the ministry and all technical bodies operating under it.</li> </ul>
Mauritius Ports Authority (MPA)	<ul> <li>Responsible for providing the port infrastructure necessary to implement the low-carbon development strategy and action plan;</li> <li>Identify and prioritise mitigation actions in the ports of Mauritius under the Green Ports Initiative;</li> <li>Thematic Contributor of data related to mitigation actions in the ports of Mauritius; and</li> <li>Identify the support needed for implementing mitigation actions and for collecting data.</li> </ul>
Mauritius Shipping Corporation Ltd. (MSCL)	<ul> <li>Contribute to the process of elaborating a mitigation strategy and action plan for domestic maritime travel; and</li> <li>Thematic Contributor of data related to domestic maritime travel.</li> </ul>
Prime Minister's Office (External Communications Division, ECD)	Contribute to the process of elaborating a mitigation strategy and action plan for domestic maritime travel;
State Trading Corporation (STC)	• STC, as a trading arm of the Government, has the responsibility for the importation of essential commodities, including petroleum products.

INSTITUTION(S)	ROLES AND RESPONSIBILITIES
	AVIATION
Prime Minister's Office (External Communications Division, ECD)	• Overall responsibility for the formulation, implementation, and monitoring & evaluation of climate change mitigation policy, strategy, and actions related to domestic aviation:
	<ul> <li>Carry out mitigation scenario analyses based on inputs from technical bodies operating under its aegis;</li> </ul>
	• Preside over the proceedings of the Av-TWG, as well as providing the Secretariatfor the Av-TWG; and
	<ul> <li>Thematic Owner of domestic aviation data (GHG and non-GHG, and supportneeded and received) reported on the MauNDC Registry by the PMO and alltechnical bodies operating under it (Table A9).</li> </ul>
Department of Civil Aviation (DCA)	<ul> <li>Carry out TNA for decarbonisation of domestic aviation (However since DCA does not have the required resources to undertake the TNA, this responsibility to be assigned to MRIC and/or tertiary instutitutions)</li> </ul>
	• Contribute to the process of developing a low-carbon development strategy and action plan for domestic aviation; and
	• Thematic Contributor of domestic aviation data (GHG and non-GHG).
Air Mauritius Ltd.	<ul> <li>Contribute to the process of developing a low-carbon development strategy and action plan for domestic aviation;</li> <li>Implement the mitigation strategy and actions through the adoption of low-carbon</li> </ul>
	technologies / options; and • Thematic Contributor of data related to domestic aviation, as listed in <b>Table A9</b> .
Airports of Mauritius Ltd. (AML)	• Responsible for providing the necessary airport infrastructure to implement the mitigation strategy for domestic aviation.
State Trading Corporation (STC)	• STC, as a trading arm of the Government, has the responsibility for the importation of essential commodities, including petroleum products.
Tertiary Education and Scientific Research Division (TESRD) [Ministry of Education, Tertiary Education,	<ul> <li>As the main policy organ of METEST for supporting scientific research, the TESRDwill be responsible for ensuring that the appropriate universities are invited to participate in the TWG in order to:</li> <li>Carry out applied research that can be used to overcome barriers to the adoption of</li> </ul>
Science and Technology (METEST)]	<ul><li>Iow-carbon technologies and fuels in transportation;</li><li>Carry out research on scenario modelling for low-carbon development, including</li></ul>
	<ul> <li>mitigation and macroeconomic analyses; and</li> <li>Develop and provide training modules / courses on alternative approaches to low- carbon transportation, as well as on relevant technologies and fuels.</li> </ul>
Business Mauritius (BM)	• BM is the apex body representing the private sector in Mauritius, and it promotes Sustainability and Inclusive Growth for business; and
	<ul> <li>Given its central position in the business landscape, BM has the capacity:</li> <li>→ to gather and make available quantitative and qualitative information with regards to project implementation of mitigation actions:</li> </ul>
	→ to coordinate analysis and research with universities and other agencies, suchas the UN in order to provide pragmatic real-life' case studies
	$\rightarrow$ to support coordination among the private sector for any data collection; and $\rightarrow$ to implement and co-fund projects to fill the gaps in our mitigation plans.
Mauritius Research and Innovation Council	<ul> <li>Provide financial support for research projects on low-carbon development in the Transport sub-sector as a priority; and</li> </ul>
(MRIC)	<ul> <li>Partner with different ministries on innovative low-carbon projects by providingsupport and seeking funds through the National Resilient Fund.</li> </ul>
Department of Climate	<ul> <li>Overall responsibility for ensuring that long-term mitigation strategies and actionsare formulated for Transport as a priority;</li> <li>Support institutional stakeholders to understand the reporting requirements under the</li> </ul>
	global climate governance, namely the Paris Agreement; • Provide support to institutional stakeholders on the use of the MauNDC Registry;
	<ul> <li>Provide technical support to institutions related to mitigation scenario modelling;</li> <li>Provide technical support to institutions for carrying out TNA for mitigation inTransport;</li> </ul>
	<ul> <li>Provide technical support to institutions for identifying support needed and received.</li> </ul>

Table A8: Roles and Responsibilities of Institutions in Transport Sub-Sector Differentiated by Mode of Travel

## A3.3.2.2. MRV System (Transport Sub-Sector)

The MRV system indicates the roles of different institutions in the collection and validation of the different parameters that need to be measured in order to carry out mitigation scenario analyses of mitigation strategies and actions and to monitor the implementation of mitigation actions. **Table A9** provides the structure of the MRV system for Transport covering both activity parameters for mitigation analyses, support needed and received, and sustainable development benefits.

ITEM	PARAMETER	UNITS	REMARKS RESPO	ONSIBILITY
		LAND TRAN	SPORT	
Passenger Mobility	Average annual distance travelled by different types of passenger vehicles (e.g. two- wheelers, cars, buses, DPVs) and broken down by fuel type (e.g. LPG, gasoline, diesel, hybrid, electric)	km per year	This has to be carried out through sampling and is a parameter that may be collected by the roadworthiness test centres.	NLTA
	Average occupancy of different types of passenger vehicles, broken down by fuel type	Number of passengers	Data should be measured through surveys.	NLTA
	Average fuel consumption of different types of passenger vehicles, broken down by fuel type	L fuel per 100km travelled	Data should be measured through surveys using the methodology adopted by the Global Fuel Economy Initiative (GFEI) project.	NLTA
	Number of registered passenger vehicles, broken down by fuel type	Number of passenger vehicles	Although these data are not used in the model, they can nevertheless be used to carry out cross-verification of the model output.	NLTA
	NCV of each type of fuel used in vehicles	GJ/tonne fuel	Uses IPCC default values, or can use laboratory data from national authorities (preferred).	NLTA
	Emission factor of each type of fuel used in passenger vehicles	tCO <sub>2</sub> /GJ	Uses IPCC default values, or can use Tier 2 factors when available.	NLTA
Freight Mobility	Average annual distance travelled by freight vehicles (diesel or gasoline)	Km per year	This has to be carried out through sampling and is a parameter that may be collected by the road worthiness test centres. Although not used in the model, it will be useful to collect data by categorising freight vehicles by tare or maximum load.	NLTA
	Average load of freight carried by vehicles	t	Data should be measured through surveys.	NLT
A\ fre	verage fuel consumption of eight vehicles	L fuel per 100km travelled	Data should be measured through surveys using methodology adopted by the Global Fuel Economy Initiative (GFEI) project. Data can also be collected for different types of freight vehicles classified by tare.	NLTA
	Number of registered freight vehicles by fuel type and size of vehicles (e.g. tare or maximum load)	Number of freight vehicles	Although these data are not used in the model, they can nevertheless be used to carry out cross verification of the model output.	NLTA
	Net calorific value (NCV) of each type of fuel used in vehicles	GJ/tonne fuel	Uses IPCC default values or can use laboratory data from national authorities (preferred).	NLTA
	Emission factor of each type of fuel used in passenger vehicles	tCO <sub>2</sub> /GJ	Uses IPCC default values or can use Tier 2 factors when available.	

ITEM	PARAMETER	UNITS	REMARKS	<b>RESPON-</b>
				SIBILITY
	L	AND TRANS	PORT	
Passenger Mobility	Average annual distance travelled by different types of passenger vehicles (e.g. two- wheelers, cars, buses, DPVs) and broken down by fuel type (e.g. LPG, gasoline, diesel, hybrid, electric)	km per year	This has to be carried out through sampling and is a parameter that may be collected by the roadworthiness test centres.	NLTA
	Average occupancy of different types of passenger vehicles, broken down by fuel type	Number of passengers	Data should be measured through surveys.	NLTA
	Average fuel consumption of different types of passenger vehicles, broken down by fuel type	L fuel per 100km travelled	Data should be measured through surveys using the methodology adopted by the Global Fuel Economy Initiative (GFEI) project.	NLTA
	Number of registered passenger vehicles, broken down by fuel type	Number of passenger vehicles	Although these data are not used in the model, they can nevertheless be used to carry out cross-verification of the model output.	NLTA
	NCV of each type of fuel used in vehicles	GJ/tonne fuel	Uses IPCC default values, or can use laboratory data from national authorities (preferred).	NLTA
	Emission factor of each type of fuel used in passenger vehicles	tCO <sub>2</sub> /GJ	Uses IPCC default values, or can use Tier 2 factors when available.	NLTA
Freight Mobility	Average annual distance travelled by freight vehicles (diesel or gasoline)	Km per year	This has to be carried out through sampling and is a parameter that may be collected by the road worthiness test centres. Although not used in the model, it will be useful to collect data by categorising freight vehicles by tare or maximum load.	NLTA
	Average load of freight carried by vehicles	t	Data should be measured through surveys.	NLTA
	Average fuel consumption of freight vehicles	L fuel per 100km travelled	Data should be measured through surveys using methodology adopted by the Global Fuel Economy Initiative (GFEI) project. Data can also be collected for different types of freight vehicles classified by tare.	NLTA
	Number of registered freight vehicles by fuel type and size of vehicles (e.g. tare or maximum load)	Number of freight vehicles	Although these data are not used in the model, they can nevertheless be used to carry out cross verification of the model output.	NLTA
	Net calorific value (NCV) of each type of fuel used in vehicles	GJ/tonne fuel	Uses IPCC default values or can use laboratory data from national authorities (preferred).	NLTA
	Emission factor of each type of fuel used in passenger vehicles	tCO <sub>2</sub> /GJ	Uses IPCC default values or can use Tier 2 factors when available.	NLTA
Aggregate Fuel Statistics	Quantity of total annual fuel consumed in land transport by fuel type	t per year	This data is already available at Statistics Mauritius. It is used in the model for carrying out the energy balance and for tracking overall national GHG emissions.	Statistics Mauritius

ITEM	PARAMETER	UNITS	REMARKS	RESPONSI- BILITY	
	L	AND TRANS	PORT		
Peak traffic decongestion	Travel distance for each decongested area	km	Data obtained from TMRSU	TMRSU	
-	Improved fuel economy of different models of transport in decongested areas (relative to baseline)	%	Data obtained from TMRSU	TMRSU	
	Number and type of vehicles transiting through demarcated areas	Number of passenger and freight vehicles	Data obtained from TMRSU	TMRSU	
Support needed and received	<u>Support needed</u> 1. Finance 2. Technology transfer 3. Capacity building	1. US\$ 2. Types of technology 3. Type of training needed for mainstreaming climate change mitigation	<ol> <li>Obtained from investment plans accompanying a land transport mitigation strategy and action plan</li> <li>Obtained from TNA</li> <li>Obtained from TNA and institutional gaps and need analyses</li> </ol>	MLTLR (with support from TMRSU, NLTA, BM and MEL)	
	Support received 1. Finance 2. Technology transfer 3. Capacity building	1. US\$ 2. Number and type of technology transferred 3. Number of persons receiving training (gender disaggregated)	<ol> <li>Public and private investments in land transport mitigation actions</li> <li>Obtained from project reports on technology transfer collated by MLTLR</li> <li>Obtained from training reports collated by MLTLR</li> </ol>	MLTLR and MFEPD (with support from BM)	
Sustainable development benefits	<ol> <li>Reduced costs of energy imports</li> <li>Number of hybrid and electric (and other low-carbon) vehicles in both public and private transport</li> <li>Number of commuters using public transport</li> <li>Travel time at peak time for pre-identified journeys</li> </ol>	<ol> <li>US\$/year</li> <li>Number</li> <li>Number of persons (gender differentiated)</li> <li>minutes</li> </ol>	<ol> <li>Data obtained from Statistics Mauritius</li> <li>Data collected by NLTA</li> <li>Data collected through surveys by MLTLR</li> <li>Data collected through surveys and drones</li> </ol>	<ol> <li>Statistics Mauritius</li> <li>NLTA</li> <li>MLTLR</li> <li>TMRSU</li> </ol>	

		MARITIME TRANSI	PORT	
Energy efficiency in maritime	Average annual distance travelled by ships Average load of freight	Km per year t	Data obtained from shipping operators Data obtained from	MSCL MSCL
travel, Including fuel switch	carried by ships		snipping operators	
	Average fuel consumption of ships	L fuel per 100km travelled	Data obtained from shipping operators	MSCL
	Net calorific value (NCV) of each type of fuel used in ships	GJ/tonne fuel	Uses IPCC default values or can use laboratory data from national authorities (preferred).	MSCL
	Emission factor of each type of fuel used by ships	tCO <sub>2</sub> /GJ	Uses IPCC default values or can use Tier 2 factors when available	MSCL (for Tier 2)
	Quantity of total annual	t per year	Data obtained from	MSCL
	fuel consumed in maritime transport by fuel type		shipping operators	
Support needed and received	Support needed 1. Finance 2. Technology transfer 3. Capacity building	<ol> <li>US\$</li> <li>Type of technology</li> <li>Type of training needed for mainstreaming climate change mitigation</li> </ol>	<ol> <li>Obtained from investment plans accompanying a maritime transport mitigation strategy and action plan</li> <li>Obtained from TNA</li> <li>Obtained from TNA and institutional gaps and need analyses</li> </ol>	MBEMRFS, Shipping Division (with support from MSCL, BM and MPA)
	Support received 1. Finance 2. Technology transfer 3. Capacity building	<ol> <li>US\$</li> <li>Number and type of technology transferred</li> <li>Number of persons receiving training (gender disaggregated)</li> </ol>	<ol> <li>Public and private investments in maritime transport mitigation actions</li> <li>Obtained from project reports on technology transfer collated by MBEMRFS</li> <li>Obtained from training reports collated by MBEMRFS</li> </ol>	MBEMRFS and MFEPD (with support from BM)
Sustainable development benefits	<ol> <li>Reduced costs of energy imports</li> <li>Number of hybrid and electric (and other low- carbon) vehicles adopted in maritime travel</li> </ol>	1. US\$/year 2. Number	<ol> <li>Data obtained from Statistics Mauritius</li> <li>Data obtained from MSCL and MPA</li> </ol>	1. Statistics Mauritius 2. MSCL / MPA

		A۱	/IATION	
Energy efficiency in domestic air travel, including	Average occupancy of different types of aeroplanes and broken down by fuel type	Number of passengers	Data obtained from aviation operator	Air Mauritius Ltd.
fuel switch	Average annual distance travelled by aeroplanes	Km per year	Data obtained from aviation operator	Air Mauritius Ltd.
	Average load of freight carried by aeroplanes	t	Data obtained from aviation operator	Air Mauritius Ltd.
	Average fuel consumption of aeroplanes	L fuel per 100km travelled	Data obtained from aviation operator	Air Mauritius Ltd.
	Net calorific value (NCV) of each type of fuel used in aeroplanes	GJ/tonne fuel	Uses IPCC default values, or can use laboratory data from national authorities (preferred).	Air Mauritius Ltd.
	Emission factor of each type of fuel used by aeroplanes	tCO <sub>2</sub> /GJ	Uses IPCC default values or can use Tier 2 factors when available	Air Mauritius Ltd (for Tier 2)
	Quantity of total annual fuel consumed in domestic aviation by fuel type	t per year	Data obtained from aviation operator	Air Mauritius Ltd
Support	Support needed			DCA (With support from AML,
Needed and received	<ol> <li>Finance</li> <li>Technology transfer</li> <li>Capacity building</li> </ol>	1. US\$ 2. Types of technology 3. Type of training needed for mainstreaming climate change mitigation	<ol> <li>Obtained from investment plans accompanying the domestic aviation mitigation strategy and action plan</li> <li>Obtained from TNA</li> <li>Obtained from TNA and institutional gaps and need analyses</li> </ol>	BMand Air Mauritius Ltd.)
	Support received 1. Finance 2. Technology transfer 3. Capacity building	1. US\$ 2. Number and type of technology transferred 3. Number of persons receiving training (gender disaggregated)	<ol> <li>Public and private investments in domestic aviation mitigation actions</li> <li>Obtained from project reports on technology transfer collated by DCA</li> <li>Obtained from training reports collated by DCA</li> </ol>	
Sustainable development benefits	<ol> <li>Reduced costs of energy imports</li> <li>Energy intensity of domestic air travel</li> </ol>	1. US\$/year 2. tonne of fuel per 1000 passenger km	<ol> <li>Data obtained from Statistics Mauritius</li> <li>Data obtained from domestic operators</li> </ol>	<ol> <li>Statistics Mauritius</li> <li>Air Mauritius Ltd.</li> </ol>

Table A9: MRV Parameters and Institutional Responsibilities for the Transport Sub-Sector

## A3.3.3. Solid Waste Management

#### A3.3.3.1. Organisational Structure

The institutional arrangement shown in **Figure A11** is proposed for SWM. The structure, thereafter called the Solid Waste Management (SWM) TWG [SWM-TWG], is proposed to be chaired by the representative of the MESWMCC (SWM) to the Climate Change Committee (CCC).



Figure A11. Organisational Structure for Solid Waste Management.

The duties and responsibilities of each institution asfar as mitigation planning, implementation, monitoring, and evaluation are concerned are listed in **Table A10**. Additional technical considerations regarding the MRV system for monitoring the implementation of mitigation actions and the support needed and received are discussed in subsection A3.3.3.2.

INSTITUTION(S)	ROLES AND RESPONSIBILITIES
Ministry of Environment, Solid Waste Management, and Climate Change	<ul> <li>Overall responsibility for proposing and developing climate change mitigation policy, strategy, and actions related to integrated SWM;</li> <li>Preside over the proceedings of the SWM-TWG, and provide a Secretariat for the proceedings; and</li> </ul>
(MESWMCC - SWM)	• Thematic Owner of data (GHG and non-GHG, and support needed and received)reported on the MauNDC Registry for SWM.
Department of Waste Management and Resource Recovery (DWMRR) <sup>46</sup>	<ul> <li>Overall responsibility for integrating climate change mitigation in policymaking with respect to SWM and the adoption of the concept of circularity in waste management;</li> <li>Developing mitigation scenarios for alternative SWM options based on TNA;</li> <li>Identify the support needed and received for implementing a mitigation strategy and actions for SWM;</li> <li>Provider of data ( from transfer stations&amp; landfill) to DWMRR on solid waste collection and disposal by waste streams</li> <li>Thematic Contributor of data (GHG and non-GHG, and support needed and received) reported on the MauNDC Registry for SWM as per Table A11.</li> </ul>
Ministry of Energy and Public Utilities (MEPU)	<ul> <li>Responsible for integrating waste-to-energy in the overall policy, strategy, and action plan for the Energy Industries.</li> </ul>
Central Electricity Board (CEB)	Responsible for integrating waste-to-energy options in the Integrated Electricity Plan.
Ministry of Local Government and Disaster Risk Management (MLGDRM), and Local Authorities (LAs)	<ul> <li>Responsible for putting in place the necessary logistics and any related infrastructure for the collection and transport of solid waste.</li> </ul>
Private operators	<ul> <li>Responsible for investing in the necessary infrastructure and logistics for the collection and transport of solid waste and the management of transfer stations and the engineeredlandfill at Mare Chicose;</li> <li>Responsible for investments in low-carbon solid waste management, such as composting, landfill gas capture, and waste-to-energy, among others; and</li> <li>Provider of data to DWMRM on solid waste collection and disposal by waste streams.</li> </ul>
Business Mauritius (BM)	<ul> <li>BM is the apex body representing the private sector in Mauritius, and it promotes Sustainability and Inclusive Growth for businesses; and</li> <li>Given its central position in the business landscape, BM has the capacity:</li> <li>→ to gather and make available quantitative and qualitative information with regards to project implementation of mitigation actions;</li> <li>→ to coordinate analysis and research with universities and other agencies, such as the UN in order to provide pragmatic real-life' case studies</li> <li>→ to support coordination among the private sector for any data collection; and</li> <li>→ to implement and co-fund projects to fill the gaps in our mitigation plans.</li> </ul>
Tertiary Education and Scientific Research Division (TESRD)	As the main policy organ of METEST for supporting scientific research, the TESRD will be responsible for ensuring that the appropriate universities are invited to participate in the TWG in order to:
[Ministry of Education, Tertiary Education, Science, and Technology (METEST)]	<ul> <li>Carry out applied research that can be used to overcome barriers to the adoption of low-carbon solid waste management technologies and processes within the ambit of acircular waste economy;</li> <li>Carry out research on scenario modelling for low-carbon development, including mitigation and macroeconomic analyses; and</li> </ul>
	Develop and provide training modules / courses on low-carbon processing of solid wastes.
Mauritius Research and Innovation Council (MRIC)	Provide financial support for research projects on low-carbon development in SWM; and Partner with different ministries on innovative low-carbon projects by providing support and seeking funds through the National Resilient Fund.
Department of Climate Change (DCC)	<ul> <li>Overall responsibility for ensuring that long-term mitigation strategies and actions are formulated for SWM;</li> <li>Support institutional stakeholders to understand the reporting requirements under the global</li> <li>climate governance, namely the Paris Agreement;</li> <li>Provide support to institutional stakeholders on the use of the MauNDC Registry;</li> <li>Provide technical support to institutions related to mitigation scenario modelling;</li> <li>Provide technical support to institutions for carrying out TNA for mitigation in SWM; and Devide technical support to institutions for carrying out TNA for mitigation in SWM; and</li> </ul>
	• Provide technical support to institutions for identifying support needed and received.

Table A10: Roles and Responsibilities of Institutions in Solid Waste Management

46 As provision under The Waste Management and Resource Recovery Act 2023 (Legal Supplement to the Government Gazette of Mauritius no. 32 of April 20, 2023, pg. 11); formerly the Solid Waste Management Division (SWMD

#### A3.3.3.2. MRV System (Solid Waste Management)

The MRV system indicates the roles of different institutions in the collection and validation of the different parameters that need to be measured in order to carry out mitigation scenario analyses of mitigation strategies and actions and to monitor the implementation of mitigation actions. **Table A11** provides the structure of the MRV system for Solid Waste Management covering both activity parameters for mitigation analyses, support needed and received, and sustainable development benefits.

ITEM	PARAMETER	UNITS	REMARKS	RESPON-
				SIBILITY
Avoided methane	Population (annual)	Number of persons	Population given by Mauritius Statistics	Statistics Mauritius
from landfill	Composition of waste	%	Waste characterisation data from DWMRR	DWMRR
	Quantity of MSW generated	Kg (or equivalent)	Data obtained from DWMRR using QA systems in place at transfer stations and landfills	DWMRR
	Quantity of industrial waste	Kg (or equivalent)	Data obtained from DWMRR using QA systems in place at landfills	DWMRR
	Quantity of waste diverted from landfills for alternative uses (e.g. recycling, composting, and waste-to- energy)	Kg (or equivalent)	Data from DWMRR through contractual agreements with private operators and using the QA system at transfer stations	DWMRR
	LFG capture (either for flaring or electricity generation)	Kg CH <sub>4</sub> (or equivalent units)	Data provided by the private operator at the landfill	DWMRR
	Degradable Organic Carbon (DOC) in various types of solid waste	Dimensionless	Data obtained from solid waste characterisation	DWMRR
	Fraction of DOC (DOCf)	Dimensionless	Data obtained from solid waste characterisation	DWMRR
	Emission factor	Dimensionless	Uses IPCC default values	DWMRR
Support needed and received	Support needed 1. Finance 2. Technology transfer 3. Capacity building	<ol> <li>US\$</li> <li>Types of technology</li> <li>Type of training needed for mainstreaming climate change mitigation</li> </ol>	<ol> <li>Obtained from investment plans accompanying the SWM mitigation strategy and action plan</li> <li>Obtained from TNA</li> <li>Obtained from TNA and institutional gaps and need analyses</li> </ol>	DWMRR (with support from LAs, BM and private operators)
	Support received 1. Finance 2. Technology transfer 3. Capacity building	<ol> <li>US\$</li> <li>Number and type of technology transferred</li> <li>Number of persons trained (gender disaggregated)</li> </ol>	<ol> <li>Public and private investments in SWM mitigation actions</li> <li>Obtained from project reports on technology transfer collated by DWMRR</li> <li>Obtained from training reports collated by DWMRR</li> </ol>	DWMRR and MFEPD (with support from BM)
Sustainable development benefits	<ol> <li>Energy produced from solid waste management</li> <li>Quantity and types of waste recycled and/or treated for environmentally sound disposal</li> <li>Jobs created in the circular waste economy</li> </ol>	<ol> <li>MWH/year</li> <li>tonne</li> <li>Number of jobs</li> </ol>	<ol> <li>Data obtained from Statistics Mauritius</li> <li>Data obtained from DWMRR</li> <li>Data obtained through surveys carried out by Statistics Mauritius and/or DWMRR</li> </ol>	<ol> <li>Statistics Mauritius</li> <li>DWMRR</li> <li>Statistics Mauritius / DWMRR / BM</li> </ol>

Table A11: MRV Parameters and Institutional Responsibilities for Solid Waste Management

## A3.3.4. Waste Water Management

#### A3.3.4.1. Organisational Structure

The institutional arrangement shown in **Figure A12** is proposed for Wastewater Management (WM). The structure, thereafter called the Wastewater Management (WM) TWG [WM-TWG], is proposed to be chaired by the representative of the MEPU to the Climate Change Committee (CCC).



Figure A12. Organisational Structure for Wastewater Management.

The duties and responsibilities of each institution asfar as mitigation planning, implementation, monitoring, and evaluation are concerned are listed in **Table A12**. Additional technical considerations regarding the MRV system for monitoring the implementation of mitigation actions and support needed and received are discussed in subsection A3.3.4.2.

INSTITUTION(S)	ROLES AND RESPONSIBILITIES
Wastewater Management Authority (WMA)	<ul> <li>Overall responsibility for the identification and prioritisation of mitigation technologies for Wastewater Management that will be integrated into the Wastewater Management policyand strategy;</li> </ul>
	<ul> <li>Developing mitigation scenarios for alternative WM options based on TNA;</li> <li>Identify the support needed and received for implementing a mitigation strategy and actions for wastewater management;</li> </ul>
	• Preside over the proceedings of the WM-TWG, as well as providing the Secretariat for the WM-TWG; and
	on the MauNDC Registry for WM.
Ministry of Energy and Public Utilities (MEPU)	<ul> <li>Responsible for Wastewater Management policy planning; and</li> <li>Thematic Owner of data to be reported in the MauNDC Registry for WM.</li> </ul>
Central Electricity Board (CEB)	<ul> <li>Responsible for integrating energy recovery for electricity production from WM options in the Integrated Electricity Plan.</li> </ul>
Utilities Regulatory Authority (URA)	• Responsible for establishing tariffs and the enabling regulatory environment for the promotion of mitigation technologies in WM; and
	Responsible for Technical Regulations in the sector.
Tertiary Education and Scientific Research Division (TESRD) [Ministry of Education, Tertiary Education, Science, and Technology (METEST)]	<ul> <li>As the main policy organ of METEST for supporting scientific research, the TESRD will be responsible for ensuring that the appropriate universities are invited to participate in the TWG in order to:</li> <li>Carry out applied research that can be used to overcome barriers to the adoption of innovative, low-carbon waste water treatment technologies;</li> <li>Carry out research on scenario modelling for low-carbon development, including mitigation and macroeconomic analyses; and</li> <li>Develop and provide training modules / courses on low-carbon waste water treatment processes.</li> </ul>
Mauritius Research and Innovation Council (MRIC)	<ul> <li>Provide financial support for research projects on low-carbon development in WM; and</li> <li>Partner with different ministries on innovative low-carbon projects by providing support and seeking funds through the National Resilient Fund.</li> </ul>
Department of Climate Change	Overall responsibility for ensuring that long-term mitigation strategies and actions are formulated for /M:
(DCC) • S	upport institutional stakeholders to understand the reporting requirements under the global climate overnance, namely the Paris Agreement;
• P	rovide support to institutional stakeholders on the use of the MauNDC Registry;
• P	rovide technical support to institutions related to mitigation scenario modelling;
• P	rovide technical support to institutions for carrying out TNA for mitigation in WM; and
• P	rovide technical support to institutions for identifying support needed and received.
	Table A12: Roles and Responsibilities of Institutions in Wastewater Management

## A3.3.4.2. MRV System (Wastewater Management)

The MRV system indicates the roles of different institutions in the collection and validation of the different parameters that need to be measured in order to carry out mitigation scenario analyses of mitigation strategies and actions and to monitor the implementation of mitigation actions. **Table A13** provides the structure of the MRV system for Wastewater Management covering both activity parameters for mitigation analyses, support needed and received, and sustainable development benefits.

ITEM	PARAMETER	UNITS	REMARKS	RESPONSIBILITY
Avoided methane from Wastewater	Population (annual) connected to different systems (sewer and non- sewer)	Number of persons	Estimation provided by WMA; Statistics Mauritius (non-sewer connections)	WMA
Management	Population (annual)	Number of persons	Data provided by Statistics Mauritius	Statistics Mauritius
	Per capita protein intake (annual)	kgN/person/year	Statistics obtained from the Food and Agricultural Organisation	WMA
	Biochemical Oxygen Demand (BOD) of wastewater connected to different systems	mg/l	Laboratory measurements carried out by WMA	WMA
	Quantity of industrial wastewater connected to sewer	Multiplication factor	Data provided by WMA or using the IPCC default value	
	Utilisation fraction of different WM treatment technologies	Dimensionless	Data provided by WMA	WMA
	Emission factor of different WM treatment technologies	Kg CH₄ / Kg BOD	Default value of the IPCC	WMA
	CH4 capture (either for flaring or electricity generation)	Kg CH₄ (or equivalent units)	Data provided by WMA	WMA
	Quantity of sludge recovered from wastewater treatment	kg (or equivalent)	Data obtained from the WMA	WMA
Support	Support needed			WMA
needed and received	<ol> <li>Finance</li> <li>Technology transfer</li> <li>Capacity building</li> </ol>	<ol> <li>US\$</li> <li>Types of technology</li> <li>Type of training needed for mainstreaming climate change mitigation</li> </ol>	<ol> <li>Obtained from investment plans accompanying the WM mitigation strategy and action plan</li> <li>Obtained from TNA</li> <li>Obtained from TNA and institutional gaps and paod apolyzoo.</li> </ol>	
	Support received 1. Finance 2. Technology transfer 3. Capacity building	<ol> <li>US\$</li> <li>Number and type of technology transferred</li> <li>Number of persons trained (gender disaggregated)</li> </ol>	<ol> <li>Public and private investments in WM mitigation actions</li> <li>Obtained from project reports on technology transfer collated by WMA</li> <li>Obtained from training reports collated by WMA</li> </ol>	WMA and MFEPD
Sustainable development benefits	<ol> <li>Amount of treated sludge and methane recovered</li> <li>Energy produced from waste water management</li> <li>Jobs created in the circular waste economy</li> </ol>	<ol> <li>tonne/year and tCH4/ year</li> <li>MWh/year</li> <li>Number of jobs</li> </ol>	<ol> <li>Data obtained from the WMA</li> <li>Data obtained from CEB and WMA</li> <li>Data obtained from the WMA</li> </ol>	WMA CEB / WMA WMA

 Table A13: MRV Parameters and Institutional Responsibilities for Wastewater Manageme

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## A3.3.5. Agriculture

#### A3.3.5.1. Organizational Structure

As shown in Figure A13, the agriculture sub-sector is subdivided into two broad categories, namely: (i) crops, and (ii) livestock. The 'crops' category can be further subdivided into 'food crops' and 'non-food crops'. Since the mitigation pathways for crops and livestock are significantly different in terms of both sources of GHG emissions and technologies, the implementation of the process-based sectoral guidance given in Section 3.2 will probably be carried out in sub-TWGs. For moreefficient and effective institutional coordination, it is proposed to establish an Agriculture (Ag) TWG [Ag- TWG] that can have two sub-TWGs as codified in FigureA13. It is proposed that the Ag-TWG be chaired by the representative of the MAIFS to the CCC. Sub-TWGs for crops and livestock can be chaired by the Food and Agricultural Research and Extension Institute (FAREI).



Figure A13. Organisational Structure for the Agriculture.

The duties and responsibilities of each institution asfar as mitigation planning, implementation, monitoring, and evaluation are concerned are listed in **Table A14**. Additional technical considerations regarding the MRV system for monitoring the implementation of mitigation actions and the support needed and received are discussed in subsection 3.3.5.2 (crops) and section A3.3.5.3 (livestock)

INSTITUTION(S)	ROLES AND RESPONSIBILITIES
Ministry of Agro-Industry and Food Security (MAIFS)	<ul> <li>Overall responsibility for the formulation, implementation, and monitoring &amp; evaluation of climate change mitigation policy, strategy, and actions related to agricultural production;</li> <li>Formulate mitigation scenario analyses based on inputs from technical bodies operating under its aegis;</li> <li>Oversee TNA for the decarbonisation of agriculture;</li> <li>Responsible for formulating the Biomass Framework (non-food crops) that will support the phase-out of coal in electricity production through the use of renewable biomass;</li> <li>Preside over the proceedings of the Ag-TWG, as well as providing theSecretariat for the Ag-TWG; and</li> <li>Thematic Owner of agriculture sector data (GHG and non-GHG, and support needed and received) reported on the MauNDC Registry by the ministry and all technical bodies operating under it.</li> </ul>
Food and Agricultural Research and Extension Institute, FAREI (food crops)	<ul> <li>Carry out TNA for the identification and prioritisation of low GHG emissions measures in food crop production;</li> <li>Identify the support needed for implementing low GHG emissions technologies in food crop production;</li> <li>Provide extension services to farmers in order to implement mitigation strategies in food crop production;</li> <li>Thematic Contributor of data used for the modelling of mitigation scenarios, as listed in Table A15; and</li> <li>Determine Tier 2 and Tier 3 emission factors (Table A15).</li> </ul>
Food and Agricultural Research and Extension Institute, FAREI (livestock)	<ul> <li>Carry out TNA for the identification and prioritisation of low GHG emissions measures in livestock production;</li> <li>Identify the support needed for implementing low GHG emissions technologies in livestock production;</li> <li>Provide extension services to farmers in order to implement mitigation strategies in livestock husbandry;</li> <li>Thematic Contributor of data used for the modelling of mitigation scenarios, as listed in Table A16; and</li> <li>Determine Tier 2 and Tier 3 emission factors for livestock waste management and enteric fermentation (Table A16).</li> </ul>
Ministry of Agro Industry and Food Security, MAIFS (Agricultural Services, AS)	<ul> <li>Contribute to the process of integrated low-carbon policy planning in the agriculture sector, especially related low-carbon (climate-resilient) agricultural practices; and</li> <li>Identification and adoption of low-carbon agricultural practices, crop species, and technologies.</li> </ul>
Irrigation Authority, IA	<ul> <li>Contribute to the process of integrated low-carbon policy planning in the agriculture sector, especially related to the provision of water for irrigation and related efficiency measures;</li> <li>Operating/upgrading of existing Public Sector Irrigation projects taking into account latest technologies geared towards water use efficiency and optimum use of energy in Agriculture.</li> <li>Identification and adoption of low-carbon water irrigation practices and technologies.</li> </ul>
Mauritius Cane Industry Authority (MCIA)	<ul> <li>Provider of data related to the availability of renewable biomass for electricity production; and</li> <li>Research and development of high-fibre cane varieties and trash components to increase non-food crop renewable biomass for electricity production, participate in the assessment of woody biomass for green energy production.</li> </ul>
Mauritius Chamber of Agriculture (MCA)	<ul> <li>Provide ideas and views on the formulation of low-carbon agricultural policies and strategies aimed at improving food security; and</li> <li>Provider of any relevant data (to the DCC) from its database of agricultural activities in Mauritius.</li> </ul>
Mauritius Chemical Fertiliser Industry (MCFI)	• Provider of data (to the DCC) on local production of chemical fertilisers by type of fertiliser used in agricultural production.

INSTITUTION(S)	ROLES AND RESPONSIBILITIES
Business Mauritius (BM)	<ul> <li>BM is the apex body representing the private sector in Mauritius, and it promotes Sustainability and Inclusive Growth for businesses; and</li> <li>Given its central position in the business landscape, BM has the capacity:         <ul> <li>to gather and make available quantitative and qualitative information with regards to project implementation of mitigation actions;</li> <li>to coordinate analysis and research with universities and other agencies, such as the UN in order to provide pragmatic real-life' case studies</li> <li>to support coordination among the private sector for any data collection; and → to implement and co-fund projects to fill the gaps in our mitigation plans.</li> </ul> </li> </ul>
Tertiary Education and Scientific Research Division (TESRD) [Ministry of Education, Tertiary Education, Science, and Technology (METEST)]	<ul> <li>As the main policy organ of METEST for supporting scientific research, the TESRD will be responsible for ensuring that the appropriate universities are invited to participate in the TWG in order to:</li> <li>Carry out applied research that can be used to overcome barriers for the transition to a low-carbon agricultural system;</li> <li>Carry out research on scenario modelling for low- emission agricultural production, including mitigation and macroeconomic analyses;</li> <li>Support FAREI in determining Tier 2 and Tier 3 emission factors in agricultural systems (Tables 15 and 16); and</li> <li>Develop and provide training modules / courses on low-carbon agricultural production.</li> </ul>
Department of Climate Change (DCC)	<ul> <li>Overall responsibility for ensuring that long-term mitigation strategies and actions are formulated for Agriculture;</li> <li>Support institutional stakeholders to understand the reporting requirements under the global climate governance, namely the Paris Agreement;</li> <li>Provide support to institutional stakeholders on the use of the MauNDC Registry;</li> <li>Provide technical support to institutions related to mitigation scenario modelling;</li> <li>Provide technical support to institutions for carrying out TNA for mitigation in Agriculture; and</li> <li>Provide technical support to institutions for identifying support needed and received</li> </ul>

Table A14: Roles and Responsibilities of Institutions in Agriculture

## A3.3.5.2. MRV System (Agriculture Crops)

The MRV system indicates the roles of different institutions in the collection and validation of the different parameters that need to be measured in order to carry out mitigation scenario analyses of mitigation strategies and actions and to monitor the implementation of mitigation actions. **Table A15** provides the structure of the MRV system for Agriculture (crops) covering both activity parameters for mitigation analyses, support needed and received, and sustainable development benefits.

ITEM	PARAMETER	UNITS	REMARKS	RESPONSIBILITY	
Reduction of nitrous oxide in agricultural production	Annual quantities of chemical fertiliser, manure, and crop residue	kgN/year	Estimation provided by FAREI and MCIA (Sugarcane)	FAREI; MCIA	
	Annual quantity of compost applied in agricultural production	tonne/year	Estimation provided by FAREI (and DWMRR, if compost is produced from municipal solid waste)	FAREI (DWMRR)	
	Quantities of urine and dung inputs to grazed soil	kgN/year	Estimated from livestock accounts obtained from FAREI	FAREI	IENTS CE
	Emission factors of each input mentioned above	kgN2O-N/kg N	Measurement of Tier 2 or Tier 3 data by FAREI (or IPCC default values)	FAREI	ARRANGEN GOVERNANC
	Fraction of synthetic fertiliser that volatilises	(kg NH₃- N+NOx-N)/ kg N	Measurement of Tier 2 or Tier 3 data by FAREI (or IPCC default values)	FAREI	
	Fraction of organic or dung that volatilises	(kg NH₃- N+NOx-N)/ kg N	Measurement of Tier 2 or Tier 3 data by FAREI (or IPCC default values)	FAREI	INSTITU
	Fraction N leached	kgN/Kg of N additions	Measurement of Tier 2 or Tier 3 data by FAREI (or IPCC default values)	FAREI	
	Emission factor N leached	kg N2O-N/kg N leached	Measurement of Tier 2 or Tier 3 data by FAREI (or IPCC default values)	FAREI	
	Emission factor of inputs volatilised	(kg N2O-N)/ kg(NH₃- N+NOx-N)	Measurement of Tier 2 or Tier 3 emission factors by FAREI (or IPCC default values)	FAREI	
Support needed and received	Support needed 1. Finance 2. Technology transfer 3. Capacity building	<ol> <li>US\$</li> <li>Types of technology</li> <li>Type of training needed for mainstreaming climate change mitigation</li> </ol>	<ol> <li>Obtained from investment plans accompanying Agriculture (crops) mitigation strategy and action plan</li> <li>Obtained from TNA</li> <li>Obtained from TNA and institutional gaps and need analyses</li> </ol>	MAIFS (with inputs from FAREI, BM and MCIA)	
	<u>Support received</u> 1. Finance 2. Technology transfer 3. Capacity building	<ol> <li>US\$</li> <li>Number         <ul> <li>and type of</li> <li>technology</li> <li>transferred</li> <li>Number</li> <li>of persons</li> <li>trained (gender</li> <li>disaggregated)</li> </ul> </li> </ol>	<ol> <li>Public and private investments in Agriculture (crops) mitigation actions</li> <li>Obtained from project reports on technology transfer collated by MAIFS</li> <li>Obtained from training reports collated by MAIFS</li> </ol>	MAIFS and MFEPD (with support from BM)	
Sustainable development benefits	<ol> <li>Quantity of compost used</li> <li>Reduction in yield variability</li> <li>Number of farmers adopting MauriGAP, and agriculture land area under sustainable farming</li> <li>Carbon stock in the soil</li> </ol>	<ol> <li>tonne/year</li> <li>%</li> <li>Number         <ol> <li>farmers</li> <li>(gender             disaggregated)             and ha             4. tC/ha</li> </ol> </li> </ol>	<ol> <li>Data obtained from FAREI</li> <li>Data obtained from FAREI</li> <li>Data obtained from FAREI</li> <li>Data measured by FAREI / MCIA</li> </ol>	1. FAREI (DWMRR) 2. FAREI 3. FAREI 4. FAREI / MCIA	

Table A15: MRV Parameters and Institutional Responsibilities for the Agriculture (Crops) Sub-Sector

A3.3.5.3. MRV System (Agriculture Livestock) The MRV system indicates the roles of different institutions in the collection and validation of the different parameters that need to be measured in order to carry out mitigation scenario analyses of mitigation strategies and actions and to monitor the implementation of mitigation actions. Table A16 provides the structure of the MRV system for Agriculture (livestock) covering both activity parameters for mitigation analyses, support needed and received, and sustainable development benefits.

ITEM	PARAMETER	UNITS	REMARKS	RESPON- SIBILITY
GHG Mitigation measures and manure management systems	Number of animal heads per year by livestock type	No. of heads	The livestock types covered in the analyses are: dairy cows, other cattle (calves, heifers, local and imported bulls), sheep, goats, horses, swine, poultry, and deer). Purpose: Calculation of baseline and project emissions	FAREI
	Typical animal mass	kg per head of animal	Measurement of Tier 2 or Tier 3 databy FAREI (or IPCC default values)	FAREI
	Average daily excretion rate	kg/mass/day	Measurement of Tier 2 or Tier 3 data by FAREI (or IPCC default values)	FAREI
	CH4 Emission factor from manure management	(kgCH4/(head year)	Measurement of Tier 2 or Tier 3 emission factors by FAREI (or IPCC default values)	FAREI
	Capacity utilisation of manure management systems (anaerobic digester, aerobic treatment, solid storage, dry lot,pasture, poultry with or without litter) volatile solid degradation factor	Dimensionless	Data measured by FAREI through field surveys / extension services	FAREI (with support from universities)
	Fraction		Animal Manure Management- GHG mitigation – CDM methodologies	FAREI
	N2O emission factors (direct and indirect emissions)	kg N2O-N/ kg N and kg N <sub>2</sub> O-N/ kg NH <sub>3</sub> -N and NO <sub>X</sub> -N	Measurement of Tier 2 or Tier 3 emission factors by FAREI (or IPCC default values)	FAREI
	Fraction of N lost due to volatilisation,	Fraction	Measurement of Tier 2 or Tier 3 data by FAREI (or IPCC default values)	FAREI
	N2O emission factor from soil and runoff water	kg N2O-N/ kg N for EF	Measurement of Tier 2 or Tier 3 emission factors by FAREI (or IPCC default values)	FAREI
	Methane conversion factor for leakage calculation	t/m <sup>3</sup>	CDM methodologies ACM 0010	FAREI
	Amount of biogas collected atthe digester outlet in a year	Nm <sup>3</sup> biogas	Obtained from volumetric flow measurement using calibrated controllers; data obtained from farmersand collated by	FAREI
	Average chemical oxygen demand (COD) of the liquid digestate	t COD / m <sup>3</sup>	Measured through sampling and surveys carried out among farmers	FAREI (with support from universities)
	Amount of liquid digestate stored anaerobically	m <sup>3</sup>	Obtained from farmers using calibrated flow metres	FAR
	Oxidation factor	0.1	Default value of the IPCC	FAREI
	Fraction of methane in the SWDS gas (volume fraction) [F]	0.5	Default value of the IPCC	
	Methane correction factor Fraction of degradable organic carbon in the waste type	Dimensionless Dimensionless	Default value of the IPCC	FAREI
	Decay rate for the waste type	1/yr	Measurement of Tier 2 or Tier 3 data by FAREI (or IPCC default values)	

ITEM	PARAMETER	UNITS	REMARKS	RESPONSI- BILITY
Support needed and received	<u>Support needed</u> 1. Finance 2. Technology transfer 3. Capacity building	1. US\$ 2. Types of technology 3. Type of training needed for mainstreaming climate change mitigation	<ol> <li>Obtained from investment plans accompanying the Agriculture (livestock) mitigation strategy and action plan</li> <li>Obtained from TNA</li> <li>Obtained from TNA and institutional gaps and need analyses</li> </ol>	MAIFS (with inputs from FAREI)
	Support received 1. Finance 2. Technology transfer 3. Capacity building	1. US\$ 2. Number and type of technology transferred 3. Number of persons trained (gender disaggregated)	<ol> <li>Public and private investments in Agriculture (livestock) mitigation actions</li> <li>Obtained from project reports on technology transfer collated by MAIFS</li> <li>Obtained from training reports collated by MAIFS</li> </ol>	MAIFS and MFEPD (with support from BM)
Sustainable development benefits	<ol> <li>Quantity of compost produced from livestock waste</li> <li>Livestock production for enhanced food security</li> <li>Number of farmers adopting low-carbon manure treatment</li> <li>technologies</li> </ol>	<ol> <li>tonne/year</li> <li>kg(meat)/year</li> <li>Number of farmers (gender disaggregated)</li> </ol>	<ol> <li>Data collected by FAREI from farmers</li> <li>Data collected by FAREI from farmers</li> <li>Data collected by FAREI from farmers</li> </ol>	1. FAREI 2. FAREI 3. FAREI / BM

Table A16: MRV Parameters and Institutional Responsibilities for the Agriculture (Livestock) Sub-Sector

## A3.3.6. Forestry

#### A3.3.6.1. Organisational Structure

The institutional arrangement shown in **Figure A14** is proposed for Forestry. The structure, thereafter called the Forestry (F) TWG [F-TWG], is proposed to be chaired by the representative of MAIFS to the Climate Change Committee (CCC).



Figure A14. Organisational Structure for Forestry.

The duties and responsibilities of each institution asfar as mitigation planning, implementation, monitoring, and evaluation are concerned are listed in **Table A17**. Additional technical considerations regarding the MRV system for monitoring the implementation of mitigation actions and the support needed and received are discussed in subsection 3.3.6.2.

INSTITUTION(S)	ROLES AND RESPONSIBILITIES
Ministry of Agro-Industry and Food Security (MAIFS)	<ul> <li>Overall responsibility for the formulation, implementation, and monitoring &amp; evaluation of climate change mitigation policy, strategy and actions related to Forestry;</li> <li>Responsible for formulating the National Biomass Framework (non-food crops) that will support the phase-out of coal in electricity production through the use of renewable biomass; and</li> <li>Thematic Owner of Forestry sector data (GHG and non-GHG, and support needed and received) reported on the MauNDC Registry by the ministry and all technical bodies operating under it.</li> </ul>
Forestry Service (FS)	<ul> <li>Support the process of Forestry policy formulation under the aegis of MAIFS;</li> <li>Carry out TNA for the identification and prioritisation of tree species and conservation approaches for enhancing carbon stocks in forests;</li> <li>Identify the support needed for enhancing carbon stocks in forests;</li> <li>Preside over the proceedings of the F-TWG, as well as providing the Secretariat for the F-TWG;</li> <li>Thematic Contributor of data used for the modelling of mitigation scenarios, as listed in Table A18; and</li> <li>Determine Tier 2 and Tier 3 carbon sequestration factors (Table A18).</li> </ul>
National Parks and Conservation Service (NPCS)	<ul> <li>Support FS in the processes related to TNA, identification of support needed and received, and calculation of carbon sequestration factors for different plant species; and</li> <li>Thematic Contributor of data used for the modelling of mitigation scenarios, as listed in Table A18.</li> </ul>
Mauritius Cane Industry Authority (MCIA)	<ul> <li>Coordination of the implementation of the National Biomass Framework through any agro-forestry development.</li> </ul>
Business Mauritius (BM)	<ul> <li>BM is the apex body representing the private sector in Mauritius, and it promotes Sustainability and Inclusive Growth for businesses;</li> <li>Given its central position in the business landscape, BM has the capacity: <ul> <li>to gather and make available quantitative and qualitative information with regards toproject implementation of mitigation actions;</li> <li>to coordinate analysis and research with universities and other agencies, such as the UN, in order to provide pragmatic real-life' case studies</li> <li>to support coordination among the private sector for any data collection; and</li> <li>to implement and co-fund projects to fill the gaps in our mitigation plans.</li> </ul> </li> </ul>
Tertiary Education and Scientific Research Division (TESRD) [Ministry of Education, Tertiary Education, Science, and Technology (METEST)]	<ul> <li>As the main policy organ of METEST for supporting scientific research, the TESRD will be responsible for ensuring that the appropriate universities are invited to participate in the TWG in order to:</li> <li>Carry out applied research that can be used to overcome barriers for enhancing thestocks of carbon in forestry and other natural ecosystems;</li> <li>Carry out natural capital accounting, including carbon stocks;</li> <li>Carry out research on scenario modelling for enhanced stocks of carbon, including mitigation and macroeconomic analyses;</li> <li>Support FS in determining sequestration factors for plants (indigenous, endemic, and exotic) in local conditions (Table A18); and</li> <li>Develop and provide training modules / courses on carbon accounting in forestry and land</li> </ul>
Department of Climate Change (DCC)	<ul> <li>use changes, natural capital accounting, and valuation of ecosystem services.</li> <li>Overall responsibility for ensuring that long-term mitigation strategies and actions are formulated for Forestry;</li> <li>Support institutional stakeholders to understand the reporting requirements under theglobal climate governance, namely the Paris Agreement;</li> <li>Provide support to institutional stakeholders on the use of the MauNDC Registry;</li> <li>Provide technical support for carrying out TNA;</li> <li>Provide technical support to institutions related to mitigation scenario modelling; and</li> <li>Provide technical support to institutions for identifying support needed and received.</li> </ul>

Table A17: Roles and Responsibilities of Institutions in Forestry

#### A3.3.6.2. MRV System (Forestry Sub-Sector)

The MRV system indicates the roles of different institutions in the collection and validation of the different parameters that need to be measured in order to carry out mitigation scenario analyses of mitigation strategies and actions and to monitor the implementation of mitigation actions. **Table A18** provides the structure of the MRV system for Forestry Service, covering both activity parameters for mitigation analyses, support needed and received, and sustainable development benefits.

ITEM				RESPONSI-
				BILITY
Carbon stocks and change in carbon stocks	Carbon fraction of tree biomass	t C t¹d.m.	Measurement of Tier 2 or Tier 3 data by FS (or IPCC default values)	FS
	Carbon fraction of litter biomass	t C t¹ d.m.	Measurement of Tier 2 or Tier 3 data by FS (or IPCC default values)	FS
	Basic wood density for all species	t d.m. m <sup>-3</sup>	Measurement of Tier 2 or Tier 3 data by FS (or IPCC default values)	FS
	Carbon stock in dead wood as a percentage of carbon stock in tree biomass	Percent (%)	Measurement of Tier 2 or Tier 3 data by FS (or IPCC default values)	FS
	Relationship between carbon stock in litter and carbon stock in living trees	Percent (%)	Measurement of Tier 2 or Tier 3 data by FS (or IPCC default values)	FS
	Root-shoot ratio for species	Dimensionless	Measurement of Tier 2 or Tier 3 data by FS (or IPCC default values)	FS
	Area of the stratum	На	Field measurement using Standard Operating Procedures (SOPs) prescribed under national forest inventory	FS
	Total area of sample plots in the stratum	На	Field measurement using Standard Operating Procedures (SOPs) prescribed under national forest inventory	FS
	Diameter at the breast height of a tree	cm or any unit of length as specified	Measurement of Tier 2 or Tier 3 data by FS (or IPCC default values)	FS (with support from NPCS and universities)
	Height of tree (H)	m or any other unit of length as specified	Measurement of Tier 2 or Tier 3 data by FS (or IPCC default values)	FS (with support from NPCS and universities)
GHG emissions attributable to the	Area of a sample plot; area of a stratum	На	Field measurement using Standard Operating Procedures (SOPs) prescribed under national forest inventory	FS
displacement of pre-project agricultural activities	Crown cover of shrubsin the shrub biomass stratum	Dimensionless	Field measurement using Standard Operating Procedures (SOPs) prescribed under national forest inventory	FS (with support fromNPCS and universities)
Afforestation and reforestation (sequestration scenarios)	Crown cover of trees in the baseline stratum	Dimensionless	Field measurement using Standard Operating Procedures (SOPs) prescribed under national forest inventory	FS (with support from NPCS and universities)
	Area of land from which agricultural activity is being displaced	На	Field measurement using Standard Operating Procedures (SOPs) prescribed under national forest inventory; policy decisions related to the Biomass Framework	FS
	Density Overbark of tree stems for tree species	t d.m. m <sup>-3</sup>	Calculation of carbon stocks and changes in carbon stocks	FS

PARAMETER	UNITS	REMARKS	RESPONSI- BILITY
<u>Support needed</u> 1. Finance 2. Technology transfer 3. Capacity building	<ol> <li>US\$</li> <li>Types of technology</li> <li>Type of training needed for mainstreaming climate change mitigation</li> </ol>	<ol> <li>Obtained from investment plans accompanying the Forestry mitigation strategy and action plan</li> <li>Obtained from TNA</li> <li>Obtained from TNA and institutional gaps and need analyses</li> </ol>	MAIFS (with inputs from FS, NPCS, BM and MCIA)
Support received 1. Finance 2. Technology transfer 3. Capacity building	1. US\$ 2. Number and type of technology transferred 3. Number of persons trained (gender disaggregated)	<ol> <li>Public and private investments in Forestry mitigation actions</li> <li>Obtained from project reports on technology transfer collated by MAIFS</li> <li>Obtained from training reports collated by MAIFS</li> </ol>	MAIFS and MFEPD (with support from BM)
<ol> <li>Number of green jobs created</li> <li>Number and types of climate adaptation co- benefits</li> <li>Area of ecosystems under conservation /</li> </ol>	<ol> <li>Number of jobs (gender disaggregated)</li> <li>Number of co- benefits by type</li> <li>ha</li> </ol>	<ol> <li>Data collected by FS &amp; NPCS</li> <li>Data collected by FS &amp; NPCS</li> <li>Data collected by FS &amp; NPCS</li> </ol>	MAIFS (with inputs from FS, BM and NPCS)
	Support needed         1. Finance         2. Technology transfer         3. Capacity building         Support received         1. Finance         2. Technology transfer         3. Capacity building         Support received         1. Finance         2. Technology transfer         3. Capacity building         1. Finance         2. Technology transfer         3. Capacity building         1. Number of green jobs created         2. Number and types of climate adaptation cobenefits         3. Area of ecosystems under conservation /         protection	PARAMETERUNITSSupport needed1. Finance1. Finance1. US\$2. Technology transfer2. Types of technology 3. Type of training needed for mainstreaming climate change mitigationSupport received1. US\$1. Finance1. US\$2. Technology transfer1. US\$3. Capacity building1. US\$2. Technology transfer3. Capacity building3. Capacity building1. US\$1. Number of green jobs created1. Number of green jobs climate adaptation co- benefits3. Area of ecosystems under conservation /1. Number of co- benefits by type3. ha	PARAMETERUNITSREMARKSSupport needed1. US\$1. Obtained from investment2. Technology transfer2. Types of technology1. Obtained from investment3. Capacity building1. US\$2. Obtained from TNA3. Capacity building3. Type of training needed for mainstreaming climate change mitigation1. Obtained from TNA3. Detained from training needed for mainstreaming climate change mitigation1. Public and private investments in Forestry mitigation actions3. Capacity building1. US\$1. Public and private investments in Forestry mitigation actions3. Capacity building1. US\$2. Obtained from project reports on technology transfer3. Capacity building1. US\$3. Obtained from project reports on technology transfer collated by MAIFS1. Number of green jobs created 2. Number and types of climate adaptation co- benefits1. Number of co- benefits by type3. Area of ecosystems under conservation /1. Number of co- penefits by type1. Data collected by FS & NPCS3. ha3. ha

Table A18: MRV Parameters and Institutional Responsibilities for the Forestry Sub-Sector with inputs from the National Measurement, Reporting, and Verification (MRV) Framework (2020)

## A3.3.7. Refrigeration and Air-conditioning (RAC)

## A3.3.7.1. Organisational Structure

The institutional arrangement shown in **Figure A15** is proposed for the RAC sector as a sub sector of the Industrial Processes and Product Use (IPPU). The TWG for the IPPU-RAC sector will have the same functions as the Project Steering Committee set up under the National Ozone Unit.

The duties and responsibilities of each institution as far as mitigation planning, implementation, monitoring, and evaluation are concerned are listed in **Table A19**. Additional technical considerations regarding the MRV system for monitoring the implementation of mitigation actions and the support needed and received are discussed in subsection 3.3.7.2.

Figure A15. Organisational Structure for RAC-IPPU

INSTITUTION(S)	ROLES AND RESPONSIBILITIES
Ministry of Environment, Solid Waste Management and Climate Change (MESWMCC)	<ul> <li>Overall responsibility for the formulation, implementation, and monitoring &amp; evaluation of climate change mitigation policy, strategy and actions related to RAC sub-sector in IPPU;</li> <li>Preside over the proceedings of the RAC-TWG, as well as providing the Secretariat for the RAC-TWG; and</li> <li>Thematic Owner of data (GHG and non-GHG, and support needed and received)reported on the MauNDC Registry for RAC.</li> </ul>
National Ozone Unit (NOU)	<ul> <li>Developing mitigation scenarios for alternative low- Global Warming Potential (GWP)and non-Ozone Depleting Substances (ODS) options based on TNA;</li> <li>Identify support needed and received for implementing mitigation strategy and actionsfor RAC;</li> <li>Implement the mitigation policy and strategy of MESWMCC; and</li> <li>Thematic Contributor of data related to RAC as per Table A20.</li> </ul>
Mauritius Revenue Authority (MRA) [Customs Service]	• Provider of data (to the NOU) on refrigerants imported and exported (by type of refrigerants);
Dangerous Chemicals Control Board (DCCB)	• Regulation of the use of dangerous chemicals, including developing policies and administrative measures for effective consultations, classification and registration, issuing licences and permits, issuing prohibition notices, coordination between enforcement agencies, and dissemination of information on dangerous chemicals.
Private operators (e.g. importers and exporters of refrigerants, Business Mauritius)	<ul> <li>Provider of data (to the NOU) on refrigerants imported and exported (by type of refrigerants); and</li> <li>Provider of data on types of refrigeration technologies (mobile and stationary) in different applications.</li> </ul>
Business Mauritius (BM)	<ul> <li>BM is the apex body representing the private sector in Mauritius, and it promotes</li> <li>Sustainability and Inclusive Growth for businesses;</li> <li>Given its central position in the business landscape, BM has the capacity:</li> <li>to gather and make available quantitative and qualitative information with regards toproject implementation of mitigation actions;</li> <li>to coordinate analysis and research with universities and other agencies, such as theUN, in order to provide pragmatic real-life' case studies</li> <li>to support coordination among the private sector for any data collection; and</li> <li>to implement and co-fund projects to fill the gaps in our mitigation plans.</li> </ul>
Tertiary Education and Scientific Research Division (TESRD) [Ministry of Education, Tertiary Education, Science, and Technology (METEST)]	<ul> <li>As the main policy organ of METEST for supporting scientific research, the TESRD will be responsible for ensuring that the appropriate universities are invited to participate in the TWG in order to:</li> <li>Carry out applied research that can be used to overcome barriers for mitigation in RAC;</li> <li>Carry out research on scenario modelling for low-carbon development, includingmitigation and macroeconomic analyses; and</li> <li>Integrate low-carbon technological options in RAC in existing university courses linked to refrigeration and/or climate change mitigation.<sup>47</sup></li> </ul>
Training Institutions (e.g. MITD)	<ul> <li>Develop and provide training modules / courses on the RAC sector, including climatechange mitigation; and</li> <li>Provide applied or technical training on emerging refrigeration technologies using naturalance low-GWP refrigerants.</li> </ul>
Mauritius Research and Innovation Council (MRIC)	<ul> <li>Provide financial support for research projects on low-carbon development in RAC; and</li> <li>Partner with different ministries on innovative low-carbon projects by providing supportance seeking funds through the National Resilient Fund.</li> </ul>
Department of Climate Change (DCC)	<ul> <li>Overall responsibility for ensuring that long-term mitigation strategies and actions are formulated for IPPU;</li> <li>Support institutional stakeholders to understand the reporting requirements under theglobal climate governance, namely the Paris Agreement;</li> <li>Provide support to institutional stakeholders on the use of the MauNDC Registry;</li> <li>Provide technical support to institutions related to mitigation scenario modelling;</li> <li>Provide technical support to institutions for carrying out TNA for mitigation in IPPU; and</li> <li>Provide technical support to institutions for identifying support needed and received.</li> </ul>

Table A19: Roles and Responsibilities of Institutions in RAC

<sup>47</sup> For example, the Université des Mascareignes is already collaborating with MESWMCC to carry out applied research and training on the use of natural refrigerants in RAC.

#### A3.3.7.2. MRV System (IPPU)

The MRV system indicates the roles of different institutions in the collection and validation of the different parameters that need to be measured in order to carry out mitigation scenario analyses of mitigation strategies and actions, and to monitor the implementation of mitigation actions. **Table A20** provides the structure of the MRV system for IPPU covering activity parameters for mitigation analyses, support needed and received, and sustainable development benefits.

ITEM	PARAMETER	UNITS	REMARKS	RESPONSI- BILITY
Refrigeration and air conditioning (RAC)	Quantity of refrigerants by type imported and exported annually	tonne	Data collected by NOU from MRA and private operators	NOU
	Composition of blended refrigerants	%	Data obtained from the Material Safety Data Sheet for refrigerant	NOU
	GWP of refrigerants	Dimensionless	IPCC default values	NOU
	Lifetime of equipment	year	Data measured by NOU through a field survey (or using the IPCC default value)	NOU
	% of gas destroyed at equipment end of life	%	Data measured by NOU through field survey (or using the IPCC default value)	NOU
	Emission factor from the installed base	%	Data measured by NOU through a field survey (or using the IPCC default value)	NOU
Support	Support needed			MESWMCC
needed and received	<ol> <li>Finance</li> <li>Technology transfer</li> <li>Capacity building</li> </ol>	<ol> <li>US\$</li> <li>Types of technology</li> <li>Type of training needed for mainstreaming climate change mitigation</li> </ol>	<ol> <li>Obtained from investment plans accompanying the IPPU mitigation strategy and action plan</li> <li>Obtained from TNA</li> <li>Obtained from TNA and institutional gaps and need analyses</li> </ol>	
	Support received 1. Finance 2. Technology transfer 3. Capacity building	<ol> <li>US\$</li> <li>Number and type of technology transferred</li> <li>Number of persons trained (gender disaggregated)</li> </ol>	<ol> <li>Public and private investments in the IPPU mitigation actions</li> <li>Obtained from project reports on technology transfer collated by MESWMCC</li> <li>Obtained from training reports collated by MESWMCC</li> </ol>	MESWMCC and MFEPD (with support from BM)
Sustainable development benefits	<ol> <li>Number and type of equipment using HFCs retired from the market</li> <li>Amount of HFCs recovered for safe disposal</li> </ol>	<ol> <li>Number and type of equipment</li> <li>tonne/year</li> </ol>	<ol> <li>Data obtained from market surveys by NOU</li> <li>Data obtained from market surveys by NOU</li> </ol>	1. NOU 2. NOU (with support from BM)

Table A20: MRV Parameters and Institutional Responsibilities for IPPU

# A-ANNEX 1 – INSTITUTIONAL ARRANGEMENT FOR THIRD NATIONAL COMMUNICATION (TNC), PROJECT



Source: Ministry of Environment, Solid Waste Management and Climate Change - TNC Chapter 2016
# **A-ANNEX 2 – INSTITUTIONAL ARRANGEMENTS FOR RODRIGUES**



INSTITUTIONAL ARRANGEMENTS FOR CLIMATE GOVERNANCE 65

# **A-ANNEX 3 – TIMELINE FOR FORMULATING AND REVIEWING MITIGATION STRATEGY AND ACTION PLAN.**

	202 <sup>-</sup>	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
NDC	X48					Х					Х
National Communications <sup>49</sup>				Х				Х			
BTR				Х		Х		Х		Х	
National Inventory	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
CC Mitigation Strategies and Action Plans	Х					Х					Х

Source: Stakeholder Engagement Plan (developed under the NAMA Project)

 <sup>48 1</sup> year later than planned as COP was postponed due to Covid
 49 The Project Implementation Plan is being developed, implying that the implementation of the Fourth National Communication will not start until 2022. Hence, the timing of the Fourth National Communication has been aligned with the first BTR.

# STAKEHOLDER ENGAGEMENT PLAN



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# **B-LIST OF ACRONYMS**

BLUP	Building and Land Use Permit
CCA 2020	Climate Change Act 2020
CONTRACT	Climate Change Committee
CCMSAP	Climate change mitigation strategies and action plans
CEB	Central Electricity Board
DCC	Department of Climate Change
EEMO	Energy Efficiency Management Office
EIA	Environment Impact Assessment
EPA	Environment Protection Act
GHG	Greenhouse gas
GRM	Grievance Redress Mechanism
IMCCC	Inter-Ministerial Council on Climate Change
INDEPENDENCE	Independent Power Producer
MAIFS	Ministry of Agro-Industry and Food Security
MARENA	Mauritius Renewable Energy Agency
MFA	Ministry of Foreign Affairs, Regional Integration & International Trade
MBEMRFS	Ministry of Blue Economy, Marine Resources, Fisheries and Shipping
MCIA	Mauritius Cane Industry Authority
MEPU	Ministry of Energy and Public Utilities
MIDSMEC	Ministry of Industrial Development, SMEs and Cooperatives
MLTLR	Ministry of Land Transport and Light Rail
MNICD	Ministry of National Infrastructure and Community Development
MOFEPD	Ministry of Finance, Economic Planning and Development
MRIC	Mauritius Research and Innovation Council
NDC	Nationally Determined Contribution
NELS	National E-Licensing Platform
STC	State Trading Corporation
SWMD	Solid Waste Management Division
URA	Utility Regulatory Authority
WWMA	Wastewater Management Authority
NYEC	National Youth Environment Council
PBMC	Permits and Business Monitoring Committee
RMCF	Resource Mobilisation and Climate Finance
SEPARATE	Stakeholder Engagement Plan

# **B1. INTRODUCTION**

Stakeholders can be defined as the individuals or communities, and institutions and organisations that are directly or indirectly affected by, and/or have influence or power over, a policy or intervention.

Effective stakeholder engagement can contribute to strengthen the design, implementation and assessment of climate change policies and actions thus enhancing their effective implementation, and entails the establishment of a process where stakeholders are informed and have the possibility or rather are facilitated in influencing the decision-making processes that may interest or affect them.

There are five main principles upon which stakeholder engagement should be based on:

- Inclusiveness. All stakeholders have the opportunity and capacity to participate effectively and equitably, including both men and women, with special attention to stakeholder groups that may be marginalised<sup>1</sup> and that may be directly affected by the policy.
- Transparency. Information relevant to making an informed decision is disseminated to all stakeholders and publicly accessible, in a format that can be understood, and provided in advance to enable effective participation.
- Responsiveness. Changes are made in response to stakeholders' input, as appropriate; stakeholders are informed how their input has been addressed; and stakeholder requests for information and for resolution of grievances are resolved impartially and promptly.
- Accountability. Clear governance structures and processes are established, including for decision-making and oversight, and for resolution of grievances with appropriate redress.
- Respect for rights. Stakeholders' rights relating to policies and their impacts are recognised and respected, with special attention to stakeholder groups that may be marginalised<sup>2</sup> and directly affected. Rights include procedural rights, such as the right to information, participation and access to justice, and substantive rights, including both customary rights and statutory rights. (ICAT, 2020)

LOW LEVEL OF PARTIC	STAKEHOLDER IPATION	MID-LEVEL OF STAKEHOLDER PARTICIPATION	HIGH LEVEL OF STAKEHOLDEF PARTICIPATION			
INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER		
Provide stakeholders with balanced and objective information to help them understand the problem, alternatives and solutions	Obtain stakeholder input on analysis, alternatives or decisions	Work directly with stakeholders throughout the process to ensure that their concerns and aspirations are consistently understood and considered	Partner with stakeholders in each aspect of decision-making, including developing alternatives and identifying preferred solutions	Place decision- making in the hands of stakeholders		
"We will keep you informed."	"We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how stakeholder input influences the decision."	"We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how stakeholder input influenced the decision."	"We will look to you for advice and innovation in formulating solutions, and incorporate your advice and recommendations into the decisions to the maximum extent possible."	"We will implement what you decide."		

There are varying degrees of stakeholder participation, as illustrated in **Table B1**.

Table B1: Degrees of Stakeholder Engagement

Source: ICAT (Initiative for Climate Action Transparency) (2020). Stakeholder Participation Guide: Supporting Stakeholder Participation in Design, Implementation and Assessment of Policies and Actions

<sup>2</sup> Marginalised stakeholders are those that have little or no influence over decision-making processes, and to whom special attention should be given. They can be women, indigenous peoples and local communities, and their marginalisation may be related to a range of factors, including gender, ethnicity, socioeconomic status, remoteness, inaccessibility, political connections, culture and religion (ICAT, 2020).

There is not necessarily a preferred degree of stakeholder engagement, but rather a differentiation of stakeholder engagement related to the stakeholders' influence and/ or interest over the intervention and decision-making process.

The Climate Change Act 2020 (CCA 2020) in Mauritius already lays the fundamentals for the roles and responsibilities of institutional stakeholders. It also outlines some of the institutional mechanisms that will be used for coordinating with stakeholders. It establishes the Inter-Ministerial Council on Climate Change (IMCCC) with the Prime Minister as the chairperson and relevant Ministers as members. The IMCCC shall inter alia "set national objectives, goals and targets with a view to making Mauritius a climate change-resilient and low emission country." The IMCCC has a collaborative function at the highest level of decision-making, and where the Ministers representing the relevant sectors have a high degree of influence over the process, representing a high degree of stakeholder participation (Table B1). A high degree of stakeholder engagement will also take place through the Climate Change Committee (CCC) tasked with coordinating the operational aspects of the decisions taken by the IMCCC.

The CCA 2020, which entered into force on 22 April 2021, also establishes the Department of Climate Change (DCC) which shall inter alia "promote and enhance the participation of stakeholders, including the business community, non-governmental organisations and local communities, in climate change matters." These functions relate to mid- and low-level of stakeholder participation where a wide array of stakeholders is involved, consulted and informed.

As such, the general approach to stakeholder participation in Mauritius is institutionalised. The chapter lays out the approach for the operationalisation of stakeholder engagement within the means of the CCA 2020, taking into consideration good practices for stakeholder participation, timelines related to national processes and transparency requirements for the Paris Agreement. The general approach laid out in this chapter is also applicable to the process of designing and formulating climate change adaptation or mitigation initiatives that can take different forms, such as policies, strategies, action plans, programmes and projects.

# B2. STAKEHOLDER PARTICIPATION IN THE CLIMATE CHANGE ACT 2020

The objective for stakeholder participation is given in the CCA 2020, and is hereby described at three levels based on the institutions established by the Act:

The IMCCC has inherently a stakeholder coordination function with high decision-making power. It is also important to note that the stakeholder engagement through the IMCCC only involves public institutions. Functions of the IMCCC:

- set national objectives, goals and targets; and
- make climate change policies and set priorities for adaptation and mitigation; and
- monitor and review progress made by Government departments on climate change projects and programmes; and
- ensure coordination and cooperation between Government departments, local authorities and other organisations engaged in climate change projects and programmes; and
- make such recommendations and issue such directives as it may determine to Government departments.

The DCC (under the Ministry of Environment, Solid Waste Management and Climate Change in the current Ministerial set-up) has more of an operational function with complementary aspects of stakeholder participation to the ones already mentioned above. The functions of the CCC are outlined in Part III, section 8(2) of the CCA 2020, and each one of the twenty-one functions either directly or indirectly implies stakeholder engagement. It suffices to quote here section 8(2) (I) and (p) of Part III that make explicit mention of the participation of stakeholders at different levels of governance and geographical scales:

- promote and enhance the participation of stakeholders, including the business community, non-governmental organisations and local communities, in climate change matters [section 8(2)(I)]; and
- establish a network at national, regional and international levels with institutions and organisations that work on climate change issues [section 8(2)(p)].

The CCC is an inter-governmental entity which also has an operational function with a high degree of stakeholder coordination, inter alia through:

- coordinate the preparation of the National Inventory Report, national communications and such other reports as may be required under UNFCCC; and
- coordinate the implementation of measures related to greenhouse gas inventories, greenhouse gas emission reduction, the assessment of risks associated and vulnerability to climate change and adaptation to climate change; and

- coordinate strategic planning and national policies relating to climate change; and
- coordinate the use of resources and any assistance provided by donors and funding agencies for climate change projects; and
- coordinate climate change-related activities.

For Rodrigues, the Commissioner to whom responsibility for the subject of environment is assigned in Rodrigues is responsible for the formulation of a climate change mitigation and climate change adaptation strategies and action plans for Rodrigues, in collaboration with the DCC, the Ministries, Departments and other bodies specified in the Climate Change Act 2020's Third and Fourth Schedule. **Figure B1** illustrates the institutional arrangements for climate change established by the Act, and the functions of the different institutions.



Figure B1. Institutional Arrangements for Climate Change Established by the Climate Change Act 2020.

In addition, the CCA 2020 states that "Every Government department shall, for the purpose of developing strategies and policies in respect of climate change, undertake public consultations."

In respect to the need for stakeholder engagement, the CCA 2020 represents a cascading effect with increasing scope for stakeholder engagement, starting from predefined, narrowly focused groups of stakeholders and gradually expanding the locus of stakeholders involved, from the IMCCC to the DCC to the CCC and Government departments.



Figure B2. Illustration of Cascading Effect of Need for Stakeholder Engagement.

While the CCA 2020 provides the broad institutional framework for carrying out stakeholder coordination, it does not specify how stakeholder engagements would take place. The Stakeholder Engagement Plan (SEP) serves as a guiding document for:

- i. identifying stakeholders;
- ii. proposing engagements approaches;
- iii. developing communication plans;
- iv. identifying resources required to carry out stakeholder engagements; and
- v. establishment of grievance redress mechanisms.

The SEP will serve equally well for issues related to climate change adaptation and mitigation. Also, it serves the purpose of providing the foundation for more detailed stakeholder engagement planning for integrating climate change in coherent sectoral policies, strategies and actions plans, including climate change initiatives, programmes and projects.

# **B2.1 Stakeholder Engagement for the Inter- Ministerial Council on Climate Change**

The stakeholders represented in the institutional structure for climate change are already defined by the CCA 2020 in its First Schedule. The Council shall be presided by the Prime Minister. In addition, the Chief Commissioner may, at the request of the Prime Minister, attend the meetings of the IMCCC.

The CCA 2020 does not specify the engagement modalities of the IMCCC. It is implicit that the engagement approach should allow the IMCCC's strategic planning, monitoring and validating functions to be carried out effectively. For this, physical meetings or virtual if needed would be preferred to allow for direct communication and exchange of views.

When considering the timing of meetings of the IMCCC the milestone reports, which include target setting and strategic considerations, should be taken into consideration. The IMCCC should meet at least once a year to review and validate the central reports produced and provide strategic direction based on the information reported through the national documents and reports on the progress of climate strategies, NDC and GHG inventory by the Department. The schedule should allow sufficient time to allow all stakeholders to share information, and provide and receive feedback. To make consultations more efficient, relevant documents for review and validation, including the ones listed in **Table B2** should be shared prior to the meeting, and with sufficient time to allow for a thorough review by all the stakeholders participating in the meetings.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
NDC	<b>X</b> <sup>3</sup>				Х					Х	
National Communications <sup>4</sup>		Х				Х				Х	
CC Strategies and Action Plans		X <sup>5</sup>			Х					Х	
Biennial Transparency Reports BTR				Х		Х		Х		Х	
National Annual Inventory			Х	Х	Х	Х	Х	Х	Х	Х	Х
National Inventory Reports				Х		Х		Х		Х	
Meetings of the Council	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х

Table B2: Tentative Minimum Meeting Requirement of the Inter-Ministerial Council on Climate Change

# **B2.2 Stakeholder Engagement for the Climate Change Committee**

According to the Act, the frequency of Committee meetings is to be determined by the Chairperson, but will be at least once a month [Part IV Section 17 3(b). The monthly meetings should be used for preparation and consultation regarding upcoming milestone tasks, as described in the timeline in **Table B3**. For this, a mix of physical (or virtual) meetings and written consultations should be appropriate. Especially the tasks involving extensive document review, should be covered by written consultations, and only general issues concerning documents need to be discussed through meetings. **Table B3** provides a tentative overview of the frequency of consultations for validating central tasks and reports and reporting to the IMCCC. The table also provides a differentiation of what topics could be covered through written consultations, and which are more suitable to be covered through meetings. A similar structure as for the National Committee is envisioned for the Rodrigues Climate Change Committee.

4 The Project Implementation Plan is being developed, implying that the implementation of the Fourth National Communication will not start until 2022. Hence, the timing of thAe Fourth National Communication has been aligned with the first BTR.

<sup>3 1</sup> year later than planned as COP was postponed due to Covid

<sup>5</sup> The first Mitigation strategy and Action Plan is expected to be delivered as a result of the NAMA project in 2022, and both mitigation and adaptation action plans should be updated every 5 years, ideally in conjunction with the NDC.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
NDC - Measures related to GHG Emission Reduction	M <sup>6</sup>				Μ					Μ	
National Communications				WR				WR			
Strategic Planning and National Policies Related to Climate Change		Μ			Μ				Μ		
BTR				WR		WR		WR		WR	
NIR - Methods to Monitor and Control	WR	WR	WR	WR	WR	WR	WR	WR	WR	WR	WR
Emissions											
Chapter on Progress made on the Tasks of		Х		Х		Х		Х		Х	
the Committee											
Monthly Meetings of the	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
Committee											

WR: Written Consultation ; M= Meeting

Table B3: Tentative Minimum Meeting Requirement of the Committee

<sup>6 1</sup> year later than planned as COP was postponed due to COVID-19 pandemic.

# B3. GENERAL APPROACH FOR STAKEHOLDER ENGAGEMENT IN CLIMATE CHANGE MATTERS AND PUBLIC CONSULTATIONS

The DCC is tasked with the promotion and enhancement of participation of stakeholders, including the business community, non-governmental organisations and local communities, in climate change matters. In addition, Government departments shall undertake public consultations for the purpose of developing strategies and policies in respect of climate change. It is concluded here that this is the space afforded under the CCA 2020 for broad and inclusive stakeholder participation. Further, country ownership, and by extension the monitoring and evaluation work of the IMCCC and Committees, willrest on the quality of stakeholder engagements in the definition of climate policies and strategies. For effective stakeholder engagement, there should be a streamlined and appropriate engagement approach able to cater for a wide variety of stakeholder groups and desired level of engagement.

In this context, this section outlines the approach to identifying stakeholders, engaging with stakeholders, communicating to and with stakeholders, and identifying resources required to carry out stakeholder engagements. Importantly, the approach includes a grievance redress mechanism (GRM) that is the ultimate means by which stakeholders have to contribute to the process. It is also important to note that the approaches described in this section are also relevant for the aspects of stakeholder engagement related to the remaining sections in the document.

# **B3.1 Identifying Stakeholders**

Any department designing a stakeholder consultation process should identify individuals or groups who may:

- be affected, positively or negatively, directly or indirectly, by the implementation and associated impacts of the strategies and policies i.e. those who have an *interest* in the issue at hand; and
- directly *influence* the design, implementation or assessment of the policy, either positively or negatively (other than the ones already consulted through the IMCCC and CCC)

A participatory process for identifying stakeholders should be applied, where initially identified stakeholders can assist in identifying further stakeholders and the appropriate methods for their participation. Staff, government agencies, NGOs, civil society organisations, private sector, vulnerable groups, interested groups and academics who have knowledge about the context should be consulted to identify appropriate stakeholder participation representatives. An important aspect of stakeholder identification is the recognition of the differentiated impacts that climate change may haveon women, disabled persons, low-income households, youth and children. Another important point to note is that while the CCA 2020 has already identified a number of institutional stakeholders, the list of identified stakeholders should neither be considered definitive nor exhaustive. Stakeholder groups not defined by the CCA 2020 should be consulted to have them select their own representatives through a mechanism that they define.

When the initial list of stakeholders has been prepared they can be classified in the following matrix, taking into consideration their interest and possibility to influence the process, which will guide the approach to their engagement in the stakeholder participation.





Boxes A, B and C represent key stakeholders. Stakeholders classified in Box A are important for the policy's or decision's success, and are mostly covered by the stakeholders identified for the IMCCC and CCC. Stakeholders classified in Box B represent the ones that are highly affected but do not have the mandates or low capacity to influence the process, and their interests should be protected. These could be residents living in areas at risk of flooding, who might have a high interest in an adaptation strategy that can protect their assets, or private sector providers of climate technologies like solar home systems, or other affected parties who do not have a direct influence on the design of e.g. a renewable energy policy, but where the policy might have a big impact on their business. Stakeholders classified in Box C can affect the outcomes, but their interest is not necessarily aligned with the overall goals of the process. E.g. building owners asked to sort waste at source. Therefore, these stakeholders should be monitored and engaged in order to ensure they do not hinder the process. Stakeholders classified in Box D do not require engagement but should be kept informed. This is important since the field is dynamic, implying that stakeholders in Box D may migrate into either Box B or Box C over time.

For general consultations in climate change matters and especially for the purpose of developing strategies and policies in respect of climate change, it is important to consider consulting multiple stakeholders within civil society, the private sector, communities, and especially vulnerable stakeholders. These are all stakeholders belonging to the high interest/low influence classification, which are expected to be highly affected by climate policies, and have a tendency to be forgotten in the stakeholder engagement process.

# **B3.2 Engagements Approaches**

The Act provides no information as to how and how often Government departments should perform public consultations for the purpose of developing strategies and policies in respect of climate change, but the following general principles should be applied:

- Timing: Stakeholders should receive the information in advance and with enough time to properly take it into consideration, potentially share it and discuss it internally and make an informed decision;
- Relevance: The information should be objective, unbiased and impartial, with an explanation of any uncertainties and different views;
- Comprehensiveness: The information should cover all relevant topics, including, how the intended activities are expected to impact the stakeholders, including feedback and possibilities to influence the process; and
- Tailored: The content, format and delivery method of the information should be tailored to each stakeholder group, in order to ensure that it is understandable and accessible, using concepts, language and terminology that they understand, and using communication media already known and used by them. (ICAT. 2020)

Depending on the mapping of stakeholders through stakeholder identification, the following engagement approaches canbe considered:

TYPE	ENGAGEMENT	STAKEHOLDER					
	APPROACH	GROUP	DESCRIPTION	PURPOSES			
Public meetings	Consult/ inform	General public	An open, accessible method of consulting with the public. Ensure that they are accessible and that adequate notice is given to enable interested stakeholders to participate. Groups of fewer than 20 people provide greater opportunities for everyone to speak, so this method is more suitable to consult at community level or for specific classes of stakeholders directly affected. Breaking out into smaller groups and using participatory methods (e.g., asking participants to provide input on cards, then grouping the cards into issues and getting their input on ranking the issues) can help to capture all viewpoints. Increasingly, the same can be accomplished using digital technologies.	Public consultation for feedback on mitigation and adaptation strategies and action plans.			
Workshops	Involve/ collaborate	Government bodies Sectoral working groups Private sector Civil society Technical experts	Workshops enable different stakeholders to discuss and exchange views on specific topics, often adopting a face-to-face format that allows brainstorming and testing of ideas. A series of workshops can be more effective than a single workshop. Different workshop types can be adopted (e.g. open-space discussions that lack an initial agenda and emphasise self-organisation, write shops where groups of stakeholders develop written documents together, round-table discussions). Facilitation is important, and a skilled, neutral individual can help to ensure that group rules are clear, views are taken seriously, and no single participant dominates.	Providing inputs on climate actions for inputs to mitigation and adaptation strategies and action plans. Providing inputs on transparency/ monitoring approaches and methods.			
Focus group discussions	Consult/involve / collaborate	Sectoral working groups Private sector Civil society Marginalised / vulnerable groups	Semi-structured discussions with a small group, generally from similar backgrounds (usually 5–12 participants plus one or two skilled facilitators). Open discussions explore people's attitudes, concerns and preferences about a specific issue, with the range of viewpoints collated at the end. Focus groups generally last about two hours, and discussions are guided by a skilled facilitator.	Providing feedback on concerns about envisioned actions in mitigation and adaptation strategies and action plans			
Expert elicitation	Involve /consult	Technical experts	A protocol for consulting with experts, including a process for helping experts understand the elicitation process, avoiding biases, and producing independent and reliable judgements. Expert elicitation can help to avoid bias when expert judgements are needed for assessments <sup>7</sup> .	Review of draft national reports to the UNFCCC and technical aspects of mitigation and adaptation strategies and action plans			

7 See Annex I for an example of a protocol for expert elicitation

ТҮРЕ	ENGAGEMENT APPROACH	STAKEHOLDER GROUP	DESCRIPTION	PURPOSES
Written consultations	Involve / collaborate	Technical experts Civil society Private sector representatives	Typically, this involves using a consultation web page or printed sheet to introduce the policy / document and to solicit written input. A draft document, broad topics or open- ended questions can be used to solicit comments, with more freedom to submit personalised responses than a survey. Define a deadline for receiving comments, ensuring that this allows sufficient time for stakeholders to be made aware of the invitation for comments and to provide comments. Identify appropriate methods to solicit comments (e.g., email, letter) and for submission of comments (e.g., online, email, mail, hand delivery to an office or a box in a public place). Provide an explanation to stakeholders about how their input will be shared and used. For example, by publishing a summary at the end of the consultation.	Receive feedback on draft mitigation and adaptation strategies and action plans and UNFCCC reports
Electronic discussion (e-discussion)	Consult / Involve / collaborate	Technical experts Civil society Private sector representatives	Enables stakeholders to provide input in response to input from other stakeholders through an electronic medium. E-discussions can be moderated discussions on specific topics (e.g., comments on a draft document). They can be held through an electronic mailing list (e.g., a list server), on a website where comments from other stakeholders are posted (e.g., in response to a blog or other information posted on the web) or via social media (e.g. Twitter or Facebook). The advantages of these discussions include lower costs and the ability to reach larger audiences. The disadvantage is that access to the Internet may be limited for some stakeholders. Thus, electronic means are best used as a tool complementing other consultation methods, such as face-to-face interviews or other events. To be a successful complement to other consultation tools, online deliberations need to be competently and constructively moderated.	Provide input on draft mitigation and adaptation strategies and action plans and UNFCCC reports

Table B4: Overview of Engagement Approaches for Different Stakeholders and Purposes

Source: Adapted from ICAT. 2020 (Initiative for Climate Action Transparency) (2020). Stakeholder Participation Guide: Supporting Stakeholder Participation in Design, Implementation and Assessment of Policies and Actions

# **B3.3 Developing Communication Plans**

In order to provide the needed information to cater for the engagement approaches and purposes defined in **Table C3**, communication plans should be developed for each purpose and stakeholder group. The following describes the proposed approached for communication with the different stakeholder groups.

### B3.3.1 Public Consultation for Feedback on Strategies and Policies in Respect of Climate Change, and Climate Change Mitigation Strategies and Action Plans

The Act's Section 19 requires every Government department to undertake public consultations, for the purpose of developing strategies and policies in respect of climate change. These strategies and policies will provide inputs to the climate change mitigation strategies and action plans (CCMSAP) to be developed by the DCC in collaboration with relevant ministries, departments, parastatals, and private sector entities and associations as listed in the Fourth Schedule of the Act. In this regard, public consultation is also highly relevant for the CCMSAP.

In order to facilitate public consultations for sectoral strategies and policies in respect of climate change, and CCMSAP, there are two engagement approaches to be considered:

- 1. Information provided to the general public; and
- 2. Consultation of affected stakeholders and influencers in the general population.

The strategies and policies in respect of climate change, and CCMSAP should be made available to the general public in draft format before final validation. They should ideally be published online in their full length, and summaries should be provided through other media such as bulletin, newspapers, radio and tv.

For information related to strategies and policies in respect of climate change, and CCMSAP, the following information should be included:

- Processes for design, implementation and assessment of the policy, description of the policy, including
  - title of the policy
  - type of policy
  - description of specific interventions
  - status of the policy
  - date of implementation
  - date of completion (if relevant)
  - implementing entity or entities
  - objectives and intended impacts or benefits of the policy
  - level of the policy
  - geographic coverage
  - sectors targeted
  - related policies
  - additional information that may be relevant to describe the policy, such as activities, timeline and budget
- Key questions or issues to be addressed by the policy, including studies undertaken to inform the design, implementation and assessment of the policy (i.e., baseline analyses)
- GHG, sustainable development and transformational impacts that are expected to be (1) relevant and (2) significantly affected by the policy (either positively or negatively), if known, including impacts for different stakeholder groups
- · Changes or adaptations to plans, processes and impacts throughout the policy design and implementation cycle
- Governance structures and procedures for decision-making and oversight relating to the policy, and reports on implementation of these procedures
- · Mechanisms to participate in policy design, implementation or monitoring and evaluation
- · Mechanisms to ask questions and request information, and how to access them
- · Grievance and redress mechanisms, and how to access and use them
- Plans for stakeholder participation and opportunities to participate
- · How stakeholder input will be used, and later how it was used
- Relationship of the policy to other existing or planned policies. (ICAT.2020)

The identified affected stakeholders (e.g. by vicinity of envisioned infrastructure projects, potential beneficiaries of climate change projects' activities, informal recyclers in relation to waste projects) should be consulted at the beginning of the process to design and formulate strategies and action plans through public meetings in affected communities and through focus groups. Minutes should be taken, and concerns raised during Committee meetings. Feedback on how concerns have been addressed should be communicated in writing to stakeholder groups representatives.

The DCC should appoint a contact responsible for addressing the needs of stakeholders in relation to the stakeholder engagement process.

As part of the baseline analyses, consultations should also try to capture stakeholders' views regarding the implementation of previous mitigation and adaptation strategies and action plans, and the perceived effectiveness of previous stakeholder engagement processes in order to look for potential for improvements. This process will allow lessons learned to be captured from their strengths and weaknesses, while at the same time contextualising the opportunities and threats that need to be considered when developing the new policies and strategies.

### B3.3.2 Consultations with Private Sector and Civil Society

The formulation of strategies and policies in respectof climate change, and CCMSAP should involve the engagement of the private sector and civil society both for the purpose of identifying potential adaptation and mitigation measures, and to provide inputs regarding concerns and needs of these stakeholders. The workshops or focus discussion groups should be led by duly elected representatives of the identified stakeholder groups. There should be at least three iterations of stakeholder consultations, one in the form of workshops if possible in the preparation of baseline analyses for designing and formulating mitigation and adaptation strategies and action plans, and one for consultation on the draft mitigation and adaptation strategies and action plans. The latter can take different forms, including workshops and written inputs. The third iteration should involve the process of validation of the final policies and strategies. Further engagements would be required as part of an adaptive learning approach, whereby stakeholders are given the opportunity to participate in the monitoring and evaluation of the policies, strategies and action plans, leading to adaptive adjustments in initial documents in an iterative way.

The representatives should chapter back to their respective stakeholder groups after each of the second and third iterations about how the Committee has incorporated their inputs and addressed the concerns of the stakeholders.

#### B3.3.3 Consultations with Technical Experts

Experts can provide valuable inputs both on the feasibility of climate measures, approaches for the establishment of emission and mitigation scenarios, monitoring of emissions and measures, assessment of climate risks, and vulnerability and adaptation measures. They should therefore be consulted at the different states of thepolicy and strategy design and formulation process. Thebroad stakeholder participation offers the opportunity to expand the locus of experts beyond the expertise that is collectively embodied in the institutions mentioned in Section 2.2. This is particularly so for individual experts who do not belong to any institutions. Expert elicitation, workshops and written consultations are engagement approaches suitable to receive inputs from experts.

Expert elicitation should be used when in-depth technical support is needed, e.g., on methodological approaches to establish emission scenarios, inputs on application of methodologies to map and monitor emissions and reductions. Similarly, they can play a significant role in adaptation planning covering methodological issues and the application of tools for downscaling of climate models to better understand climate impacts, and to carry out vulnerability assessments. As many of the functions related to the actual preparation of the documents, monitoring and development and coordinate policies, projects, strategies, programmes and action plans related to climate change befall the DCC, it should identify where and when there are specific needs for expert elicitation.

Taking the functions of the DCC and potential needs for expert contribution into consideration, the DCC should identify where there are specific needs for inputs through workshops and written consultations. The CCA 2020 [Part II Section 7(1) (c)] also states that the Minister *"may appoint such technical advisory committees, greenhouse gas inventory committees and such other committees as may be necessary to assist the Council in the discharge of its functions."* If necessary, the DCC, acting as Secretariat, should request from the IMCCC the needed support through the establishment of technical advisory committees. The stakeholder identification process described in Section 2.1 is a useful way to identify these experts (bothindividual and institutional).

### **B3.4 Resources Needed**

A stakeholder engagement campaign should be accompanied by a detailed budget that will cover, among others, the costs of hiring an appropriate venue; logistical support; facilitators; stationeries; transport of stakeholders, especially representatives from marginalised and vulnerable groups; and food and refreshments. The budget should also cover the cost of developing communications materials, as well as expenses related to the publication and dissemination of materials relevant to the topic under consideration.

# B3.5 Grievance Redress Mechanism (GRM)

Addressing grievances - i.e. concerns or complaints raised by an individual or group of stakeholders is crucial for effective stakeholder engagement. Stakeholders should be informed about the existing and applicable GRMs relevant for the given, action, policy or matter related to the consultation.

#### B3.5.1 Environment Impact Assessment (EIA) Mechanism

For most large-scale construction and infrastructure projects, there are existing provisions under the Environmental Impact Assessments, Part IV of the Environment Protection Act (EPA) of 2002. Under these provisions, EIA notices are published in one daily for two consecutive dates, and the Government Gazette to invite public comments. A copy of the EIA chapter is made available in the Resource Centre of the Ministry and at the Head Office of the Local Authority, and on the Ministry's website for consultation.

Proponents applying for an EIA licence are now required to make the EIA applications on the National E-Licensing Platform (NELS) and are also required to submit three printed copies and a soft copy of the EIA chapter to the Director of Environment. All concerned authorities/ departments can access the EIA chapter through the NELS. The latter are required to submit their views/ recommendations to the Director of Environment not later than fourteen days after the expiry of the time limit set for submission of public comments.

Concurrently, a joint inter-ministerial site visit is organised together with the proponent along with his consultant(s) for an assessment of the site and the environmental implications of the proposed development on the surrounding environment. The proponent may, thereafter, be requested to carry out further studies or to submit additional information. The Director may also convene a technical committee to discuss pertinent issues on the EIA.

The application is processed and the Director's Review is prepared taking into consideration the views of the authorities concerned as well as any public comments received. The Director's Review is referred to the EIA Committee for examination and recommendations.The recommendations are forwarded to the Ministerfor a decision which is, thereafter, communicated to the proponent by the Director.

The decision on the EIA application is published in one daily and the Government Gazette. The list of conditions of the EIA licence or the reasons for the rejection of the application are also made available at the Resource Centre for consultation. Any person who is not satisfied with the decision of the Minister on an EIA may appeal within twenty-one days of the decision to the Environment and Land Use Appeal Tribunal. Any party who is dissatisfied with the Tribunal's determination on a point of law can still appeal to the Supreme Court.



Figure B4. Process for GRM through the EIA Mechanism.

### B3.5.2 Building and Land Use Permit (BLUP)

For regular development and building construction, there is a Building and Land Use Application system, which is a formal request for permission to carry out a proposed development/building construction. The process for submitting an application is as follows:

- All applications for Building and Land Use Permits (BLUP) should be made on the National Electronic Licensing System platform
- b. Applications are processed online and letters/ permits are generated electronically
- c. Applications for a BLUP are determined by the Permits and Business Monitoring Committee (PBMC)
- d. The PBMC may take the following decisions:
  - i. approve,
  - ii. approve with conditions, or
  - iii. reject the application

Approvals with modification or refusal of an application are referred to the Executive Committee of the city or municipal or District Council.

The decisions of the Executive Committee, once taken, shall be implemented immediately. The applicant will be called at the Land Use and Planning Department of the city or municipal or District Council to:

(i) Pay the appropriate fees and collect his BLP together with set of approved plans; or

- (ii) Collect his refusal letter; or
- (iii) Collect his letter of approval with modifications.

Any person aggrieved by a decision of, e.g. City Council of Port-Louis regarding a BLP application, may appeal the decision. Although, only an applicant can appeal to the Environment and Land Use Appeal Tribunal, within a delay of 21 days as from the date on which the decision was communicated. All other aggrieved parties have to appeal by way of Judicial Review.



Figure B5. Process for GRM through the BLP Mechanism.

## **B3.5.3 Citizen Support Unit**

In addition, to the provisions described earlier the general public can submit grievances through the Citizen Support Unit, either in person at Ministries, Agencies and Citizens Advice Bureaus, or online through the Citizen Support Portal https://www.csu.mu/index.php. The portal forwards grievances to the institution with the appropriate mandate upon receiving them, and provides a mediating environment between the citizen and the various governing institutions and bodies. Its Citizen Support Unit also visits concerned citizens to gather feedback and mediate if needed.

Should the complainant feel that the grievance redress remained inadequate, he/she can have recourse to the legal/ court system.



Figure B6. Process for GRM through the Citizen Support Unit.

# B4. STAKEHOLDER ENGAGEMENT RELATED TO NATIONAL CLIMATE CHANGE MITIGATION STRATEGY AND ACTION PLANS

Section 14 of the CCA 2020 defines the stakeholders that will participate in the process of formulating National Climate Change Mitigation Strategy and Action Plans, listed in the Fourth Schedule of the Act, and the frequency of review, defined as every 5 years, or at such time as the Minister to whom responsibility for the subject of climate change is assigned may determine. The National Climate Change Mitigation Strategy and Action Plans shall include:

- a) national development priorities; and
- b) policy formulation, including national policies and measures for mitigation and the enhancement of sinks; and
- c) an action plan and investment programme; and
- d) information on compliance with international commitments; and
- e) research and development; and
- f) climate data and information; and
- g) recommendations on education, training and public awareness; and
- h) approaches for monitoring, evaluation and reporting.

The content of the National Climate Change Mitigation Strategy and Action Plans and their frequency are of such nature that it should describe the implementation arrangements for the operationalisation of the mitigation component of the NDC.

The stakeholders listed in the Fourth Schedule of the CCA 2020 have been initially screened and mapped to define more precise engagement approaches. The following describes the engagement approach for the different sets of stakeholders:

# **B4.1 Stakeholders Relevant to the Design and Implementation of National Climate** Change Mitigation Strategy and Action Plans

### B4.1.1 Stakeholders with High Interest and High Influence over the Design and Implementation of National Climate Change Mitigation Strategy and Action Plans

There are stakeholders listed in the Fourth Schedule that have high interest and high Influence over the design and implementation of national climate change mitigation strategy and action plans. They should therefore be engaged in such a way to allow for their active involvement and empowerment over the design and Implementation.

- Ministry Agro-industry and Food Security
  - Forestry Service
  - National Parks and Conservation Service
  - Food and Agricultural Research and Extension Institute
- Ministry Blue Economy, Marine Resources, Fisheries and Shipping
- Ministry Commerce and Consumer Protection
  - State Trading Corporation, Ltd
- Ministry Energy and Public Utilities
  - Central Electricity Board
  - Mauritius Renewable Energy Agency
  - Utilities Regulatory Authority
  - Energy Efficiency Management Office
  - Wastewater Management Authority
- Ministry Environment
  - Department of Climate Change
  - Solid Waste Management Division
- Ministry Finance, Economic Planning and Development
- · Ministry Health and Wellness
- Ministry Housing and Land Use Planning
- Ministry Industrial Development, SMEs and Cooperatives
- Industrial Development Division
- Ministry Land Transport and Light Rail
  - National Land Transport Authority
  - Traffic Management and Road Safety Unit
  - Metro Express Ltd
- Ministry Local Government and Disaster Risk Management
- Ministry National Infrastructure and Community Development
- Ministry Tourism
- Business Mauritius
- Association des Hoteliers de Restaurateurs de l'île Maurice
- Mauritius Cane Industry Authority
- Mauritius Chemical Fertiliser Industry
- Omnicane Ltd.
- Terragri Ltd
- Alteo Agri Ltd
- Air Mauritius Ltd
- Airports of Mauritius Co. Ltd.
- Council of Registered Professional Engineers of Mauritius
- Mauritius Export Association
- Mauritius Ports Authority
- Mauritius Shipping Corporation Ltd

These stakeholders' collaboration is needed for the successful design and implementation of national climate change strategies and action plans. Governmental stakeholders and departments within them will be responsible to develop sectoral strategies and policies in respect of climate change, and private sector stakeholders will in many cases be responsible for implementing climate relevant actions with the application and diffusion of technologies and practices. These stakeholders should therefore be empowered to propose actions and provide inputs on how they can contribute to the national climate change strategies and action plans. In addition, some of the stakeholders might be highly affected by potential envisioned actions e.g., tax, subsidy and electricity tariff reforms, and other regulatory changes. Their concerns should be taken into account and alternatives proposed by these stakeholders should be considered. These selected stakeholders will therefore be able to contribute with the following required aspects that the National Climate Change Mitigation Strategy and Action Plans shall include:

- i. national development priorities; and
- ii. policy formulation, including national policies and measures for mitigation and the enhancement of sinks; and
- iii. an action plan and investment programme; and
- iv. recommendations on education, training and public awareness; and
- v. approaches for monitoring, evaluation and reporting.

### B4.1.2 Stakeholders with Low Interest and High Influence over the Design and Implementation of National Climate Change Mitigation Strategy and Action Plans

The following stakeholders are identified as having low interest but high influence over the national mitigation strategy and action plans. Low interest, meaning that their daily operations and core business are not expected to be highly impacted by the national climate change mitigation strategy and action plans. These institutions are the remaining ones from the Act's Fourth Schedule, and consisting of academia, research institutions and agencies sourcing and providing standards and data:

- University of Mauritius
- University of Technology, Mauritius
- Council of Registered Professional Engineers of Mauritius
- Mauritius Research and Innovation Council
- Mauritius Standard Bureau
- Statistics Mauritius

These stakeholders' are especially relevant for the following aspects:

- i. Information on compliance with international commitments
- ii. Research and development
- iii. Climate data and information
- iv. Recommendations on education, training and public awareness
- v. Approaches for monitoring, evaluation and reporting
- vi. Advise on policy formulation, including national policies and measures for mitigation and the enhancement of sinks

These stakeholders should be involved in the process of formulating national climate change mitigation strategy and action plans and be consulted as experts, but do not necessarily need to collaborate or have decision-making roles.

# **B4.1.3 Engagement Approach**

#### Technical Working Groups for the Development of Climate Change Mitigation Strategy and Action Plan

The DCC should engage stakeholders listed in the Fourth Schedule and beyond through technical working groups, leaning on the existing structures for climate planning in Mauritius, aligned with the CCA 2020. The CCA 2020 section 12,4(a) foresees the establishment of sub-committees under the Climate Change Committee, as necessary. The figure below illustrates the potential division of sub-committees, based on the definition of sectors aligned with the IPCC sectors, in the institutional arrangements for climate governance described in the guidelines for the implementation of the climate change mitigation provisions of the Climate Change Act 2020.



Figure B7. Potential Definition of Sectoral Working Groups Structured in Sub-Committees.

The technical working groups should engage in sectoral focus group discussions with both government and non-state actors. The DCC should provide to the stakeholders an initial sectoral overview of climate actions as reported by the sectors through the national NDC registry, and other transparency provisions by the UNFCCC. The discussions should then gather inputs on actions and expected GHG emission reduction contributions from sectoral strategies, policies and measures in respect of climate change, and private sector and civil society organisations' ongoing and planned action relevant to climate change. This information will provide an initial input on the ongoing and planned climate actions in the different sectors, allowing for a stocktake and assessment if actions and emission reductions are aligned with the setablished national targets, and potential increased ambition for future NDC targets. Discussions should then be held on national development priorities, and ways to enhance mitigation ambition in the respective sectors. The discussions should result in the following outputs:

- Overview of national development priorities
- Overview of current sectoral strategies and policies in respect of climate change and their level of implementation, and current approaches for monitoring, evaluation and reporting
- Overview of climate actions by non-state actors
- Stocktake of mitigation efforts and alignment with current ambition level
- Potential for increased ambition and barriers to achieve such ambition, as contribution to policy formulation, including national policies and measures for mitigation and the enhancement of sinks
- Identification of needs of the different stakeholders in order to raise mitigation ambition, including recommendations on education, training and public awareness

The discussions should be facilitated by the DCC, and attended by technical experts able to provide guidance and relevant inputs. Minutes of the discussions should be circulated to the participants for review.

#### Workshops for Identifying New and Additional Mitigation Actions

Sectoral workshops should be held to elaborate on the list of potential actions for increased ambition, and provide an overview of initial identified barriers to implement the identified activities. The stakeholders should prioritise amongst the identified mitigation actions using multi-criteria-analysis as the prioritisation approach. Prior to the prioritisation, the DCC might have to interact with the relevant Government bodies and non-state actors, and technical and sectoral experts to prepare technical data and information regarding the different identified mitigation actions. Academia and research institutions can here provide valuable inputs as experts. During the multi-criteria analysis prioritisation the stakeholders will review the different mitigation options, define prioritisation criteria for the actions' selection, assign score to the actions, and weights to the prioritisation criteria to arrive at a consensus on which actions should be prioritised.

Stakeholders needed for implementation and a responsible entity for each action should be identified and agreed upon, to assign responsibilities for further development of the climate actions in question.

The workshops should result in the following outputs:

- Identification of prioritised mitigation options as inputs to national policies and measures for mitigation and the enhancement of sinks, including CCMSAP.

The workshops should be organised by the DCC and attended by technical experts and potentially assisted by skilled facilitators with experience in the application of multi-criteria analysis. Minutes of the analysis and final selection of actions should be circulated to the participants for final review and validation.

#### Written Consultations / E-Discussions to further Develop Prioritised Mitigation Actions

Written consultation and/or e-discussions should be facilitated by the DCC to allow the stakeholders needed for implementation of the prioritised actions to elaborate on the proposed actions. The identification of barriers should form the starting point to identify potential actions for barrier removal, in the regulatory, financial, social domain or other. Once the needed actions for the establishment of enabling environments are identified, the design of the mitigation actions should focus on the identification of appropriate implementation instruments, e.g. regulatory /subsidy /tax reform, financial structuring / concessional finance and support, Introduction of new standards and effective enforcement, etc. Once the implementation instruments are identified, the impact potential of the policy/action should be analysed, and its expected mitigation contribution established. In the process of impact assessment, indicators, approaches and responsibilities of monitoring, evaluation and reporting should be identified, and defined. Eventual support needs should be clearly communicated and actions to meet those need should be integrated into the mitigation strategy and action plans.

The consultations / e-discussions should result in the following outputs:

- Inputs to policy formulation, including national policies and measures for mitigation and the enhancement of sinks as part of the national climate change mitigation strategy and action plans
- Definition of investment needs and overall cash flow of proposed actions, as inputs to the action plan and investment programme
- Monitoring, evaluation and reporting approach for the mitigation action

The DCC should facilitate the discussions, and technical experts should be invited to the consultations and discussions to provide relevant inputs.

**Figure B9** illustrates a potential set of a sub-committee for the energy sector, as defined in the Institutional arrangements for climate governance - Guidelines for the implementation of the climate change mitigation provisions of the Climate Change Act 2020. In this example, the sub-committee is chaired by the representative of Ministry of Energy and Public Utilities to the CCC. It would then be up to the sub-committee to propose to the CCC to establish ad hoc sub-committees to work on any technical issues for specific subsectors, such as road transport or others.



Figure B8: Potential Organisation Structure for a Sub-Committee on Energy

CCD: Climate Change Department; CEB: Central Electricity Board; EEMO: Energy Efficiency Management Office; IPPs: Independent Power Producers; MAIFS: Ministry of Agro-Industry and Food Security; MARENA: Mauritius Renewable Energy Agency; MBEMRFS: Ministry of Blue Economy, Marine Resources, Fisheries and Shipping; MCIA: Mauritius Cane Industry Authority; MEPU: Ministry of Energy and Public Utilities; MIDSMEC: Ministry of Industrial Development, SMEs and Cooperatives; MLTLR: Ministry of Land Transport and Light Rail; MNICD: Ministry of National Infrastructure and Community Development; MRIC: Mauritius Research and Innovation Council; STC: State Trading Corporation; SWMD: Solid Waste management Division; URA: Utility Regulatory Authority; WWMA: Wastewater Management Authority;

# **B5. FURTHER APPROACHES TO PROMOTE AND ENHANCE THE PARTICIPATION OF STAKEHOLDERS, INCLUDING THE BUSINESS COMMUNITY AND NON-GOVERNMENTAL ORGANISATIONS**

# B5.1 Coordination Committee on Resource Mobilisation and Climate Finance (RMCF)

#### **B5.1.1 Scope**

A NDC Coordination Committee on Resource Mobilisation was set up by the IMCCC under the chairmanship of the Ministry of Finance, Economic Planning and Development (MOFEPD) to implement the Mauritius Nationally Determined Contribution (NDC). This committee is a great initiative and should serve as the basis for a subcommittee to be established under the CCC. The current RMCF has although a limited scope, focusing on coordinating and facilitating mobilisation of resources and funding for the implementation of the NDC. The Committee should serve the following purposes in order to cover the broad spectrum of activities relevant to climate finance:

- Provide an overview of climate relevant finance received from the international community, which is also relevant for inputs to the upcoming Biennial Transparency Reports to be submitted to the UNFCCC
- Capture climate related national spending and tagging climate related expenditures in the national budget. Including the establishment of guidelines and approaches to identify and tag climate expenditures
- Provide strategic inputs to the IMCCC on climate related finance for the achievement of national targets (NDC) and implementation of climate change strategies and action plans
- Devise options, discuss and make recommendations on appropriate strategies for mobilisation of resources for the implementation of measures identified in the Mauritius NDC
- Track progress on resources to be mobilised from institutions concerned and inform members accordingly
- Strategic planning for attracting climate finance from the international community based on available sources of funding, requirements for funding and scope of funds, and existing track record on secured finance in Mauritius
- Identify funding opportunities and windows available on Climate Change, and share relevant information with

all members

- Discuss and follow up on the formulation of project proposals submitted by organisations concerned
- Compile inputs and views towards finalisation of project proposals, and its endorsement and submission to institutions concerned through appropriate channels
- Consider climate expenditures reporting by the private sector, through disclosure in financial statements.

#### Methodological Aspects

The following are central methodological aspects the sub-committee should agree on:

- What financing is defined as "climate finance"?

How can climate related (incremental) costs be identified and calculated?

- How can climate related expenditures of national budgets be captured (e.g. can existing methods like RioMarkers / CPEIR be applied in the Mauritian context)?
- How is the concept of "new and additional" finance (from the international community) be applied?

How is the definition of climate finance transferred to the private sector?

To facilitate dialogue between the different stakeholders, the establishment of a taxonomy of activities that would be considered climate finance is recommended.

## **B5.1.2 Identifying Stakeholders**

As a minimum, the coordination committee on RMCF should contain representatives who belong to the High Interest/ high influence category, as described in **Figure B4**. These include the following institutions and entities that have the appropriate mandates, institutional capacities and competencies to provide the needed inputs:

- A representative from the DCC
- A representative of the Ministry responsible for the subject of finance, economic planning and development
- National designated authorities and focal points for international climate funds<sup>8</sup>
- A representative from Development Bank of Mauritius
- A representative of Business Mauritius
- Small Farmers Welfare Fund (under the aegis of the Ministry of Agro-Industry and Food Security)
- Sugar Insurance Fund Board (under the aegis of the Ministry of Agro-Industry and Food Security)
- CSO representative

In addition, the coordination committee on RMCF should also include other stakeholders that are central for financing climate action, including:

- A representative from the Central Bank, Bank of Mauritius
- Local banks representatives
- Donor agencies with country offices / presence in Mauritius and/or agencies which provide frequent support

MOFEPD will be in charge of calling for meetings and preparing agendas and minutes.

#### **B5.1.3 Engagement Approaches**

The coordination committee on RMCF should meet at least once a year for analysis of data on climate expenditures, expected cost of NDC implementation and achievement, and progress of attracting finance from international sources, in order to chapter central information to the IMCCC. In addition, it should meet frequently once established in order to resolve methodological aspects related to the definition, identification, and analysis of climate finance.

The coordination committee on RMCF will initially have to engage with other institutional stakeholders on a need-by-need basis in order to get inputs on the climate relevance of their programmes and projects, and identifying climate funding opportunities. Once the methodological issues are resolved, definitions of climate finance available, and guidance on how to identify and calculate climate related expenditures available, these should be shared with the other stakeholders. Ideally, this should result in a budget tagging system where climate related expenditures are captured automatically during budgeting tasks.

The coordination committee on RMCF should also guide institutions and entities on approaches of costing climate action, and identification of climate related (incremental) costs.

Each year, the coordination committee on RMCF should provide the DCC and IMCCC with a status chapter on climate finance, including past and future climate expenditures and financing, disaggregated by source (public, private, national and international). This is published yearly in Budget Documents.

<sup>8</sup> For the Green Climate Fund, Global Environment Facility and Adaptation Fund, currently Mr. Dharma Dev Manraj, Financial Secretary, Ministry of Finance

# B5.2 Stakeholder Engagement for Financing National Climate Action through the National Environment and Climate Change Fund

#### **B5.2.1 Scope**

Once mobilised, climate finance also needs to be channelled to specific activities that enable climate action. The National Environment and Climate Change Fund established under the Environment Protection Act has as objectives, inter alia to finance projects, programmes and schemes, and may inter alia consider financing the actions identified in the mitigation strategy and action plans. Income for the fund is envisioned through:

- a) funds raised from public activities organised with the approval of the Board
- b) any contribution made by the private sector
- c) any donation, grant and other receipt from international organisations
- d) any money received from the Consolidated Fund9
- e) such other sum as may lawfully accrue to the Fund

Disbursement of funds to finance projects and activities can only happen with the authorisation of the Board. The Board fulfils the following functions:

- Review the execution of projects for which financing has been earmarked
- Assesses project progress and any delays in project implementation
- Closely monitor project implementation
- Review and approve that funds be transferred to the respective Deposit Account, as applied for by the respective Ministries/Departments to effect payments accruing under various projects
- Push for remedial action where required and approve projects / proposals for which financial clearance has previously been obtained
- Approve financial statements and final accounts for auditing purposes.

#### **B5.2.2 Identifying Stakeholders**

The relevant stakeholders are already identified by the Environment Protection Act as the Fund's Board members, consisting of:

- a) A Deputy Financial Secretary, as Chairperson, to be designated by the Financial Secretary
- b) The Supervising Officer of the Ministry responsible for the subject of the environment, or his representative
- c) The Supervising Officer of the Ministry responsible for the subjects of local government and disaster risk management, or hisrepresentative
- d) The Supervising Officer of the Ministry responsible for the subjects of national infrastructure and community development, or his representative
- e) The Supervising Officer of the Ministry responsible for the subjects of land transport and light rail, or his representative
- f) The Supervising Officer of the Ministry responsible for the subject of tourism, or his representative
- g) A representative of the Land Drainage Authority established under Land Drainage Authority Act 2017
- h) A representative of the National Development Unit of the Prime Minister's Office
- i) The Accountant-General, or his representative.

The stakeholders and institutions represented by the Board are aligned with stakeholders that will be engaged through the CCC, and by affiliation, the stakeholders that will participate in the process of formulating National Climate Change Mitigation Strategy and Action Plans, listed in the Fourth Schedule of the Climate Change Act 2020, even though the ones in the Board only represent a small selection. Given the functions of the Fund, broad stakeholder representation shouldn't be necessary, as the climate relevant activities that the Fund will finance will already go through a broad stakeholder representation through the formulation of National Climate Change Mitigation Strategy and Action Plans.

<sup>9</sup> The Consolidated Fund established by Section 103 of the Constitution consists of revenues or other money raised or received for the purposes of the Government

#### **B5.2.3 Engagement Approaches**

Projects are assessed at the level of MOFEPD and incorporated within the Fund for financing. Thus, the RMCF will be the fora for stakeholder engagement and strategic discussions on funding of projects through the National Environment and Climate Change Fund. The Board is convened by the Chairperson on a monthly basis to fulfill its functions. The engagement approach should enable active discussion, and should preferably be done through in person discussions, or through e-meetings. The Board also recommends the tabling of the financial accounts of the Fund to the National Assembly, by the Minister of Environment, Solid Waste Management and Climate Change and thus, by extension engages the decision-makers at the highest political level.

## **B5.3 Sub-Committee on International Partners**

#### **B5.3.1 Scope**

The sub-committee's scope is to enhance the efficiency and effectiveness of implementation and financing of climate action in Mauritius with assistance from the international community. The sub-committee will serve the following purposes:

- Reporting from donor and international agencies on the active initiatives in Mauritius and upcoming
  opportunities.
- Identification, alignment and matchmaking of country and donor's priorities in respect to climate action.
- Coordination amongst donor activities, creating synergies and enhancing efficiency.
- Prioritisation of climate action support from the international community.

#### **B5.3.2 Identifying Stakeholders**

The sub-committee shall consist of all the international agencies providing support to Mauritius, which are present or have a country office. Additional donor agencies of strategic importance should be invited to participate remotely. In addition, a representative from the DCC should participate in all meetings to represent country priorities in respect to Climate Change, in addition to a representative of the Ministry responsible for the subject of foreign affairs (MFA) and MOFEPD. These stakeholders are identified as belonging to the high Interest/ high influence category, as described in **Figure B4**, concerning climate finance. The government representatives will also have an overview of active projects supported by the international community in Mauritius, thus being able to update the stakeholders that should be part of the sub-committee. MOFEPD will be in charge of calling for meetings and prepare agendas and minutes.

#### **B5.3.3 Engagement Approaches**

The engagement approach should enable active discussion, and should preferably be done through in person discussions, or through e-meetings. The sub-committee should meet at least once every six months in order to chapter on the advancement of active initiatives and discuss potential upcoming opportunities. This frequency will also facilitate the sharing of information on advancements in active projects, thus allowing other initiatives to capitalise on intermediate deliverables of activities, enhancing constructive synergies between initiatives and avoiding replication.

The sub-committee should work as a reporting channel, to allow international agencies and donors to chapter on support provided to Mauritius on a biennial basis, to facilitate reporting through BTRs.

## **B5.4 Sub-Committee for Business and Industry**

The private sector is pivotal for effective climate action implementation, as in most cases it is responsible for the provision, installation, operation and maintenance of technologies and services, but also in terms of financing private sector actions relevant for climate change. Private sector engagement strengthens non-state sector actions, such as voluntary commitments, implementation of new technologies, and private sector financing, but also enhance private sector participation in policies and actions.

Representation by the private sector is envisioned through the institutional arrangements outlined in the CCA 2020, but only through one representative engaging through the CCC, and some selected firms and private sector interest organisations for the formulation of CCMSAP, as listed in the Fourth Schedule of the CCA 2020. These representatives will have a crucial role in representing the whole of Mauritius private business and industry's interests in respect to climate action. In order to ensure as wide a representation as possible, the representatives for the private sector should consult with the stakeholders they represent using the approach outlined in Chapter 3. This will enable gathering feedback and information, and identify potential additional and/or unnoticed contributions of the private sector against national targets and climate change strategies and action plans. These stakeholders should then convene together into a sub-committee to discuss and present a coordinated input from the private sector.

#### **B5.4.1 Scope**

The sub-committee should provide the opportunity for business and industry stakeholders to share concerns and ideas related to climate change issues, and provide a coordinated response to the government's request for contributions to the NDC and climate change strategies and action plans. The sub-committee can also strategies about comparative advantages by greening the Mauritian business and industry profile through, e.g. the establishment of climate targets for the industries, businesses and sectors, and potential for additional revenue through voluntary and international carbon markets. In addition, the sub-committee can serve to share best practices and identify potential synergies between businesses and industries, e.g. for energy efficiency initiatives, coordinated ecotourism planning and investment in renewables.

## **B5.4.2 Identifying Stakeholders**

The sub-committee should as a minimum consist of one representative from the following private sector interest organisations:

- Business Mauritius
- Mauritius Chamber of Agriculture
- Mauritius Chamber of Commerce and Industry
- Association of Hoteliers and Restaurants in Mauritius
- Association des Hotels de Charme
- Independent Power Producers
- · Energy Service Companies and providers of energy services and equipment
- Mauritius Export Association
- Mauritius Sugar Syndicate
- Mauritius Meat Producers' Association
- Mauritius Co-operative Agricultural Federation Ltd
- Council of Registered Professional Engineers of Mauritius
- · Construction Industry Development Board

These stakeholders are identified as belonging to the high Interest/high influence category, as described in **Figure B4**, concerning non-state actors relevant for climate action. The stakeholders should themselves do a stakeholder mapping to potentially identify additional stakeholders that should participate in the sub-committee.

### **B5.4.3 Engagement Approaches**

The stakeholders should be invited to engage with the DCC at a minimum in relation to each NDC preparation and climate change strategy and action plan. Meetings and discussions should be facilitated by the DCC, including draft agendas and description of scope of the meetings, but stakeholders should have the opportunity to influence both the scope and agenda. The Department should strive to get commitments to communicate non-state climate action, and chapter on their implementation regularly to match BTR submissions. A possibility for private sector entities to chapter interventions into the NDC registry currently under development should be considered.

# **B5.5 Consultation with CSO/NGOs**

#### **B5.5.1 Scope**

Civil society organisations and non-governmental organisations (CSO/NGO) in general represent the voice of groups of the general public, including specific topics and interests. They can be divided into environmental non-governmental organisations, indigenous and marginalised peoples' organisations, research and independent non-governmental organisations, trade unions non-governmental organisations, women and gender, and youth organisations.

Representation by civil society is envisioned through the institutional arrangements outlined in the CCA 2020, but only through one representative engaging through the CCC, to be appointed by the Minister to whom responsibility for the subject of climate change is assigned. This representative will have a crucial role in representing the whole of Mauritius civil society in respect to climate action. In addition, CSO/NGO representation in climate related matters is also envisioned through the National Network for Sustainable Development established under the Environment Protection Act, where inter alia, the Minister to whom responsibility for the subject of the environment is assigned can designate five or more CSO/NGO representatives. More specifically, the Network shall:

- a. examine, and comment on, any relevant climate change guidelines
- b. make recommendations for policies and approaches to achieve climate change-resilient sustainable development; and
- c. make recommendations for policies and approaches for greenhouse gas emission reduction to achieve a lowemission economy.

### **B5.5.2 Identifying Stakeholders**

The CSO/NGO representatives to the Committee and the National Network for Sustainable Development can be identified through the official list of NGOs affiliated to the MOESWMCC<sup>10</sup>, and should be considered to be expanded beyond the minimum of six total representatives allowed by the Climate Change Act 2020 and the Environment Protection Act 2002. In addition to the identified NGOs and CSOs, the Department should approach the National Youth Environment Council (NYEC). Climate change planning, being an intragenerational issue, where the future generations will be more affected by the actions taken today, should give high importance to the concerns and views of youth, and the NYEC provides an excellent vehicle for consultation and engagement of this specific group of stakeholders.

The NYEC is set up under the aegis of the Prime Minister's Office, to give an opportunity to the youth to contribute in the decision-making process formatters relating to the protection of the environment, and consists of thirteen members between 18–35 years of age. The members are chosen based on gender balance and appropriate representation of NGOs involved in the conservation and preservation of marine sciences, biodiversity, climate change, sustainable agriculture and education/heritage.

### **B5.5.3 Engagement Approaches**

In order to ensure a wide representation as possible, the civil society representative of the CCC should consult (CSO/ NGO) organisations represented through the National Network for Sustainable Development and beyond, to discuss concerns and ambition related to the NDC and climate change strategies and action plans, and potential impacts on the interest group/area they represent. The representative should follow the approach for stakeholder consultation outlined in Chapter 3. In addition, the representative should chapter on non-state actions relevant for climate change, currently under implementation by CSO/NGO. The consultations with the NYEC should focus on recommendations andproposals on how youth engagement in climate action can be enhanced, including aspects of sensitisation, awareness and education.

<sup>10</sup> A list of NGOs affiliated to the MOESWMCC is available on the Ministry's website: https://environment.govmu.org/Documents/ngo180620.pdf

# **B6. CONCLUSION**

The SEP provides an overview of how the CCA 2020 caters for stakeholder engagement through the Climate Change Council and the CCC, and through the stakeholders listed in the CCA 2020's Schedules. Being a framework legislation, the CCA 2020 does not provide a specific guide on how wider stakeholder engagement is to take place, the scope and frequency of the engagement, how stakeholders are to be identified and classified, the engagement approach, and how to fit this engagement within the structures established by it. In line with the CCA 2020, the SEP provides this information as a resource document to guide institutions on how stakeholder engagement should be done, and also lists the tasks needed to be performed by the Council and CCC in relation to national needs and international obligations and provides a plan for how the Council and CCC can schedule consultations to effectively respond to their tasks. The SEP tries as much as possible to work within the structures established by the CCA 2020 and elaborated upon in the *Guidelines for the implementation of the climate change mitigation provisions of the Climate Change Act 2020*, made by ELIA under the NAMA project, but it also utilises existing structures, systems and approaches to the extent possible so as not to duplicate efforts and put undue burden on the institutions.

The SEP further describes the general approach that Government Departments should apply for stakeholder engagement for the identification and development of climate actions, and formulation of mitigation and adaptation strategies and action plans, and public consultations of the more general public, civil society and interest organisations. A stakeholder identification and classification methodology is provided, dividing stakeholders in four classes with respective engagement approaches:

- A. High interest/high influence Collaborate/empower
- B. High interest/low influence Consult
- C. Low interest/high influence Involve/consult
- D. Low interest/low influence Inform

Different consultation modalities are described for a variety of purposes to ensure effective stakeholder engagement. The SEP provides the information relevant to be included in communication plans to stakeholders, and approaches to address grievances through the existing provisions under the EIA and BLUP frameworks and the Citizen Support Unit. The SEP further identifies and classifies the relevant stakeholders to engage in the formulation of National Climate Change Mitigation Strategy and Action Plans and describes how they should be engaged. Finally, the SEP provides a description of sub-committees, related stakeholders and related engagement approaches that could be established under the CCC in order to effectively engage stakeholders relevant for planning and attracting climate finance, enhanced engagement of the business and industry community, and effective engagement with civil society and NGOs.
# B-ANNEX I - 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES - VOLUME 1: GENERAL GUIDANCE AND REPORTING-A PROTOCOL FOR EXPERT ELICITATION

Wherever possible, expert judgement should be elicited using an appropriate protocol. An example of a well-known protocol for expert elicitation, Stanford/SRI protocol, has been adapted and is described below.

- Motivating: Establish a rapport with the expert, and describe the context of the elicitation. Explain the elicitation method to be used and the reason it was designed that way. The elicitor should also try to explain the most commonly occurring biases to the expert, and to identify possible biases in the expert.
- Structuring: Clearly define the quantities for which judgements are to be sought, including, for example, the year
  and country, the source/sink category, the averaging time to be used (one year), the focus activity data, emission
  factor or, for uncertainty, the mean value of emission factors or other estimation parameter, and the structure of
  the inventory model. Clearly identify conditioning factors and assumptions (e.g., resulting emissions or removals
  should be for typical conditions averaged over a one-year period).
- Conditioning: Work with the expert to identify and record all relevant data, models, and theory relating to the formulation of the judgements.
- Encoding: Request and quantify the expert's judgement. The specific qualification will differ for different elements and be present in the form of a probability distribution for uncertainty, and an activity or emission factor estimate for activity data and emission factors. If appropriately managed, information on uncertainty (probability density function) can be gathered at the same time as gathering estimates of activity or emission factor. The section on encoding in Chapter 3 describes some alternative methods to use for encoding uncertainty.
- Verification: Analyse the expert's response and provide the expert with feedback as to what has been concluded regarding his or her judgement. Is what has been encoded really what the expert meant? Are there inconsistencies in the expert's judgement?

## **Possible Biases in Expert Elicitation**

Elicitation protocols should be designed to overcome the biases that can be introduced by the rules of thumb (sometimes called heuristics) that experts use when formulating judgements.

- The most common unconscious biases introduced by rules of thumb are:
- Availability bias: This is basing judgements on outcomes that are more easily remembered.
- Representativeness bias: This is basing judgements on limited data and experience without fully considering other relevant evidence.
- Anchoring and adjustment bias: This is fixating on a particular value in a range and making insufficient adjustments away from it in constructing a representative estimate.

To counteract the first two potential sources of bias, elicitation protocols should include a review of relevant evidence. In order to counteract the third potential source of bias, it is important to ask the expert to make judgements regarding extreme values first, before asking for judgements regarding the best estimate or central values for an uncertainty distribution.

There is also the possibility of more conscious biases:

- Motivational bias is a desire by an expert to influence an outcome or to avoid contradicting prior positions on an issue.
- Expert bias arises from an unqualified expert's desire to appear as a true expert in the field. This would typically lead to overconfident estimates of uncertainty.
- Managerial bias is a situation in which an expert makes judgements that achieve organisational goals, rather than judgements that reflect the actual state of knowledge regarding an inventory input.
- Selection bias occurs when the inventory compiler selects the expert who tells it what it wants to hear.

The best way to avoid these biases is to be careful in the selection of experts. Expert judgements can be elicited from individuals or groups. Groups can be useful for sharing knowledge and hence could be part of the motivation, structuring, and conditioning steps of the elicitation. However, group dynamics occasionally introduce other biases. Thus, it is usually preferable to elicit judgement on an individual basis. When eliciting judgements independently for a given quantity from

two or more experts, it is possible that different views on distributions (or ranges) will be obtained. In some cases, the differences may not lead to a significant difference in the overall estimate for the inventory, such as when the inventory is not sensitive to the particular quantity. Thus, in these cases, disagreements among experts do not matter significantly to the overall assessment. However, when judgements differ, and when the quantity of the judgements is made is important to the overall inventory, there are two main approaches that can be used. One is to estimate resulting emissions or removals and perform the uncertainty analysis separately for each set of judgements and compare the results. The other is to ask the experts to weight the judgements and combine them into one assessment. The former approach is preferred where possible, but the latter is acceptably provided that the judgements are weighted and not averaged. The difference is that weighting enables sampling from each of the expert's estimations, whereas averaging can produce intermediate values that are not supported by any of the expert's judgement.

A similar situation can occur when comparing predictions with alternative models, as described in the section of 'Combining Data Sets Numerically' in Section 2.2.3. The distinction between weighting and averaging is explained there. Although the development of weighting schemes can be complex, it is reasonable to start with assuming equal weights for each expert and refine the development of weights only as needed or as appropriate for a given situation.

### **Expert Judgement Documentation**

The subjective nature of expert judgement increases the need for quality assurance and quality control procedures to improve the comparability of emissionand uncertainty estimates between countries. It is recommended that expert judgements are documented as part of the national archiving process, and inventory compilers are encouraged to review expert judgements, particularly for key categories. Table C2A.1 below shows an example of the document elements necessary to provide transparent expert judgement (Column 1) and an example of the data to record (Column 2).

Such documentation will save the compiler a considerable amount of time in reporting and documenting the inventory through the enhanced transparency of the inventory. More general text on documentation, checking and review of methods is included in Chapter 6, QA/ QC and Verification, of Volume 1. These principles should also be applied to the use of expert judgement in inventory compilation and uncertainty assessment.

TABLE 2A.1								
EXAMPLE OF DOCUMENTATIO	ON OF EXPERT JUDGEMENT							
Documentation Element	Documentation Example							
Reference Number for judgement	EJIPPU2005-001							
Date	14 <sup>th</sup> January 2005							
Name of Expert(s) involved	Dr Anne N Other							
Experts' Background (references, roles, etc.)	Nitric Acid Process emissions and abatement industrial expert							
The Quantity being judged	National emission factor for emissions of N <sub>2</sub> O from Nitric Acid Plant							
<i>The Logical Basis</i> for judgement, including any data taken into consideration. This should include the rationale for the high end, low end, and central tendency of any uncertainty distribution	An absence of measurement data for 9 out of the 10 Nitric Acid plant. The single plant estimate has been recommended as the basis for a national factor to be applied to national nitric acid production.							
<b>The Result:</b> e.g., activity value, emission factor or for uncertainty the probability distribution, or the range and most likely value and the probability distribution subsequently inferred	8.5 kgN <sub>2</sub> O/tonne nitric acid produced for 1990 – 2003							
Identification of any External Reviewers	Nitric Acid Trade Association							
Results of any External Review	See document: e:/2003/ExpertJudgement/ EJIPPU2005-001.doc							
Approval by Inventory Compiler specifying date and person	25 <sup>th</sup> January 2005, Dr S.B Else							

## **B-REFERENCES:**

Climate Change Act 2020, 2020: *The Climate Change Act 2020*, Act No. 11 of 2020, Legal Supplement 429 to the Government Gazette of Mauritius No. 145 of 28 November 2020

ELIA, 2020: Institutional arrangements for climate governance (baseline analysis and recommendations) (draft version 2). 7 September 2020

ELIA, 2021: Institutional arrangements for climate governance - Guidelines for the implementation of the climate change mitigation provisions of the Climate Change Act 2020, For Components 1 and 3 under the GEF project Nationally Appropriate Mitigation Actions (NAMAs) for Low CarbonIsland Development Strategy for the Republic of Mauritius

ICAT (Initiative for Climate Action Transparency), 2020. Stakeholder Participation Guide: Supporting Stakeholder Participation in Design, Implementation and Assessment of Policies and Actions, J.C. Durbin and S. Vincent, eds. Washington, D.C.: Climate, Community& Biodiversity Alliance and Verra; Bonn: ICAT.

https://climateactiontransparency.org/icatguidance/stakehold er-participation/

# GUIDELINES FOR IDENTIFYING AND PRIORITISING MITIGATION ACTIONS



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# **C-LIST OF ACRONYMS**

CCA 2020	CLIMATE CHANGE ACT 2020	
ССМ	CLIMATE CHANGE MITIGATION	
GEF	GLOBAL ENVIRONMENT FACILITY	
GHG	GREENHOUSE GAS	
MCA	MULTI-CRITERIA ANALYSIS	
NAMA	NATIONALLY APPROPRIATE MITIGATION ACTION	
NCCMSAP	NATIONAL CLIMATE CHANGE MITIGATION STRATEGY AND ACTION PLAN	
NDC	NATIONALLY DETERMINED CONTRIBUTION	
ΡΑ	PARIS AGREEMENT	
SEP	STAKEHOLDER ENGAGEMENT PLAN	
SWMD	SOLID WASTE MANAGEMENT DIVISION	
ТАР	TECHNOLOGY ACTION PLAN	
TFS	TECHNOLOGY FACT SHEET	
TNA	TECHNOLOGY NEEDS ASSESSMENT	
TNC	THIRD NATIONAL COMMUNICATION	
UNEP	UNITED NATIONS ENVIRONMENT PROGRAMME	
UNFCCC	UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE	

# **C1. INTRODUCTION**

The identification and prioritisation of mitigation actions are related to the decision of the Conference of Parties 1/CP21.<sup>1</sup> Paragraph 35, invited Parties "to communicate, by 2020, to the secretariat mid-century, long-term low greenhouse gas emission development strategies in accordance with Article 4, paragraph 19, of the Agreement". The low greenhouse gas (GHG) development strategies would be published on the United Nations Framework Convention on Climate Change (UNFCCC) website.<sup>2</sup> Article 4 of the Paris Agreement states that Parties<sup>3</sup> should aim to reach global peaking of GHGs as soon as possible and to undertake rapid reductions thereafter based on the best available science in order to achieve balance between anthropogenic emissions and removals by sinks of GHGs - i.e. net zero carbon emissions - in the second half of this century. Reductions in GHGs are to be carried out on the basis of equity and based on national circumstances<sup>4</sup> to support sustainable development and the eradication of poverty. The application of paragraph 35 and Article 4 to a small emitter like Mauritius has been carried out to provide an equity-based, effort-sharing perspective on long-term GHG emission reductions, aligned with the goal of netzero emissions by 2050.5

The identification and prioritisation of mitigation actions should therefore be carried out within the ambit of developing a national long-term low-carbon development strategy. Such an approach will be aligned with the provisions of Section 14 of the Climate Change Act (CCA 2020) related to the National Climate ChangeMitigation Strategy and Action Plan (NCCMSAP)<sup>6</sup> According to Section 14(2), the NCCMSAP shall be formulated in accordance with (a) UNFCCC and related instruments; and (b) national development priorities. The latter implies understanding the time implications of climate change mitigation for the country's development priorities. The development priorities can be captured by the appropriate choice of criteria and indicators used in multi-criteria analyses for identifying and prioritising mitigation actions.

The guidelines are set out in two parts:

- 1. Section 1: Process and Procedures This section describes the process that is proposed for identifying and prioritising mitigation actions. Since the NDC is concerned with mitigation contributions, the linkage between mitigation contributions and mitigation actions is first discussed. It is explained how mitigation actions, or the ensemble of policies and projects, are equated to technological options for mitigation. The process is based on the Technology Needs Assessment (TNA) methodology, and its application as a bottom-up method to support the NDC process is explained. The procedures for making the process inclusive of necessary stakeholders and having a gender-differentiated outcome are outlined.
- **2. Section 2:** Identifying and prioritising mitigation actions This section details the steps for identifying and prioritising mitigation actions. It also presents tools that can be used to carry out the two steps.

The process, procedures and tools are proposed from a learning-by-doing perspective to reinforce human and institutional capacity that has been acquired through successive UNFCCC-related and GEF-funded projects, including the TNA project and the Third National Communication (TNC). The NAMA project delivered an online training on the use of multi-criteria analysis (MCA) for prioritising mitigation technologies on 7 July 2021, and a training chapter was delivered. This guidance document applies the same process and procedures, and it references the tools that were used in the training and past projects.<sup>7</sup>

It is pointed out that the process of identifying and prioritising falls under the ambit of Section 16(1)(b)(ii) of the CCA 2020 wherein public and private institutions 'take into account climate change in their strategies, action plans and other policies'.<sup>8</sup>

7 These Excel-based tools are available upon request from the Department of Climate Change.

<sup>1</sup> UNFCCC (2021) Chapter of the Conference of the Parties on its twenty-first session, held from November 30 to December 13, 2015.

<sup>2</sup> The long-term, low-carbon strategies that have been communicated to the UNFCCC are found at: https://unfccc.int/process/the-parisagreement/long-term-strategies - accessed October 19, 2021.

<sup>3</sup> Article 4(6) states that 'The least developed countries and small island developing States may prepare and

communicate strategies, plans and actions for low greenhouse gas emissions development reflecting their special circumstances'.

<sup>4</sup> Parties should strive to formulate and communicate their long-term low GHG emission development strategies, mindful of Article 2 – i.e. pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels – using the principle of common but differentiated responsibilities and respective capabilities.

<sup>5</sup> PNK Deenapanray (2021) Increasing the ambition of mitigation action in small emitters: the case of Mauritius, Climate Policy 21(4):514-528.

<sup>6</sup> Republic of Mauritius (2020) The Climate Change Act 2020, Government Gazette of Mauritius No. 145 of November 28, 2020.

<sup>8</sup> Republic of Mauritius (2020) The Climate Change Act 2020.

# C2. PROCESS AND PROCEDURES

This section discusses the TNA process for developing mitigation action plans (MAPs). The MAPs require the prior identification and prioritisation of mitigation actions. The NDC includes a host of approaches or contributions for setting mitigation targets, and it is necessary to explain the relationships between mitigation actions and mitigation contributions so that the application of the TNA process can be better conceptualised. Implementation of the TNA process and gender responsiveness. Procedures for applying these principles are discussed.

# **C2.1. Mitigation Contributions and Actions**

Figure C1 is a schematic of the multiple forms that a mitigation contribution can take, including outcomes and actions at the highest level. For the purpose ofthis guiding document, outcomes are essentially GHG emission reduction targets that can be set using different approaches. For instance, in the case of Mauritius, an outcome is defined in the form of a 'baseline scenario target'-i.e. the mitigation target is the difference between an emission reduction scenario and a baseline-as-usual scenario. Even when targets are defined in the form of an outcome, for all practical purposes, the outcome has to be further defined in the form of actions, which in Figure C1 would correspond to policies and projects. In this guiding document, mitigation actions, or the ensemble of policies and projects, are equated to technological options for mitigation. Here, a technology is defined in a very broad sense as composed of hardware, software (processes associated with the production and use of the hardware), and organisational (or orgware) components that are interrelated.9 The tangible aspects, such as equipment and products, constitute the hardware element; the policy instruments that support technology uptake, knowhow, experiences and practices form the software element; and the organisational framework required to operationalise these two elements is referred to as orgware. This broad definition of technology (applied here to climate mitigation) accommodates the policies and projects that when implemented will culminate in GHG emission reductions.



<sup>9</sup> Brooks H (1995) Marshalling technology for development, National Academies Press, Washington DC,

Figure C1. Approaches for Defining Mitigation Contributions. (Source: WRI & UNDP (2015) Designing and Preparing Intended Nationally Determined Contributions (INDCs))

pp. 83-96; Haselip J, Narkevičiūtė R, Rogat J, Trærup S (2019) TNA step by step: a guidebook for countries conducting a technology needs assessment and action plan. UNEP DTU Partnership, Copenhagen.

The conceptualisation of mitigation actions (policies and projects) as mitigation technologies also serves to reconcile top-down and bottom-up approaches for operationalizing emissions reductions.<sup>10, 11</sup>

- Top-down models are most useful for studying broad macroeconomic and fiscal policies for mitigation, such as carbon taxes or other environmental taxes.
- Bottom-up models are most useful for studying options that have specific sectoral and technological implications.

So, the top-down approach may serve to define outcomes, and the bottom-up approach is a means to make the overall outcome actionable. Hence, even where the NDC may propose economy-wide sectoral targets, the guidelines will allow mitigation actions to be identified and prioritised to achieve such targets.

# C2.2. Technology Needs Assessment Process

The TNA process illustrated in **Figure C2** offers a robust methodological approach for climate action planning through the prioritisation of environmentally sound technologies for climate technology transfer and diffusion. The TNA process and methodology have been applied in eighty-nine (89) countries to date.<sup>12</sup>The process is equally applicable to climate adaptation and mitigation, and it proceeds through three stages:<sup>13</sup>

- 1. To identify and prioritise, through country-driven participatory processes, technologies that can contribute to national mitigation and adaptation goals while meeting their national sustainable development goals and priorities (TNA); and
- 2. To identify the barriers that hinder the acquisition, deployment, and diffusion of the prioritised technologies for mitigation and adaptation; and
- 3. To develop Technology Action Plans (TAP) that specify activities and enabling frameworks to overcome the barriers and facilitate the transfer, adoption, and diffusion of selected technologies in order to achieve country-defined outcomes (mitigation or adaptation).



Figure C2. The TNA Process. from Technology Prioritisation to Action Plans.

(Source: Boldt J, Nygaard I, Hansen UE, Trærup S (2012) Overcoming Barriers to the Transfer and Diffusion of Climate Technologies. UNEP Risø Centre, Roskilde)

<sup>10</sup> UNFCCC (2005) The UNFCCC manual for the preparation of information on measures to mitigate climate change.

<sup>11</sup> UNFCCC (2006) Training Handbook on the Mitigation Assessment for Non-Annex I Parties.

<sup>12</sup> PNK Deenapanray and S Trærup (2021) Technology needs assessment for climate change adaptation: Experiences of Mauritius and Seychelles, Regional Environmental Change (revised version under review).

<sup>13</sup> Boldt et al. 2012; Haselip et al. 2019.

Of particular interest in this guiding document is stage 1 of the process, which is detailed in Section 3. Stage 2 of the process relates to discussions in Section 2.1 since the measures (enabling environment) and incentives (financial/economic) take the form of policy instruments – i.e. the policy aspect of action in **Figure C1** – that support technology deployment.

## **C2.3. Stakeholder Inclusiveness**

The inclusion of relevant stakeholders at different steps in the TNA process is critical. Any person or institution having an interest in or being affected by the mitigation action identification and prioritisation process or the results thereof should be considered a relevant stakeholder. The project has developed a Stakeholder Engagement Plan (SEP)<sup>14</sup> that can be used to develop a stakeholder-driven process for the identification and prioritisation of mitigation actions. It is noteworthy that the SEP provides guidance from the broader perspective of engaging stakeholders for the formulation, monitoring and evaluation and review of long-term mitigation strategies, of which the identification and prioritisation of mitigation actions will be a subset. In addition to he SEP, the global TNA project has also developed a guidance document on how best to identify and engage the relevant stakeholders.15

It is important to plan stakeholder meetings to maximise their usefulness and maintain the engagement of participants. An important consideration is to avoid stakeholder fatigue that can be prominent in a small island state, whereby the same individuals are called upon to participate in a multitude of parallel climate initiatives and activities. In order to minimise stakeholder fatigue, a balanced approach combining plenary and bilateral meetings using face-to-face, orthodox and virtual media is encouraged.<sup>16</sup> A most important consideration is to integrate technology identification and prioritisation in ongoing sectoral processes such as integrated policy planning that will avoid seeing climate change as an 'add-on' to existing work. This is the ambition of the CCA 2020. Hence, all stakeholder coordination will fall within a context where climate change is mainstreamed.

Stakeholder meetings can be coordinated by the Department of Climate Change, Ministry of Environment, Solid Waste Management, and Climate Change as per the provisions of Section 19 of the CCA 2020.<sup>17</sup> Facilitation of meetings can be carried out by either the coordinator – i.e. Department of Climate Change, or the ministry that has the mandate to formulate sectoral policies and strategies, or an independent facilitator. For increased ownership and appropriation of the results of the process, it is recommended that facilitation be carried out by the respective ministries having the mandate to formulate sectoral policies and strategies. An audit trail of what is discussed and the reasons for the basis of any decisions should always be written up after each event and circulated for feedback.

## **C2.4. Gender Mainstreaming**

The stakeholder consultation process should also be gender-sensitive in both process and content. This means that the perspectives of both women and men need to be sought during consultation to ensure that both have an opportunity to voice their opinions. In this way, it can be ensured that men and women benefit equally from mitigation actions and that gender disparities in actions and outcomes are reduced or eliminated. In the TNA process, there are several instances where gender issues can be taken into account, as follows:

- Prioritisation of mitigation actions: As discussed below, prioritisation of mitigation actions that have been identified is carried out using multi-criteria analysis (MCA). Gender-relevant indicators can be used to prioritise mitigation actions. Genderdifferentiated indicators that can be applied are listed in section 3.2.2; and
- Mitigation action planning or TAP: The gender dimension can be taken into account while conducting barrier analyses (Stage 2 of the TNA process) for mitigation actions. This is also the stage at which gender analysis takes place to deliver a gender-responsive mitigation action plan.

The guidebook that has been developed for conducting gender-responsive TNA is a useful reference.<sup>18</sup>

<sup>14</sup> UDP (2021) Stakeholder Engagement Plan.

<sup>15</sup> UDP (2015) Identification and Engagement of Stakeholders in the TNA Process: A Guide for National TNA Teams.

<sup>16</sup> PNK Deenapanray and S Trærup (2022) Technology needs assessment for climate change adaptation: Experiences of Mauritius and Seychelles, Regional Environmental Change 22(2); https://doi.org/10.1007/s10113-021-01859-y.

<sup>17</sup> Republic of Mauritius (2020) The Climate Change Act 2020, Government Gazette of Mauritius No. 145 of November 28, 2020.

<sup>18</sup> J. de Groot (2018) Guidance for a gender-responsive Technology Needs Assessment, UNEP DTU Partnership, Copenhagen.

# **C3. IDENTIFYING AND PRIORITISING MITIGATION ACTIONS**

This section provides an overview of the methods that can be applied to first identify mitigation actions and then prioritise them.

## **C3.1. Identifying Mitigation Actions**

Mitigation actions supported by technological options are varied, and they can be grouped based on their relevance and applicability in the local context. The category into which a mitigation action or technology falls determines its mode of identification. **Table C1** gives a summary of three broad groups of mitigation actions or technologies, as well as the means of identifying them.

CATEGORY OF MITIGATION ACTION	SOURCE OF INFORMATION FOR TECHNOLOGY IDENTIFICATION	INSTITUTIONAL STAKEHOLDERS					
Scaling up an existing mitigation action (e.g. adoption of a mitigation technology)	Existing sectoral policies, strategies and action plans	Decision-makers in public and para- governmental institutions					
Scaling up a mitigation action that is at the pilot stage or proof-of-concept (e.g. demonstration or diffusion stage of the technology lifecycle) OR Mitigation technologies that are under development in the country	<ul> <li>There can be several sources of information on this category of mitigation actions:</li> <li>Institutional knowledge captured in internal reports on pilots, and proof-of-concept, or technology development</li> <li>Publications on the results of proof-of-concept and/or technology development in the public domain</li> </ul>	Academic and research organisations; public and para- governmental institutions; private sector organisations; civil society organisations; non-governmental organisations; independent researchers					
Mitigation technology is not currently available in the country	Information about this category of technology will emanate from expert knowledge and thorough literature reviews	Academic and research organisations; public and para- governmental institutions; private sector organisations					

Table C1: Categorisation of Mitigation Actions and their Sources of Identification

At the stage of technology identification, all categories of technologies referred to in **Table C1** should be covered, although the timescale of mitigation actions will differ from technology to technology. This is an important consideration since the formulation of low-carbon development strategies should cover at least the 2050 time horizon so that consecutive NDCs can be connected coherently to contribute towards achieving net-zero emissions by 2050.<sup>19</sup>

**Table C1** also identifies a list of potential institutional stakeholders that may have knowledge of mitigation actions. The importance of putting in place a robust multi-stakeholder process so that the best knowledge of mitigation actions can be collected at the start of the process cannot be overstated.

In order to avoid stakeholder fatigue at this early stage of the process, the identification of mitigation technologies can be carried out by distance (e.g., electronic mail and telephone) or through short bilateral meetings (e.g. in person or virtual meetings). The process can be coordinated by the Department of Climate Change.

<sup>19</sup> The proposed time horizon is subject to change and needs to be aligned with the policy decision regarding the timeline for the National Climate Change Mitigation Strategy and Action Plan. to be developed under Article 14 of the Climate Change Act 2020.

In addition to institutional knowledge, mitigation actions can be identified in the secondary literature. A non-exhaustive list of prominent sources of information is:

- Handbook for Conducting TNA for Climate Change:<sup>20</sup> Table A7-1 in Annex 7 of the Handbook provides an indicativelist of mitigation technologies covering the following areas: (i) electricity production;<sup>21</sup> (ii) heating for industrial and domestic use; (iii) cooling-climate control; (iv) hot water in buildings; (v) lighting; (vi) demand-side management for electricity; (vii) cooking; (viii) industrial; (ix) transport; (x) carbon capture and storage; (xi) substitution of ozone-depleting substances; (xii) agriculture; (xiii) forestry; (xiv) waste management; and (xv) management of ozone- depleting substances in products and equipment at end-of-life; and
- TNA Guidebooks: <sup>22</sup> The global TNA project hosts a number of resources that can be used to identify mitigationactions. A brief summary of the existing resources is:
- Climate technologies in an urban context: <sup>23</sup> This guidebook provides information on technologies for climate change mitigation and adaptation that are relevant in an urban context, specifically in relation to buildings, transportation, and waste management for mitigation and in relation to droughts, floods, and heat waves for adaptation. It aims to provide TNA stakeholders and city-level decision-makers with information about
- · varioustechnological options and potential challenges and opportunities for their use in cities.
- Technologies for mitigation in the building sector: <sup>24</sup> This guidebook covers a range of building technologies, design principles, and practices that can significantly reduce emissions of greenhouse gases while improving living and working conditions.
- Technologies for mitigation in the agriculture sector:<sup>25</sup> This guidebook covers a range of technologies and practices in the agricultural sector related to crops and livestock that can control emissions of greenhouse gases and help improve productivity at the same time; and
- Technologies for mitigation in the transport sector: <sup>26</sup> This guidebook covers a range of transport technologies and practices that can significantly reduce emissions of greenhouse gases and support key development goals.
- TNA database:27 The global TNA project hosts a database of TNA Reports and Technology Action Plans, as well as Technology Fact Sheets produced by some 72 countries to date.<sup>28</sup>

- 20 UNDP (2010) Handbook for Conducting Technology Needs Assessment for Climate Change, UNDP, NY.
- 21 This area of emissions covers the following categories of technologies: renewable, fossil fuel-based energy supply, fuel cells, and combinations thereof.
- 22 Please see resources available at: https://tech-action.unepdtu.org/resources/ accessed October 28, 2021.
- 23 UDP (2021) Climate technologies in an urban context, UNEP DTU Partnership, Copenhagen.
- 24 W.C-N. Cam (2012) Technologies for Climate Change Mitigation Building Sector, UNEP Risø Centre, Roskilde.
- 25 D.C. Uprety, S. Dhar, D. Hongmin, B.A. Kimball, A. Garg and J. Upadhay (2012) Technologies for Climate Change Mitigation Agriculture Sector, UNEP Risø Centre, Roskilde.
- 26 UNEP (2011) Technologies for Climate Change Mitigation Transport Sector, UNEP Risø Centre, Roskilde.
- 27 https://tech-action.unepdtu.org/tna-database/ accessed on October 28, 2021.
- 28 The database contained 185 documents related to climate change mitigation across several sectors as of October 28, 2021.

## **C3.2. Prioritising Mitigation Actions**

The prioritisation of mitigation actions is a means of obtaining an ordinal ranking of pre-identified mitigation actions based on the country's development priorities. For all practical purposes, the list of mitigation actions to be prioritised would typically not exceed ten to twelve technologies. However, the list of mitigation actions that have been identified in the previous step may well exceed this guiding range. In this case, a pre-screening step needs to be carried out in order to obtain a short list of mitigation actions from a starting long list.

## C3.2.1. Pre-Screening of Long-Listed Mitigation Technologies

This intermediary step is required in case the list of preidentified mitigation actions exceeds the guiding range

of ten to twelve technologies.<sup>29</sup> Pre-screening consists of assessing the long list of mitigation actions against a few criteria in order to rate them from low applicability/ technically feasible to high applicability based on expert knowledge. The criteria that can be used are: (1) Criterion 1: applicability of technology to a subtropical country;<sup>30</sup> (2) Criterion 2: support to national policy (i.e., technology is current practice; technology is supported by ongoing initiatives or initiatives in the pipeline or has high potential to support policy); (3) Criterion 3: relevance of technology scale of economies in the context of a Small Island State; and (4) Criterion 4: level of technology maturity (time horizon for technology implementation).

The mitigation technologies can be rated using the scheme shown in **Table C2**. The rating scheme uses a combination of binary (yes, no) and colour (low, moderate, high) codes.

A mitigation technology is short-listed if it follows the ratings shown in **Table C3**. This means that the short-listed technology should (i) be applicable in the local context, (ii) provide a high level of support for implementing national policy, and (iii) high relevance in terms of the relatively small scale of economies. As for Criterion 4, the rating can be either high or moderate or low depending on the timeline for implementation from short- to medium- to long-term.

CRITERION		SCORING SCHE	ME
Criterion 1	Yes	No	
Criterion 2	High	Moderate	Low
Criterion 3	High	Moderate	Low
Criterion 4	High	Moderate	Low

Table C2: Criteria Scoring Scheme

CRITERION 1	CRITERION 2	CRITERION 3	CRITERION 4
Yes	High	High	High
			Moderate
			Low

Table C3: Application of a Scoring Scheme to a Short-Listed Mitigation Action

## C3.2.2. Prioritisation of Short-Listed Mitigation Technologies

MCA is used to prioritise the short-listed mitigation actions. Some of the main attributes of MCA are summarised in **Table C4**.

Key output	A single most preferred option, ranked options (ordinal), short list of options for further appraisal, or characterisation of acceptable or unacceptable possibilities.
Key input	Criteria of evaluation, as well as relevant metrics for those criteria (monetary and non-monetary dimensions of development).
Ease of use	It depends on the particular MCA tool employed. All rely on the exercise of some expert judgement. For the ordinal ranking of a number of technology options, the simple linear additive method suffices.
Training required	The choice and application of appropriate MCA techniques require some expertise, but they can be acquired fairly easily. A low level of technical training is required for the application of the linear additive model.

Table C4: Attributes of Multi-Criteria Analysis

MCA is applied using the eight decision steps shown in **Figure C3**, which is an extension of the pre-screening method used in Section 3.2.1. Steps 3 to 8 constitute the backbone of the prioritisation process. The application of each step is discussed separately below.

<sup>29</sup> An example of using the pre-screening step is the detailed analysis of baseline technologies that was carried out during the TNA project in 2011 for the identification of a short list of mitigation technologies in the energy industries. The starting point was the mitigation technologies listed in Annex 7 of the TNA Handbook that are mentioned in Section 3.1. Sixty (60) technologies were screened, and the results can be found in Annex 7(a) of the Mauritius TNA Chapter [Republic of Mauritius (2012) Technology Needs Assessment for an Enhanced Climate Change Adaptation and Mitigation – TNA Chapter I, Ministry of Environment and Sustainable Development].

<sup>30</sup> It is pointed out that several mitigation technologies are not applicable in Mauritius because of a combination of contexts (e.g., climatic conditions implying no need for heating, topography that limits hydroelectricity, feed-in tariffs to promote microgeneration of renewable energy technologies in place), technology already adopted (e.g., CFL and solar water heating for household and industrial applications), low socio-cultural acceptability (e.g., solar cook stoves), and/or the stage of development of Mauritius (e.g., use of modern fuels like LPG for cooking automatically excludes biomass/coal/kerosene cook stoves)



Figure C3. Steps of Multi-Criteria Analysis.

### Step 1: Establish Decision Context

The MCA is applied in the context of prioritising a bundle of mitigation actions that can then be used for developing a Mitigation Strategy and Action Plan for either formulating the NDC or implementing the NDC.

## Step 2: Identify Options to be appraised

The mitigation actions or technologies to be appraised are those identified in Section 3.1 or the short list formulated in Section 3.2.1.

# Step 3: Identify Criteria and Indicators to compare options

This is a crucial step, since the outcome of the prioritisation process will hinge on the choice of the criteria and indicators that are used to carry out MCA. The choice of criteria and indicators should be carried out using a stakeholder engagement process involving a combination of high-level policymakers and senior technicians / technical officers. The number and type of criteria and indicators used in MCA is a matter of trade-off between the time inputs from stakeholders (and hence stakeholder fatigue), the technical capacity of stakeholders to calculate objective indicators, availability of data to quantify objective indicators.<sup>31</sup>

- **Criteria:** These should cover the sustainable development priorities of the country and should lend themselves to being measured either subjectively (e.g., rated on a subjective scale) or objectively (e.g., using quantifiable indicators). The number of criteria should be kept to a manageable set (seven in the example given below), since each one will be measured using between one and three indicators.
- Indicators: MCA is prone to bias, and all effort should be spent to minimise, if not eliminate, sources of bias. One form of bias arises from the subjective evaluation of indicators. This source of bias can be minimised by having a balanced blend of subjective and objective indicators.

The latter are calculated using analytical or mathematical approaches and are subject to an objective evaluation. Although there are no rules to determine the appropriate mix of subjective and objective indicators, a good balance could be to achieve parity between the two types of indicators.

31 This is because of the effect of dilution of the impact of any indicator towards the final result because of the decreasing values of weights when criteria and indicators increase in numbers.

The MCA4Climate<sup>32</sup> framework is proposed as a starting point for selecting criteria and indicators.<sup>33</sup> It provides a robust framework for developing climate change mitigation (and adaptation) plans and strategies. In particular, it aims to support developing countries in identifying policies and measures that are low-cost, environmentally effective, and consistent with national development goals. The MCA4Climate framework does this by providing a structured approach to assessing and prioritising climate options while taking into consideration associated social, economic, environmental, and institutional costs and benefits.<sup>34</sup> The criteria and indicators in the MCA4Climate framework are shown in **Table C5**, as well as an indication of which indicators can be gender-differentiated.

CRITERIA	INDICATORS
	- Direct costs
Financing needs	Indirect costs
Implementation barriers	<ul> <li>Ease of implementation</li> <li>Compliance with the required timing of policy intervention</li> </ul>
Climate related	-GHG reduction (black carbon
Economic	<ul> <li>Trigger private investments</li> <li>Improve economic performance</li> <li>Job creation<sup>35</sup> (gender- differentiated)</li> <li>Contribute to fiscal sustainability</li> </ul>
Environmental	<ul> <li>Protect environmental resources (quality &amp; stock)</li> <li>Protect biodiversity</li> <li>Support ecosystem services</li> </ul>
Social	<ul> <li>Poverty reduction (gender- differentiated)</li> <li>Reduce inequity (gender- differentiated)</li> <li>Improve health (gender- differentiated)</li> <li>Preserve cultural heritage</li> </ul>
Political & institutional	<ul> <li>Contribute to political stability</li> <li>Improve governance</li> </ul>

An example of the application of the MCA4Climate framework for prioritising mitigation technologies in the TNA project is given in Annex 1.<sup>36</sup>

#### Step 4: Scoring Options against Indicators

This step seeks to assess the performance of each mitigation action against the chosen indicators. The objective indicators are calculated based on methodologies chosen by the stakeholders (high policymakers and senior technical staff) in each sector. For instance, avoided GHG emissions will be computed using standardised baseline and approved methodologies of the UNFCCC.<sup>37</sup>

Another way to minimise bias is to have a sufficiently large number of stakeholders who, together, will have adequate knowledge of the short-listed mitigation technologies. Experience with the TNA, TNC and NAMA

projects has shown that a cohort of 6 – 10 persons are appropriate. Nevertheless, it is highly possible that several participants in the MCA do not have knowledge of all aspects of technologies covered by indicators. To bridge this knowledge gap, a technology fact sheet (TFS) is developed for each technology. Annex 2 provides an example of a TFS for utility-scale solar photovoltaic (PV) with battery storage. As mentioned above, the global TNA database contains numerous TFS for reference that can be customised for the local context

#### **Performance Matrix**

**Table C6** gives an example of the application of the MCA4Climate framework (Annex 1) for seven mitigation actions. It shows the performance of each technology against the criteria and indicators, hence theperformance matrix. Out of the nine indicators, four are objective indicators and five are subjective indicators. The objective indicators are calculated using quantitative data,<sup>38</sup> while the subjective indicators are scored using expert judgements with the help of the TFS.

Table C5: Criteria and Indicators from the MCA4Climate Framework

32 UNEP (2011) A Practical Framework for Planning Pro-development Climate Policy, UNEP DTIE, Paris.

38 The Excel tool for carrying the MCA shown in Table C6 integrates the calculation of the objective indicators, and it is available from the Department of Climate Chang upon request

<sup>33</sup> The MCA4Climate framework has been applied to technology prioritisation in Mauritius under the following projects: Technology Needs Assessment Project, Third National Communication Project and NAMA Project.

<sup>34</sup> https://www.unep.org/resources/report/practical-framework-planning-pro-development-climate-policy - accessed November 8, 2021.
35 Depending on the country's priorities, job creation can be further divided into gender-differentiated formal and informal jobs. Another distinction that can be made is the quality of jobs, in terms of whether the jobs created support a green economy or not. Methodologies to estimate green job creation are given in: Jarvis, Varma and Ram (2011) Assessing green job potential in developing countries: A practitioner's guide, International Labour Organisation, Geneva; https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/ publication/wcms\_153458.pdf - accessed April 20, 2022.

<sup>36</sup> Republic of Mauritius (2012) Technology Needs Assessment for an Enhanced Climate Change Adaptation and Mitigation – TNA Chapter I, Ministry of Environment and Sustainable Development.

<sup>37</sup> https://cdm.unfccc.int/methodologies/index.html; https://cdm.unfccc.int/methodologies/standard\_base/index.html - accessed November 9, 2021.

While it is desirable to have consensual decision-making, it is not a necessity. For example, stakeholders may have different views on assumptions used to calculate objective indicators, or they may have different appreciations of subjective indicators. When these situations arise, the different values of indicators should be noted down for carrying out sensitivity analyses.

		CRITERIA AND INDICATORS													
	Public Financing	Implementation Barriers	Climate		Economic		S	Political & Institutional							
TECHNOLOGY	Incremental cost (Rs/tCO <sub>2</sub> )	Ease of implementation (0-100)	GHG reduction (tCO <sub>2</sub> )	Catalysing private investment (0-100)	Reduction in energy bill (MRs)	Replicability (0-100)	Impact on health (0-100)	Job creation (number)	Political stability (0-100)						
Solar PV (1MW)	5,552.8	m	769,536	h	5,521.2	m60	I	1430	m70						
Wind (utility scale)	1,515.4	h	1,869,815.3	m	13,415.4	I	I	366	m70						
Small-scale hydro (>50kW)	1,515.4	h40	70,454.3	130	505.5	m70	Ι	26	m60						
EE HVAC (industrial)	17,298.0	m60	40,454.9	m70	290.3	h80	m	73	m						
EE Bldg Des (exterior insulation)	833.0	vh10	17,441.1	130	125.1	h80	m70	32	m						
HE Compressors (industrial)	125.5	h	13,485.0	m70	96.8	m70	m60	24	m						
EE Boilers:Heat recovery	2,246.3	h30	143,090.5	h80	56.3	h80	m65	287	m						

#### Table C6: Performance Matrix

The subjective indicators were evaluated on a scale of 0 to 100 using the coding given in **Table 7**. It is pointed out that the scale used for 'Ease of Implementation' is the reverse of the scale used for the other four subjective indicators.<sup>39</sup> This is illustrated using colour-coding in **Table C6** and **Table C7**.<sup>40</sup>

VL	VL5	VL10	VL15	VL20	L	L30	L35	L40	L45	Μ	M55	M60	M65	M70	H	H80	H85	H90	H95	VH
0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5	0

Table C7: Scales used for Evaluating Subjective Indicators

## **Scale Normalisation**

Two important observations can be made from Table C6:

- 1. The range of values of objective indicators is different from each other, and
- 2. The scales of objective and subjective indicators are not commensurate.

Therefore, it is not possible at this stage to have a total score or overall performance of one technology simply by adding its scores across the different indicators as given in the performance matrix. Before summation of scores across indicators can be effected, it is necessary to normalise the values of objective indicators on a relative scale of 0 to 100 - i.e. similar to the scale range used for the subjective indicators. This is done using the MIN-MAX scale normalisation. However, it is pointed out that, just as the scales of subjective indicators can be reversed, the same attribute applies to the objective scores.

**Financing cost**: For this indicator, the highest (MAX) value in the performance matrix is assigned a score of 0, whereas the lowest (MIN) value in the performance matrix is assigned a value of 100. The rationale is that a higher financing cost will hinder the adoption and diffusion of a technology. All values between the MIN and MAX scores are then normalised on the new scale between 0 and 100. Therefore, the scores across all technologies are normalised using Eq(1). Equation (1) is used whenever the preferred performance value for an indicator is on the low side.

<sup>39</sup> An Excel-based tool was developed for the training delivered on July 7, 2021 for prioritising mitigation actions using MCA. The tool is customised to convert the subjective code given in Table C7 into the corresponding scores. The Excel tool used to generate Table C6 applies the same method.

<sup>40</sup> For instance, a very high (VH) level of 'Catalysing private investment' or 'Replicability' or 'Positive impact on health' or 'Enhance political stability' will correspond to a score of 100. In contrast, a very high level of 'Implementation barriers' will correspond to a score of zero.

$$S_{i} = 100 \quad \mathcal{H}\left(\frac{X_{i} - X_{MIN}}{X_{MAX} - X_{MIN}}\right)$$

 $Eq^{\scriptscriptstyle (1)}$ 

Where: S<sub>i</sub> is the normalised score; and

X<sub>i</sub> is the performance score of mitigation option i; and

X<sub>MIN</sub> is the minimum score among all mitigation options; and

 $X_{MAX}$  is the maximum score among all mitigation options.

**Other objective indicators (GHG reduction, Energy bill and Job creation)**: For these indicators, a higher performance score is desirable. Hence, normalisation of scores is performed using Eq(2) - i.e. the reverse of Eq(1). Equation (2) is used whenever the preferred performance value for an indicator is on the high side.

$$S_i = 100 \left( \begin{array}{c} \frac{X_{i-} X_{MIN}}{X_{MAX-} X_{MIN}} \end{array} \right)$$

Eq(2)

#### **Normalised Performance Scores**

After transcribing the subjective codes using **Table C7**, and normalising the objective indicators using Eq(1) and Eq(2), the performance scores given in **Table C6** can be translated into the scores given in **Table C8**. It is observed that the normalised objective scores are now on a dimensionless 0-100 relative scale.

		CRITERIA AND INDICATORS									
	Public Financing	Implementation Barriers	Climate		Economic		So	cial	Political & Institutional		
TECHNOLOGY	Direct cost	Ease of implementatio	GHG reduction	Catalysing private investment	Reduction in energy bill	Replica- bility	Impact on health	Job creation	Political stability	TOTAL	
Solar PV (1MW)	68.4	50	40.7	75	40.9	60	25	100.0	70	530.03	
Wind (utility scale)	91.9	25	100.0	50	100.0	25	25	24.3	70	511.24	
Small-scale hydro (>50kW)	91.9	40	3.1	30	3.4	70	25	0.1	60	323.49	
EE HVAC (industrial)	0.0	60	1.5	70	1.8	80	50	3.5	50	316.69	
EE Bldg Des (exterior insulation)	95.9	10	0.2	30	0.5	80	70	0.6	50	337.18	
HE Compressors (industrial)	100.0	25	0.0	70	0.3	70	60	0.0	50	375.30	
EE Boilers:Heat recovery	87.9	30	7.0	80	0.0	80	65	18.7	50	418.34	

Table C8: Normalised Performance Scores

#### Step 5: Assign Weights to Criteria and Indicators

Since both the objective and subjective scores are now on the same relative scale, they can be added to a total score. However, the total score cannot be used to rank the mitigation options. This is because some criteria (and their indicators) can be considered of higher importance in decision-making, such as reflecting the sustainable development needs of the country. Hence, the highest weight will be assigned to the criterion most important for the country's development context, and vice versa. Since the objective of the exercise is to resolve differences between technologies, a relatively lower weight can be assigned to the criteria whose indicator(s) is (are) least resolved – i.e. the lowest difference between the maximum and minimum values. A good example is 'Political stability' (Political and Institutional criterion) forwhich the scores across mitigation options are contained in a narrow window of only 20 points. The weights should be assigned following discussions between stakeholders participating in the MCA exercise. In order to take into account any differences in views between stakeholders in assigning weights, different sets of weights can be identified that cover the views of all stakeholders. The use of different sets of weights for carrying out sensitivity analyses is discussed in Step8 below.

For any combination of weights, the sum of weights is equal to 1.

#### Step 6: Combining Scores and Weights

The linear additive model shown in Eq(3) is used to combine the scores and weights.

$$S_{Ti} = \sum_{j=1}^{n} S_{ij} W_j$$

Eq(3)

Where:  $S_{\tau_i}$  is the total performance score for mitigation option i; and

 $S_{ij}$  is the performance score of mitigation option i for indicator j; and

w, is the weight assigned to indicator j.

For the example given in **Table C6**, the ranking of mitigation technologies following the summation of combined scores and weights is given in **Table C9**. In this example, the weights correspond to the first set of weights given in Annex 1. In the ordinal ranking, the mitigation technology receiving the highest combined score is the most preferred option, or the option that would be implemented with the highest priority to achieve mitigation objectives. The priority of mitigation actions in achieving mitigation objectives will decrease with decreasing combined scores.

		CRITERIA AND INDICATORS									
	Public Financing	Implementation Barriers	Climate		Economic	;	S	ocial	Political & Institutional		
TECHNOLOGY	Direct cost	Ease of implementation	GHG reduction	Catalysing private investment	Reduction in energy bill	Replicability	Impact on health	Job creation	Political stability	TOTAL	RANK
Solar PV (1MW)	10.3	7.5	8.1	11.3	4.1	3.0	1.3	10.0	3.5	59.00	2
Wind (utility scale)	13.8	3.8	20.0	7.5	10.0	1.3	1.3	2.4	3.5	63.47	1
Small-scale hydro (>50kW)	13.8	6.0	0.6	4.5	0.3	3.5	1.3	0.0	3.0	33.00	5
EE HVAC (industrial)	0.0	9.0	0.3	10.5	0.2	4.0	2.5	0.3	2.5	29.31	7
EE Bldg Des (exterior insulation)	14.4	1.5	0.0	4.5	0.1	4.0	3.5	0.1	2.5	30.53	6
HE Compressors (industrial)	15.0	3.8	0.0	10.5	0.0	3.5	3.0	0.0	2.5	38.28	4
EE Boilers:Heat recovery	13.1	4.5	1.4	12.0	0.0	4.0	3.3	1.9	2.5	42.66	3
WEIGHTS	0.15	0.15	0.2	0.15	0.1	0.05	0.05	0.1	0.05	1	

Table C9: Ranking of Mitigation Options after Combining Scores and Weights

#### Step 7: Examine the Results

This step consists of detailed analysis and discussion of the MCA results by all stakeholders. The purpose is to see if the results could be expected given the national decision context. It is also an opportunity to reflect on the process and discuss ways in which it could be improved. As shown in **Figure C3**, this step provides an opportunity to review earlier steps (namely steps 1 to 5) in order to make corrective changes in the process.

#### Step 8: Sensitivity Analysis

Sensitivity analysis is carried out to establish the robustness of the prioritisation results due to small changes in scores and weights. Further, as mentioned above, stakeholders may not give the same performance scores for a given mitigation option and indicator, or they can give differing considerations for weights. The robustness of the results would imply that small changes in performance scores and/or weights should not significantly change the ordinal ranking. An example of sensitivity analysis on weights is given in **Table C10**. In this case, the last combinations of weights (rightmost column) given in Annex 1 is used. It can be seen that the order of ranking is unchanged, showing that the result is robust for the changes in weights. A similar analysis can be carried out for small changes in scores.

		CRITERIA AND INDICATORS									
	Public Financing	Implementation Barriers	Climata		Economic		907	sial	Political & Institutional		
TECHNOLOGY	Direct cost	Ease of implementation	GHG reduction	Catalysing private investment	Reduction in energy bill	Replica- bility	Impact on health	Job creation	Political stability	TOTAL	RANK
Solar PV (1MW)	10.3	5.0	8.1	3.8	4.1	3.0	1.3	15.0	10.5	61.00	2
Wind (utility scale)	13.8	2.5	20.0	2.5	10.0	1.3	1.3	3.6	10.5	65.44	1
Small-scale hydro (>50kW)	13.8	4.0	0.6	1.5	0.3	3.5	1.3	0.0	9.0	34.01	5
EE HVAC (industrial)	0.0	6.0	0.3	3.5	0.2	4.0	2.5	0.5	7.5	24.49	7
EE Bldg Des (exterior insulation)	14.4	1.0	0.0	1.5	0.1	4.0	3.5	0.1	7.5	32.06	6
HE Compressors (industrial)	15.0	2.5	0.0	3.5	0.0	3.5	3.0	0.0	7.5	35.03	4
EE Boilers:Heat recovery	13.1	3.0	1.4	4.0	0.0	4.0	3.3	2.8	7.5	39.10	3

Table C10: Technology Prioritisation using a Different Set of Weights

## **Additional References**

Additional information on carrying out MCA can be obtained from the following sources:

- UNDP (2010) Handbook for Conducting Technology Needs Assessment for Climate Change, UNDP, NY. Available at: https://www.undp.org/publications/handbook-conducting-technology-needs-assessment-climate-change accessed November 9, 2021.
- Subash Dhar, Denis Desgain and Rasa Narkeviciute (2015) Identifying and prioritising technologies for mitigation – A hands-on guidance to multi-criteria analysis (MCA), UNEP DTU partnership, Copenhagen. Available at: https://tech-action.unepdtu.org/publications/identifying-and-prioritising-technologies-for-mitigation/ - accessed November 9, 2021.
- CIFOR (1999) Guidelines for Applying Multi-Criteria Analysis to the Assessment of Criteria and Indicators. 9. The Criteria & Indicators Toolbox Series. Center for International Forestry Research (CIFOR). Available at: https://www.cifor.org/publications/pdf\_files/Books/toolbox9.pdf accessed November 9, 2021.

# C-ANNEX 1 – EXAMPLE OF THE APPLICATION OF THE MCA4 CLIMATE FRAMEWORK

		MEASUREMENT SCALE	WEIGHT	SENSITIVITY		
CRITERIA	INDICATORS			ANAL	YSIS	
Public Financing Needs	Direct incremental cost, e.g. direct government budgeting	Rs/tCO2	0.15	0.2	0.15	
Implementation Barriers	Ease of Implementation e.g. non- financial barriers	Likert scale: 0 (highest barrier) - 100 (lowest barrier)	0.15	0.1	0.1	
Climate-Related	GHG reduction	tCO2 (to 2025)	0.2	0.25	0.2	
Economic	<ul> <li>Catalysing private investments</li> <li>Reduction in energy import bill</li> <li>Replicability</li> </ul>	Likert scale: 0 (lowest) – 100 (highest) MRs (million Rs) (to 2025) Likert scale: 0 (lowest) – 100 (highest)	0.15 0.1 0.05	0.05 0.1 0.05	0.05 0.1 0.05	
Social	<ul><li>Impact on health</li><li>Job creation</li></ul>	Likert scale: 0 (lowest) – 100 (highest) Quantity (to 2025)	0.05 0.10	0.05 0.15	0.05 0.15	
Political and Institutional	Contribute to political stability	Likert scale: 0 (lowest) – 100 (highest)	0.05	0.05	0.15	

# C-ANNEX 2 – EXAMPLE OF TECHNOLOGY FACT SHEET

TECHNOLOGY CHARACTERISTICS
The solar power source is via photovoltaic modules that convert light directly into dectricity. However, this differs from and should not be confused with concentrated solar power, the other large-scale solar generation technology, which uses heat to drive a variety of conventional generator systems. Both approaches have their own advantages and lisadvantages, but to date, for a variety of reasons, photovoltaic technology has seen much vider use in the field. A photovoltaic power station, also known as a central PV system, is a large- cale photovoltaic system (PV system) designed for the supply of merchant power into the electricity grid. They are differentiated from most building-mounted and other because they supply power at the utility level rather than to a local user or users. They are sometimes also referred to as solar farms or solar anches, especially when sited in agricultural areas. The generic expression utility-scale olar is sometimes used to describe this type of project.
<ul> <li>PV Power Farm System includes a grid-connected central inverter that connects directly to ne utility grid and converts direct current (DC) output from PV arrays into alternative current AC). The generated electricity can be sold to the utility grid according to the government's romotion policy for electricity generated from sustainable energy.</li> <li>Many storage technologies have been considered in the context of utility-scale energy torage systems. These include:</li> <li>Pumped Hydro</li> <li>Batteries (including conventional and advanced technologies)</li> <li>Superconducting magnetic energy storage (SMES)</li> <li>Flywheels</li> <li>Supercapacitors / Ultracapacitors</li> <li>Each technology has its own particular strengths and operational characteristics. For example, pumped hydro is best suited for large-scale bulk electrical energy storage (if uitable geographic topology, geology and environmental conditions exist) and for longer ours of operation, whereas battery storage can be cheaper for a shorter storage duration. The other technologies are either in the development stage or more costly.</li> </ul>

			BATTERY ENERGY STORAGE			ENERGY STORAGE	
Capacity	MW	400	400	400	400	400	400
Storage Duration	hrs	4	10	4	10	4	10
30-Year Total Levelised Cost (LCOS)	\$MWh	\$144	\$145	\$149	\$149	\$151	\$92
Engineering and Installation Time	Years	0.5-1.0	1.3-1.7	0.3-1.3	1.0-2.0	8-10	8-10

Technology:	Central PV (MW Scale) System with Storage
Country-Specific Applicability and Potential	The impact of photovoltaic (PV) power generation with energy storage on the electric utility's load shape for load levelling purposes is explored. Results show that utilities employing storage technology for peak load shaving might benefit from the use of photovoltaic power, with the extent of its usefulness being dependent on the specific load shapes as well as the photovoltaic array orientations. Also, storage willallow for the variable nature of solar PV to be better managed, leading to greater grid stability.
Status of Technology in a Country	There is no central PV system with storage technology in the country. However, standalone, large-scale battery storage technology is being utilised by the national utility. Also, the country already has experience with on-grid solar PV producing 145.7 GWh in 2020 [Statistics Mauritius (2021) Energy and Water Statistics, 2020]. The bulk of investments in renewable energies in Mauritius come from the private sector.
Benefits to Economic / Social and Environmental Development	The direct impact will be on the reduction of the fuel import bill, hence improving the balance of payments and keeping more forex in the country. This will mean that there will be more government funds for capital projects. There will be a reduction in the risk of spillage due to the importation of fossil fuels in the country. New personnel will have to be trained to be able to work in this environment, whereby creating new jobs.
Climate Change Mitigation Benefits	<ul> <li>There are direct CO2 or other GHG emissions from such systems, as they willreduce or eliminate the use of fossil fuels for producing electricity.</li> <li>For the purpose of this exercise, a number of assumptions are used:</li> <li>Target: solar PV installed capacity is 50 MW; battery capacity is 10 MW for 4 hours of storage (i.e. 80 MWh)</li> <li>Using a capacity factor of 0.2 and 95% availability, the annual production is 83,220 MWh</li> <li>It is further assumed that PV electricity displaces thermally generated electricity using HFO. The emission factor is: 0.69 tCO2/MWh</li> </ul>
Financial Requirements and Costs	In recent years, PV technology has improved its electricity-generating efficiency, reduced the installation cost per watt as well as its energy payback time, and reached grid parity in at least 19 different markets by 2014. PV is increasingly becoming a viable source of mainstream power. However, prices for PV systems show strong regional variations, much more than solar cells and panels, which tendto be global commodities. Please use the following data for the purpose of this exercise:
	<ul> <li>Solar farm installation costs are typically between \$0.82 to \$1.36 per watt [https://www.solarreviews.com/blog/what-is-a-solar-farm-do-i-need-one – 1 July]. For the purpose of this exercise, use \$0.9 per W.</li> <li>The cost of battery storage is US\$ 150 / MWh (for 4 hours storage) [https://www.energy-storage.news/blogs/behind-the-numbers-the-rapidly-falling-lcoe-of-battery-storage – 1 July 2021].</li> </ul>

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