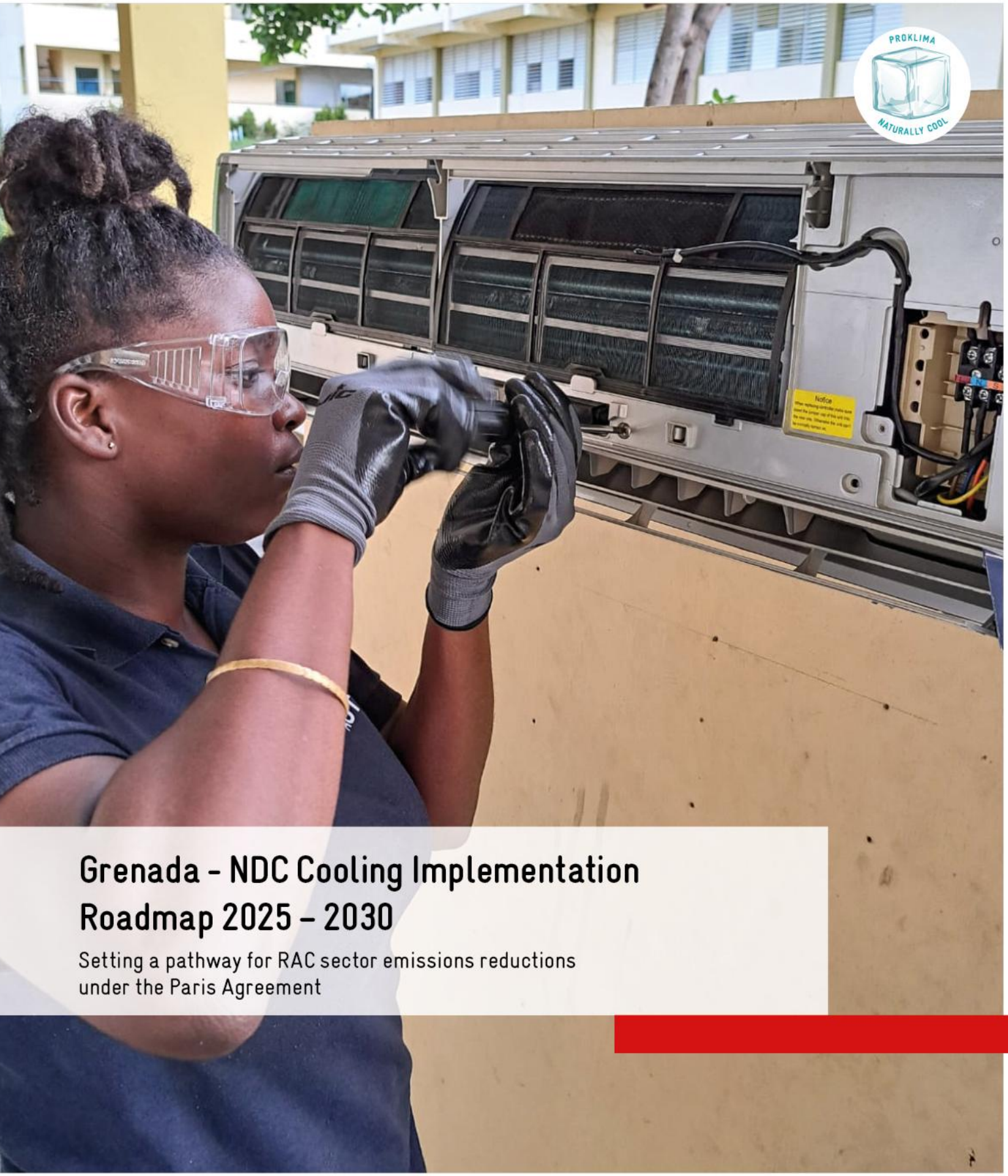

Grenada - NDC Cooling Implementation Roadmap 2025 – 2030

Setting a pathway for RAC sector emissions reductions under the Paris Agreement

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Supported by:

Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection

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IKI INTERNATIONAL CLIMATE INITIATIVE

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Eschborn, June 2025

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1 Introduction

In Grenada, the urgent need to address the climate impacts calls for a focused and strategic approach to mitigation. The **National Cooling Action Plan** (NCAP), launched in 2021, outlines four key action areas.

1. **Building performance standards,**
2. **Improving the energy efficiency of refrigeration and air conditioning (RAC) appliances,**
3. **Transitioning to natural refrigerants, and**
4. **Cross-cutting measures, including communication, capacity development, and enabling policies such as sustainable public procurement, financial support mechanisms, certification of RAC technicians, and a take-back scheme for appliances.**

These action areas form the backbone of Grenada's comprehensive strategy for reducing emissions in the RAC sector and promoting sustainable cooling.

Within this broader strategy, the building sector stands out as a critical leverage point for achieving mitigation goals and a transition to sustainable cooling. Several elements offer significant opportunities for reducing greenhouse gas emissions, particularly through thermal envelope improvements, including passive cooling strategies, efficient cooling systems, and sustainable electricity generation, as described in Table 1: Key elements to mitigate emissions from the buildings sector. The thermal envelope and passive cooling methods alone account for nearly 50% of global building emissions [reductions], highlighting their critical importance. The government and its institutions have a high level of leverage over these elements, enabling them to set design standards through building codes and zoning regulations. Similarly, cooling solutions also represent up to 50% of emissions, with cities able to promote efficiency choices to reduce energy consumption. Furthermore, electricity generation [from] [for] buildings can contribute up to 70% of operating emissions, underscoring the necessity for effective generation strategies at the building level.

This report will therefore emphasize the significance of these components in mitigating climate impact while simultaneously enhancing adaptation, resilience, and local economic development.

Table 1: Key elements to mitigate emissions from the buildings sector

Element	Mitigation Potential	Government Leverage	Benefits
Materials and Embodied Carbon	Up to ~30% of global buildings emissions and rising	Medium – can affect design choices but require industry changes	Economic development potential
Thermal Envelope and Passive Cooling	**Up to ~50%** of global buildings' emissions	**High** – can set design standards through building codes and zoning	Adaptation and resilience
Cooling	**Up to ~50%** of global buildings' emissions	**Medium** – cities can encourage efficient choices	Adaptation and resilience
Appliances and Lighting	Up to ~20% of global buildings' emissions	Low – appliance efficiency primarily set at national level	Local air quality and health
Electricity Generation	**Up to ~70%** of global buildings' emissions based on total operating emissions	**Medium** – can support building-level generation but limited effect on grid mix	Resilience

Source : https://www.climatepolicyinitiative.org/wp-content/uploads/2022/07/Buildings-Scoping-Paper-final.pdf

To improve the energy efficiency of refrigeration and air conditioning (RAC) appliances, Grenada can adopt mandatory Minimum Energy Performance Standards (MEPS), along with appliance labelling schemes. These measures will help promote the import and use of high-efficiency products. Within the RAC sector, unitary air conditioners, particularly split-type units, represent the largest share of related emissions.

Finally, regarding the transition to low global warming potential (GWP) refrigerants, Grenada has ratified the Kigali Amendment to the Montreal Protocol, which requires countries to phase down the use of high-GWP refrigerants, primarily hydrofluorocarbons (HFCs). Grenada has also developed the first stage of its HFC phase-down plan, which outlines clear actions and is supported by dedicated funding. The plan is structured in three stages, to be implemented from 2025 through 2045.

2 Grenada's NDC and the Cooling Implementation Roadmap

2.1 Grenada's NDC and coverage of the RAC sector

- **Target: The emissions reductions in the 2020 NDC are a confirmation of the indicative ambitious 2030 target of 40% below 2010 levels (i.e., 216.0 Gg CO_2e) submitted in the 2016 Intended National Determined Contributions (INDC), which is conditional on external funding.**
- **Sector coverage: Grenada's economy wide target covers the energy (including domestic transport), waste, forestry, and Industrial Processes and Product Use (IPPU) (including cooling sector) sectors. The inclusion of F-gases is a new addition to Grenada's second NDC and cover HCFC and HFC and their mixture/blends, in line with obligations under the Kigali Amendment to the Montreal Protocol.**
- **Indicative cost: The indicative cost of Grenada's identified NDC mitigation measures through 2030 is between USD 984.9 and 1,054.5 million – in form of grants and other concessional finance for supporting capacity building and institutional strengthening and access to appropriate technologies.**
- **Sources of finance: Multilateral and bilateral support including the Green Climate Fund, multilateral agencies, bilateral arrangements with development partners. These funds will be used to leverage the limited national resources and technical capacities that are available.**

2.2 Goals and objectives of the Implementation Roadmap

- **Purpose of this document**
  - **Provide a plan with specific activities and timelines for implementing emissions reductions measures in the RAC sector.**
  - **Facilitate the transition from the economy-wide NDC target to real action and emission reductions in the RAC sector.**

2.3 Boundaries of the Implementation Roadmap

- **Carbon intensity of the power sector: reducing the grid emissions factor is key to reduce emissions in the RAC sector but is beyond the scope of this roadmap. This requires the adoption of utility scale solar PV plants and geothermal development.**

- **Grenada has a target to achieve 100% renewable electricity by 2035. From the building sector, it is proposed to equip several government buildings with rooftop solar PV by 2030, complementing energy efficiency improvements in new and renovated buildings.**

2.4 Alignment of the Implementation Roadmap with national plans

This Roadmap is aligned with the following policy documents

- **National Sustainable Development Plan (NSDP) 2035**
- **National Cooling Action Plan 2021**
- **National Climate Change Policy and Action Plan 2022-2027**
- **National Adaptation Plan 2025-2030**
- **National Climate Change Policy for Grenada, Carriacou and Petite Martinique 2017-2021**
- **Kigali commitments described in the Stage I of the Kigali Implementation Plan, which include freeze HFC consumption from 2024 and gradually phasing down the use of HFCs after 2028**
- **National Energy Policy 2035**
- **Energy Efficiency Act (Draft)**
- **Montreal Protocol Controlled Substances Act (Draft)**

3 Priority mitigation actions within the NDC Cooling Roadmap

The selection of Priority Mitigation Actions is based on the policy measures proposed in Grenada's National Cooling Action Plan (NCAP) and also includes new technologies that are market ready in the post pandemic context, as well as more ambitious polices that have been published since. However, for the Implementation Roadmap, this has been divided into two main intervention areas, as depicted in Figure 1:

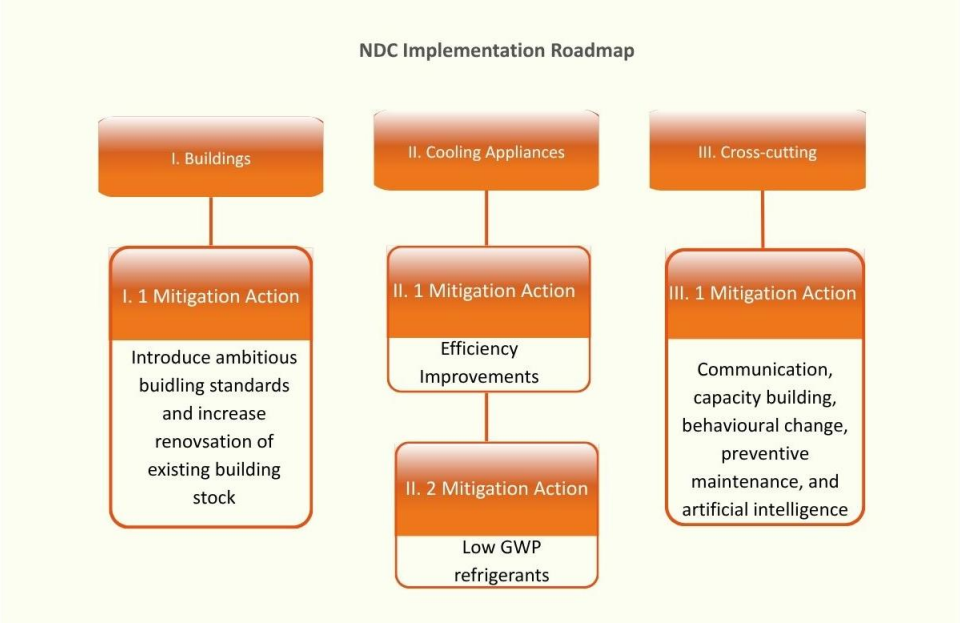

Figure 1. Roadmap Actions

The **first intervention area encompasses the building envelope. The mitigation action within this intervention area** focuses both on **introducing ambitious building standards** and **increase the renovation rate** of the existing building stock.

The **second intervention area covers cooling appliances**, with one mitigation action **targeting efficiency improvement** and the other focusing on the **use of natural refrigerants** while simultaneously phasing out the use of climate-damaging F-gases.

Last, **the third intervention area are other cross-cutting measures** that contribute to the transition toward sustainable cooling. These include behavioural changes, such as adjusting temperature set points, preventive maintenance, and the use of artificial intelligence (AI).

The mitigation potential for these two intervention areas is:

- **I.1 building actions:16kt CO_2eq by 2050;**
- **II.1 and II.2 for MEPS implementation and the transition to low GWP refrigerants and for and 20kt CO_2eq by 2050; and**
- **III.1 cross-cutting measures contribute towards achieving the mitigation potential but have not been modelled.**

Each of the mitigation actions includes a description of enabling measures and policies that can promote implementation. This includes, for example, adequate training and awareness but also financial strategies.

3.1 Intervention area I: Upgrading building envelope for new and existing buildings

The building envelope (including both its physical elements and relevant aspects of building design) is critical to reduce the energy required to cool a building (i.e., the cooling load) and thus affects the size and type of the cooling appliances needed. Upgrading the building envelope is possible through the implementation of ambitious and mandatory building codes, which set standards for buildings or building systems determining minimum requirements of energy performance.

Description

Energy efficiency of building envelopes is the most important factor that affects the energy consumed by cooling equipment. Optimizing building envelope design should thus be a key part of any energy use reduction and consequently climate change mitigation strategy (IEA, 2013). The level of energy efficiency of a building is commonly expressed in energy consumption per square meter of floor area per year (kWh/m^2/year) and measured against energy consumption benchmarks which vary according to building type and climatic condition (UNIDO/REEEP, 2008).

The core objective of this mitigation action is to substantially enhance energy efficiency in the residential and commercial sectors***, for both new and existing buildings***. The main policy actions to untap the emissions potential in the building sector include:

Energy performance of new buildings

The proposed policy action involves the progressive enhancement of Minimum Energy Performance Standards (MEPS) for new buildings, achieved through the **iterative strengthening of building codes** over time. To ensure MEPS remain relevant and effective over the long term, it is recommended that they include clearly defined update cycles, minimum performance targets, and reference trajectories, such as the progression of energy performance levels outlined in ***Table 6***, which extends to 2050. This

allows MEPS to serve as a forward-looking planning tool that avoids obsolescence and gives stakeholders predictability. By applying best available technology and methods, significant reductions in energy demand for cooling and thus also related emissions can be achieved. The earlier MEPS are introduced, the more emissions from highly energy intensive new buildings can be avoided. To untap the full emissions reductions potential, MEPS need to be mandatory, and performance based. Ensuring compliance is a precondition to achieve the suggested pathway. In addition, consistency with CARICOM building energy standards should be ensured.

Energy performance of renovated buildings

As the old building stock is highly energy intensive compared to new good practice buildings, the prioritization of the renovation of old buildings is a prerequisite to achieve the desired level of emissions reductions in the sector. A key policy measure to effectively address the renovation of the existing building stock is the establishment of a renovation rate. This rate specifies the percentage of buildings that must be renovated annually to improve energy efficiency and reduce CO_2 emissions. An ambitious renovation rate of the existing building stock is crucial to complement the introduction of ambitious building codes for new constructions.

Expansion of rooftop PV on new and renovated buildings

Despite the application of best available technology in terms of ventilation, air conditioning, shading and insulation, a certain energy demand will remain to ensure comfortable inside air quality. To target emissions from that remaining power demand, options to decarbonize the power generation mix must be considered. This includes the generation of electricity from renewable energy sources, with Grenada aiming to produce 100% of its electricity from renewables by 2035. Actions in the building sector that contribute to this goal include equipping most if not all new and renovated buildings with rooftop.

Policy actions

Energy performance of new buildings

Reference level[1]:

- **Energy consumption in residential buildings was 62 kWh/m²/year in 2017**
- **Energy consumption in commercial buildings was 131 kWh/m²/year in 2017**

Target level:

- **Residential buildings: 17 kWh/m²/year**
- **Commercial buildings: 25 kWh/m²/year**

Following a **net-zero emissions pathway**, all new buildings should be built according to net-zero energy building (nZEB) standards by year 2031. For buildings in the Caribbean region, that means reaching an annual energy demand per square meter of 17 kWh for residential buildings, and 25 kWh for commercial buildings. In order to achieve that, a step-wise introduction of improved mandatory MEPS is applied on a 3-year basis. For residential buildings, a new MEPS of 32 kWh/m²/yr should be introduced in 2025, which is then again updated to 19 kWh/m²/yr in 2028, and to finally meet the nZEB standard in 2031. The corresponding steps for commercial buildings are 60 kWh/m²/yr in 2025, and 30 kWh/m²/yr in 2028 as presented in
Table 2.

[1] The current consumption is of as reported by Grenada Electricity Services (Grenlec), 2023. The reference level is used in the modelling

The use of MEPS is one of the key policies to improve the energy efficiency of buildings (SoCA, 2023). The net-zero scenario on which these target levels are based is in line with IEA's Net Zero by 2050 scenario in which nZEB building-codes are introduced for all new buildings in all of the world's regions by 2030 (IEA Net Zero by 2050).

Table 2: Enhancement schedule for MEPS in the residential and commercial sector in the mid-term

	Residential	Commercial
2025	32 kWh/m²/yr	60 kWh/m²/yr
2028	19 kWh/m²/yr	30 kWh/m²/yr
2031	17 kWh/m²/yr	25 kWh/m²/yr

Energy performance of renovated buildings

Reference level: Around 1% (expert estimates)
Target level: 3% of existing building stock

Starting from a currently low renovation rate of about 1%, this needs to gradually increase to reach an international best-practice level of 3% by 2030. The renovation rate is expected to increase according to an s-curve as illustrated in Figure 2. Following this pathway would ensure that the full existing building stock is renovated by 2050, which would be required to follow a pathway compatible with the Paris Agreement.

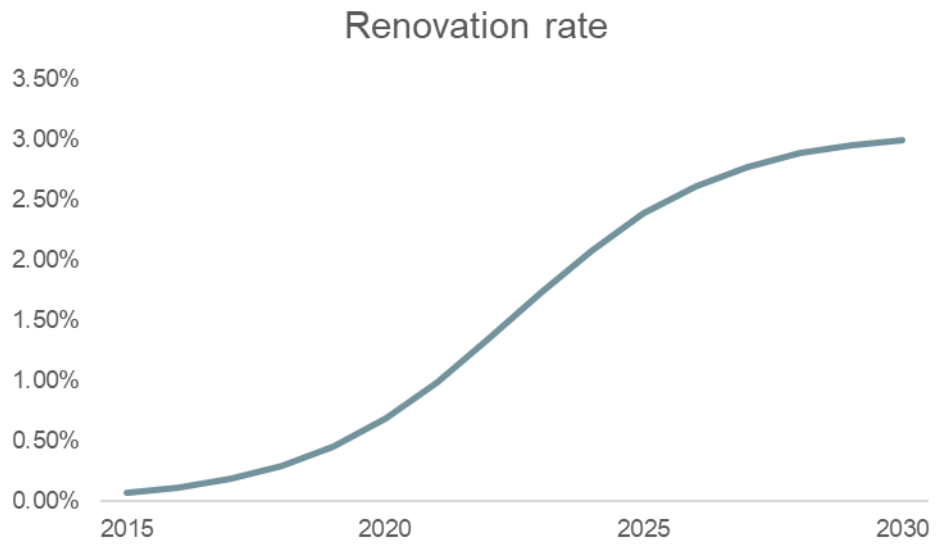

Figure 2. Increased renovation rate according to an s-curve.

In terms of the energy performance of renovated buildings, this is also expected to gradually improve and to reach best practice standards by 2030. As the renovation of existing buildings somewhat constraints the potential efficiency improvements that can be made, the target energy performance is slightly higher compared to that of new buildings. For residential buildings, the target rate thus reaches about 20 kWh/m²/yr by 2030, and for commercial buildings it reaches 30 kWh/m²/yr.

Renovation policy package should ideally be a mix of the following key themes: regulatory measures with binding but dynamic short to long-term national as well as building type specific targets in terms of CO_2 or energy savings; mandatory code requirements and ambitious labelling schemes; financial instruments such as incentive schemes and taxation mechanisms; economic instruments such as

utility -funded programs; capacity building and awareness raising campaigns as well as the compilation of a database on building typology and characteristics and the identification of consumer behaviour and energy saving opportunities (GBPN, 2015). All these policy instruments should relate to the specific political, economic and social situation in Grenada.

Expansion of rooftop PV on new and renovated buildings

Reference level: No figures currently available

*Target level: To reach the netzero pathway, a*ll new buildings are equipped with rooftop PV as of 2031; 44% of renovated buildings are equipped with rooftop PV by 2030. In current conditions the realistic targets are that 25% for all new buildings, and for 20% of all renovated buildings are equipped with solar PV rooftops by 2030.

In the pathway to reach net-zero by 2050 for new buildings, these are gradually equipped with rooftop PV as the ambition level of the MEPS is stepwise enhanced. This net-zero pathway would require that by 2031, when all new buildings should live up to nZEB standards, they would also expected to be equipped with rooftop PV systems. Similarly, renovated buildings are also increasingly equipped with rooftop PV, reaching a level of 44% by 2030 in the same net-zero emissions pathway.

The goal of decarbonizing the power supply increases the mitigation potential for all buildings.

Annual expected GHG mitigation in 2030

Energy performance in new buildings

The successful implementation of stepwise improved mandatory MEPS together with Grenada's target of producing 100% of its electricity from renewables by 2035 would result in annual total energy-related emission reductions of about 90 kt CO_2 (56%) by 2030 compared to the low ambition scenario, considering both the residential and commercial sectors (Figure 3). This mitigation measure thus offers the most significant mitigation potential compared to renovation. Nevertheless, the deep renovation of the existing building stock remains a vital and significant measure to stay on a path towards net-zero emissions by 2050.

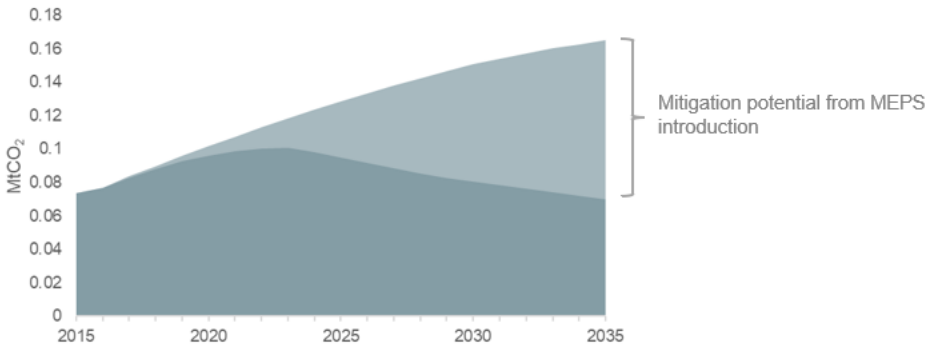

Figure 3. Mitigation potential of energy-related CO_2 emissions from the introduction of mandatory MEPS for new buildings, compared to the low ambition scenario.

Energy performance of renovated buildings

As the deep renovation of existing buildings follows an s-shaped growth, it gradually accelerates to reach its maximum around 2030 in the net zero scenario. As such, a mitigation potential of energy

related CO_2 emissions of about 12 kt CO_2 is achieved by 2030 (Figure 4). This corresponds to 7% reduction compared to the low-ambition scenario.

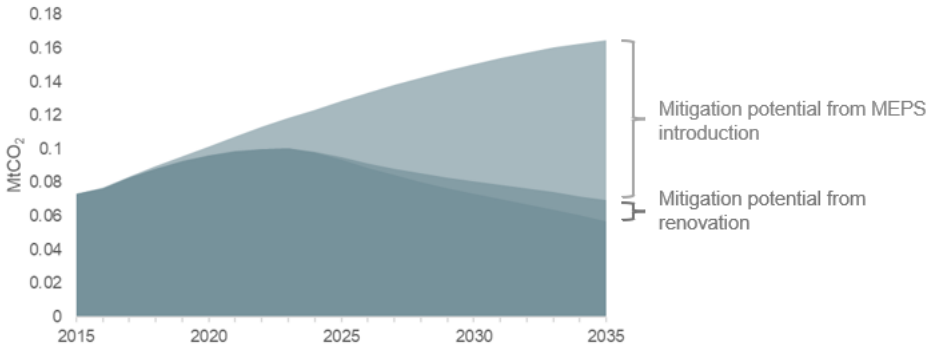

Figure 4. Mitigation potential of energy-related CO_2 emissions from the deep renovation of existing buildings, compared to the low ambition scenario.

Expansion of rooftop PV on new and renovated buildings

The mitigation potentials achieved under both of the two first mitigation measures (MEPS introduction and deep renovation) are the results of two main actions: (1) energy efficiency and, (2) the decarbonisation of the energy supply for cooling. The successful achievement of the latter one is highly reliant on the widespread deployment of rooftop PV, but also the decarbonisation of the national grid. As presented in Figure 5, the achievement of the national target of 100% renewable energy in the national electricity grid by 2035 contributes to the complete decarbonisation of the commercial and residential cooling sectors. Reducing the overall electricity demand for cooling through the implementation of MEPS and renovation will make the achievement of the electricity sector target significantly more feasible as there will be an overall lower demand for electricity that needs to be met with renewables.

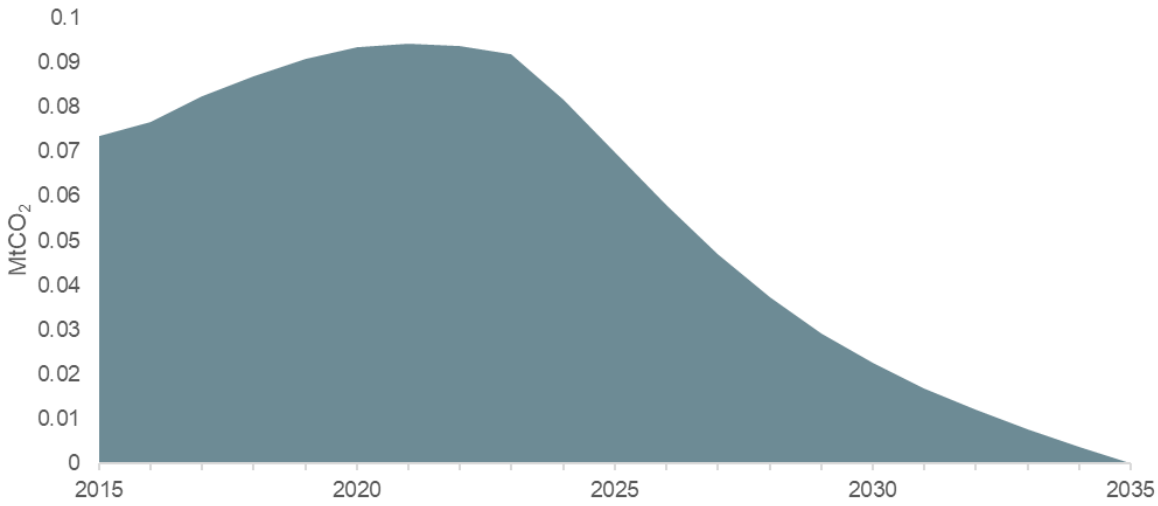

Figure 5. CO_2 emissions mitigation potential compared to a scenario where all other mitigation options remain the same, but all electricity is supplied through the national grid.

Governance and institutional responsibility

Governance and institutional responsibility play a crucial role in the successful implementation of mitigation measures, especially in sectors such as energy, infrastructure development, and physical planning. Various institutions are tasked with specific responsibilities to ensure the effectiveness of these measures. A list of institutions in Grenada and their relevance for the selected mitigation actions can be found in Table 3.

Table 3: Institutional responsibility for selected Mitigation Actions

(1 key institution; 2 relevant institution; 3 marginally influential institution)

	Energy performance of new buildings	Energy performance of renovated buildings	Expansion of rooftop PV on new and renovated buildings
National Ozone Unit	2	2	3
Ministry of Climate Resilience, Environment and Renewable Energy	1	1	1
Ministry of Infrastructure Development	1	2	2
Physical Development Authority (PDA)	1	1	1
Grenada Bureau of Standards (GDBS)	2	2	2
Grenada Solid Waste Management Authority (GSWMA)	3	3	3
Grenada Customs and Excise Division	2	2	1
Department of Trade	2	2	2
The National Climate Change Committee (NCCC)	2	2	2
Grenada Refrigeration, Air-conditioning and Ventilation Association	2	2	3
Grenada Electricity Service Ltd. (GRENLEC)	2	2	1
Public Utilities Regulatory Commission (PRUC)	2	2	1

The role of each agency is the following:

1. **National Ozone Unit (NOU)**

   Mandate: Focuses on phasing out Montreal Protocol Controlled substances (ODS) and ensuring the adoption of climate-friendly alternatives in cooling and refrigeration sectors.

- **New buildings**: Can promote climate-friendly refrigerants and cooling technologies that improve energy efficiency in HVAC systems, which is a key component of energy performance in buildings.
- **Renovated buildings**: Advocate for retrofitting energy-efficient, low-GWP (global warming potential) refrigeration systems in renovated buildings.

Expanded Mandate: While their current focus is on phasing out substances controlled under the Montreal Protocol, the NOU could broaden its scope to include a stronger focus on overall energy efficiency in building systems. This could involve:

- Promoting energy-efficient and low-carbon HVAC technologies that integrate with renewable energy sources, such as systems compatible with rooftop PV.
- Increasing collaboration with the renewable energy sector to understand how cooling technologies can work with distributed energy systems.

2. Ministry of Climate Resilience, Environment, and Renewable Energy

Mandate: Oversees policies and strategies related to climate resilience, renewable energy, and environmental sustainability.

- **New buildings**: Can drive the development of national standards and policies that mandate energy-efficient building designs and renewable energy integration, such as rooftop PV.
- **Renovated buildings**: Could create incentives and frameworks for energy-efficient retrofits, including mandatory energy audits and renovation standards.
- **Rooftop PV**: Responsible for promoting the adoption of renewable energy, including facilitating incentives for installing PV on both new and existing structures.

Expanded Mandate: Already central to climate and renewable energy policies, this ministry could take on an expanded role in setting binding targets for energy efficiency and renewable energy integration in the building sector.

- Mandate minimum energy performance standards, alongside GDBS, for new and renovated buildings, including the integration of rooftop PV requirements, in the country's building code.
- Lead a Green Building Certification program that incentivizes developers and renovators to exceed these energy performance standards, with rewards such as tax breaks or streamlined permitting.

3. Ministry of Infrastructure Development

Mandate: Focuses on infrastructure projects, including public buildings, roads, and utilities.

- **New buildings**: Responsible for incorporating energy performance standards in public infrastructure projects and ensuring that new government buildings meet energy efficiency targets.
- **Renovated buildings**: Could implement guidelines for improving energy performance in government-owned and funded building renovation projects.
- **Rooftop PV**: Can lead by example in installing rooftop PV systems on public infrastructure and buildings, potentially encouraging private sector uptake through demonstration projects.

Expanded Role: Currently focused on public infrastructure, this ministry could become the champion of sustainable construction practices by:

- Implementing mandatory energy audits and energy performance certification for all public buildings and ensuring government projects serve as models for energy efficiency and rooftop PV integration.
- Prioritizing materials and technologies that contribute to high energy performance in national Green Public Procurement policies and facilitate rooftop PV installations.

4. **Physical Development Authority (PDA)**

Mandate: Regulates land use, development, and building permits in Grenada.

- **New buildings**: Can enforce building codes and energy efficiency standards as part of the permitting process for new construction.
- **Renovated buildings**: Could require energy performance improvements as part of renovation permits, ensuring that all upgraded buildings meet modern efficiency standards.
- **Rooftop PV**: Can streamline the approval process for rooftop PV installations and ensure compliance with building codes that promote renewable energy adoption.

Expanded Mandate: The PPA could play a stronger regulatory role in enforcing energy efficiency and renewable energy integration by:

- Revising building permit processes to include energy performance benchmarks for new constructions and renovations, requiring minimum energy ratings and rooftop PV installations for large-scale projects.
- Mandating that all large renovations trigger a requirement for energy-efficient upgrades and renewable energy integration, including solar PV.

5. **Grenada Bureau of Standards (GDBS)**

Mandate: Develops and enforces technical standards for products and services, including energy efficiency and construction materials.

- **New buildings**: Responsible for establishing standards for energy-efficient building materials, insulation, windows, and appliances used in new construction.
- **Renovated buildings**: Ensures that materials and systems used in renovations meet energy efficiency criteria.
- **Rooftop PV**: Develops and enforces standards for the safe installation and performance of rooftop PV systems, ensuring they meet both energy and safety requirements.

Expanded Mandate: GDBS could broaden its scope beyond product standards to include:

- Developing mandatory energy efficiency standards for building materials and technologies, ensuring that only certified energy-efficient products (e.g., windows, insulation, HVAC systems) are used in construction.
- Establish national standards for the integration of energy storage systems with rooftop PV, ensuring compatibility and safety of emerging technologies like battery storage.

6. **Grenada Solid Waste Management Authority (GSWMA)**

Mandate: Manages waste disposal and recycling systems across the country.

- **New and renovated buildings**: Could play a role in promoting sustainable construction materials that are recyclable or have lower energy footprints in both new and renovated buildings.
- **Rooftop PV**: Limited direct role but could encourage the recycling of PV system components and the responsible disposal of construction waste associated with retrofitting buildings with energy-efficient systems.

New Mandate: While currently focused on waste management, GSWMA could support energy efficiency and renewable energy initiatives by:

- Facilitating a recycling program for building materials, particularly for energy-efficient renovations that involve replacing old materials and appliances.
- Create incentives for using recycled or low-carbon materials in construction and renovation projects to reduce embodied energy.

7. Grenada Customs and Excise Division

Mandate: Manages import and export regulations, including tariffs and duties on goods.

- **New and renovated buildings**: Can enforce potential tax incentives for importing energy-efficient construction materials, appliances, and equipment used in building projects.
- **Rooftop PV**: Plays a key role in facilitating the import of PV panels and systems by offering duty reductions or exemptions to lower the cost of adopting solar energy.

Expanded Role: This division could enhance its role by actively promoting energy-efficient technologies through customs policy:

- Develop a fast-tracked customs process for energy-efficient products, the facilitation and processing of concessions on duties and taxes for solar PV systems, and to encourage faster adoption and reduce costs for developers and homeowners installing rooftop PV.

8. Department of Trade

Mandate: Regulates domestic and international trade, including energy products and building materials.

- **New and renovated buildings**: Can influence the market by encouraging the import and sale of energy-efficient products through trade policy.
- **Rooftop PV**: Could work on policies that promote the trade of solar PV technologies and incentivize businesses to adopt solar systems through easier market access, tax breaks, and streamlined permitting and licencing processes.

Expanded Role: Could be more involved in promoting the market for energy-efficient and renewable energy products:

- Work with international partners to create preferential trade agreements for energy-efficient and renewable energy technologies, reducing costs and enhancing access to high-quality products.
- Encourage local businesses to prioritize and stock energy-efficient products, including materials for new buildings and renovations, e.g. by establishing an incentive program for green trade.

9. National Climate Change Committee (NCCC)

Mandate: Provides policy advice on climate change mitigation and adaptation strategies.

- **New and renovated buildings**: Can push for the inclusion of energy efficiency measures and renewable energy targets in national climate policies and building regulations.
- **Rooftop PV**: Advises on strategies to integrate renewable energy into national plans, supporting initiatives that promote rooftop PV installations.

Expanded Role: Could take on a more active role in setting binding targets and monitoring progress toward energy efficiency and renewable energy goals:

  - Act as the monitoring and accountability body for a national roadmap on energy-efficient buildings and renewable energy adoption, including rooftop PV targets.
  - Lead cross-institutional efforts to ensure that energy efficiency and renewable energy measures are aligned with Grenada's climate goals, using data from national energy performance assessments to inform policy adjustments.

10. Grenada Refrigeration, Air-conditioning and Ventilation Association

Mandate: Represents professionals in the refrigeration, air-conditioning, and ventilation sectors.

- **New and renovated buildings**: Plays a key role in promoting energy-efficient HVAC systems, which are crucial for reducing energy use in buildings.
- **Rooftop PV**: Not directly involved in PV systems, but energy-efficient HVAC systems complement rooftop PV by reducing the overall energy demand of buildings.

Expanded Role: Could shift from focusing solely on technical standards to advocating for industry-wide change:

- Collaborate with the NOU to train technicians on integrating energy-efficient HVAC systems with solar-powered and grid-independent solutions, making HVAC part of a building's overall energy performance strategy.
- Develop an industry-wide energy-efficient technician certification, ensuring that only certified professionals handle energy-efficient and renewable-ready installations in new and renovated buildings.

11. Grenada Electricity Services Ltd. (GRENLEC)

Mandate: Serves as the main electricity utility provider in Grenada

- **New buildings:** Can support the design and implementation of energy-efficient electrical systems in new buildings, and facilitate net metering arrangements for rooftop PV installations.
- **Renovated buildings:** Has the capacity to provide technical guidance on energy-efficient upgrades to electrical systems during building renovations and ensure compatibility with rooftop PV integration.
- **Rooftop PV:** Plays a key role in enabling and scaling up rooftop solar by providing grid connection support, net metering infrastructure, and customer engagement on distributed renewable energy systems.

Expanded Role: Currently focused on reliable electricity supply and grid stability, GRENLEC could become a key enabler of the energy transition in the building sector by:

- Developing and promoting incentive schemes for rooftop PV adoption in both new and renovated buildings, including performance-based tariffs and financing options.

- Offering technical assistance and grid integration support for energy-efficient building retrofits, ensuring that renewable energy systems are seamlessly incorporated.
- Partnering with government and private developers to expand decentralized solar generation and create model buildings that showcase energy efficiency and solar energy use.
- Upgrade and modernise the grid infrastructure to accommodate additional renewable energy sources

12. Public Utilities Regulatory Commission (PURC)

Mandate: Regulates the electricity sector in Grenada to ensure affordable, reliable, and sustainable utility services. Oversees tariffs, licensing, and the development of regulatory frameworks for energy efficiency and renewable energy deployment.

- **New buildings**: Can propose, alongside the GBST, the development of MEPS and building performance standards, establish minimum energy performance standards for electricity use in new buildings and require compliance through regulatory approvals or licensing procedures. Also, it can introduce mandatory energy performance certification schemes for buildings, linked to grid connection and tariff incentives.
- **Renovated buildings**: Can propose, alongside the GBST, setting mandatory efficiency upgrade requirements for major building renovations and enforce standards for electrical systems' energy performance.
- **Rooftop PV:** Can support the expansion of rooftop solar by creating clear regulatory frameworks for self-generation, net metering, and feed-in tariffs.

Expanded Role: While traditionally focused on utility regulation, PURC could take a more proactive role in driving building sector decarbonization by:

- Developing and enforcing technical standards for rooftop PV systems in both new and existing buildings to ensure safety, performance, and scalability.
- Promoting regulatory innovation that accelerates energy efficiency and distributed renewable energy deployment, ensuring that the electricity sector supports a transition to net-zero buildings.
- **Public awareness and communication: driving public awareness campaigns for energy efficiency, such as demand side management.**

A cross-cutting recommendation for all institutions would be to **establish an inter-agency task force** to improve coordination between these institutions on energy efficiency in buildings and rooftop PV initiatives, ensuring that each entity's work aligns with national climate and energy goals.

Relevant regulatory frameworks

When implementing measures related to a mitigation action, it is crucial to navigate through and adhere to relevant regulatory frameworks to ensure effective and harmonized outcomes. This section examines two important regulatory frameworks relevant to Grenada—the CARICOM Regional Energy Efficiency Building Code (CREEBC) and the OECS Building Code, derived from the Caribbean Uniform Building Code (CUBiC) (Table 4: Regulatory frameworks relevant for selected Mitigation Actions).

Table 4: Regulatory frameworks relevant for selected Mitigation Actions

(1 key framework; 2 relevant framework; 3 marginally influential framework)

	Energy performance of new buildings	Energy performance of renovated buildings	Expansion of rooftop PV on new and renovated buildings
CARICOM Regional Energy Efficiency building code (CREEBC)	1	2	3
OECS Building Code, based on the Caribbean Uniform Building Code (CUBiC)	1	2	3

CARICOM Regional Energy Efficiency Building Code (CREEBC)

Current Role: The CREEBC, developed by the CARICOM Secretariat, is aimed at establishing regional standards for energy efficiency in the design and construction of buildings. It emphasizes reducing energy consumption through measures like efficient lighting, ventilation, insulation, and the use of energy-efficient building materials. Its influence focuses on:

Energy Performance of New Buildings:

- The CREEBC sets minimum standards for energy efficiency in the design and construction of new buildings. This includes guidelines for thermal insulation, window performance, and the use of natural lighting, which are key to reducing overall energy demand in new constructions.

Energy Performance of Renovated Buildings:

- While the CREEBC does not specifically address renovation projects, its principles could be applied to retrofitting older buildings to meet modern energy efficiency standards, focusing on the upgrading of heating, ventilation, and air conditioning (HVAC) systems, and improving insulation and lighting systems.

Expansion of Rooftop PV Systems:

- The code touches on the integration of renewable energy but does not provide specific requirements for PV systems. Its guidelines for energy-efficient design could indirectly support PV integration by reducing overall energy needs, but it lacks direct mandates or incentives for installing rooftop PV systems.

Potential Expansion of Mandate:

To make substantial progress, the CREEBC could be expanded to include:

- **Mandating PV Readiness** for all new buildings by requiring structural considerations (e.g., roof strength, orientation) that facilitate the installation of solar panels.
- **Explicit Energy Performance Standards for Renovations**, including the requirement to meet updated efficiency codes whenever major renovations occur.
- **Incentivizing PV Retrofits** in existing buildings, possibly through a certification program that offers benefits or recognition for energy-efficient and PV-equipped buildings.
- **Incorporating Smart Energy Technologies**, like energy monitoring systems, to complement energy efficiency and renewable energy generation.

OECS Building Code (Based on CUBiC)

Current Role: The OECS Building Code, drawing on the broader Caribbean Uniform Building Code (CUBiC), provides general guidelines for the construction of safe, durable, and sustainable buildings in the region. The code mainly focuses on structural integrity and safety, with some attention to sustainability principles.

Energy Performance of New Buildings:

- The OECS Building Code currently places less emphasis on energy efficiency compared to the CREEBC. However, by following CUBiC, it includes general provisions for sustainable construction, which could be interpreted to encourage energy-efficient designs, though not in specific terms.

Energy Performance of Renovated Buildings:

- Like the CREEBC, the OECS Building Code does not specifically address renovations. Its application in this area could be enhanced by including energy-efficiency measures when buildings are being updated for safety or durability reasons.

Expansion of Rooftop PV Systems:

- The code, as it stands, has no explicit provisions for the installation of rooftop PV systems. Its focus on building safety and structural standards could indirectly affect the feasibility of rooftop PV installations by ensuring that buildings are structurally sound enough to support PV systems.

Potential Expansion of Mandate:

To better address energy performance and PV integration, the OECS Building Code could be expanded to include:

- **Energy Efficiency Standards for New Buildings**, including a focus on reducing overall energy demand through better insulation, efficient windows, and smart design principles.
- **Renovation Standards** that require retrofitting buildings to improve their energy performance during major updates, such as when updating roofs, windows, or HVAC systems.
- **Specific Guidelines for Rooftop PV Installations**, such as ensuring roof structures are strong enough to accommodate PV systems and developing standard designs to make PV installation easier and more cost-effective.
- **Resilience and Energy Independence**, combining energy efficiency and PV system requirements to ensure that buildings in the region are better prepared for natural disasters, with decentralized energy sources like solar PV playing a critical role.

Both the CREEBC and the OECS Building Code have foundational roles in improving energy performance and facilitating the use of renewable energy, but there are significant gaps. Expanding their mandates would involve setting explicit standards for:

- **New buildings** to be PV-ready and meet higher energy performance criteria.
- **Renovated buildings** to integrate modern energy efficiency upgrades and renewable energy solutions.
- **Rooftop PV systems** to become a core component of energy planning in building codes, incentivizing or even mandating the installation of such systems on both new and existing buildings.

Key enabling activities

To implement the improvements suggested in this study technical skills and expertise is needed that are now probably inaccessible in Grenada considering the low market penetration of nZEB in Latin America and the Caribbean. Also, as nZEB business models are relatively new, information campaigns are needed to inform prospective buyers that the energy efficiency measures are worth the additional cost. For this purpose, a well-developed Energy Service Company (ESCO) market would be an important instrument. ESCOs provide a broad range of energy solutions including designs and implementation of energy savings projects.

Other important enabling activities that should accompany the policy measures described in this document include:

- **Capacity development of architects, engineers, contractors, and builders**
- **Awareness raising with general public**
- **Green public procurement: Amending current Procurement Act to include green/sustainable procurement**

Financing selected mitigation actions

The transition to net-zero energy buildings in Grenada, encompassing both new constructions and the renovation of existing structures, will require substantial financial resources. These resources are needed not only for the direct costs associated with improving energy efficiency and installing renewable energy systems but also for developing a supportive market environment and infrastructure. This section introduces the key areas demanding financing and explores potential funding sources. By linking financing needs with appropriate sources, we aim to provide a clear framework for stakeholders involved in supporting this transition.

Key Areas Requiring Financing

The upfront costs for a net-Zero Energy Building (nZEB) are generally higher than those for a standard building, and profitability depends on various factors such as energy costs and access to capital. Therefore, it is essential to establish appropriate financial mechanisms, such as access to affordable loans, subsidies, etc. To achieve a net-zero energy future for Grenada's building sector, financing is needed in three major areas:

Direct Costs of Construction and Renovation
This includes the materials, labour, and technologies required for upgrading building envelopes and installing rooftop solar PV systems. Specific areas include:

- **Retrofitting insulation and upgrading windows/doors**
- **Upgrading HVAC systems and energy-efficient lighting installations**
- **Certification processes for meeting nZEB standards**

Market Preparation and Enabling Environment
Developing the necessary market conditions to support nZEBs includes:

- **Training programs for the workforce, including the certification of energy auditors and installers**
- **Pilot projects to test and demonstrate new technologies and approaches**
- **Government capacity building to create and enforce regulatory frameworks**

Supporting Infrastructure and Systems
Ensuring that Grenada has the infrastructure and systems in place to support nZEBs, including:

- **Developing supply chains for energy-efficient materials and renewable technologies**
- **Research and development (R&D) for localized solutions**
- **Implementing monitoring and reporting systems to track energy performance and emissions reductions**

Potential Financing Sources

To meet the financial demands of these areas, Grenada can tap into various funding sources. The financing options include private, public, international, and hybrid mechanisms. Below, we explore how these sources can be matched with specific financing needs.

Table 5: Overview of areas requiring finance and potential funding sources (non-exhaustive)

Area requiring finance	Private sources	Public sources	International sources	Hybrid sources
DIRECT COSTS OF CONSTRUCTION AND RENOVATION	**Commercial Banks and Financial Institutions**: Provide loans for building renovations, energy-efficient upgrades, and mortgages with green incentives.	**Government Budgets**: Offer subsidies and incentives to help the private sector meet new nZEB standards and codes.	**Multilateral Development Banks (MDBs):** Provide concessional loans for large-scale renovations and nZEB implementation.	
	ESCOs (Energy Service Companies): Offer performance-based contracts for energy-saving renovations, allowing costs to be paid from energy savings.	**Development Financial Institutions (DFIs):** Provide concessional loans or grants to lower upfront costs for renovations and nZEB upgrades.	**Climate Funds (GCF, GEF):** Support large-scale energy-efficient building projects through grants and concessional loans.	
	Real Estate Investment Trusts (REITs): Invest in energy-efficient commercial and residential buildings.			
	Green Bonds: Issue bonds specifically for financing green			

Area requiring finance	Private sources	Public sources	International sources	Hybrid sources
	building projects, focusing on energy efficiency improvements.			
MARKET PREPARATION AND ENABLING ENVIRONMENT		**Government Budgets:** Support workforce training programs, certification of energy auditors, and institutional capacity building.	**Bilateral Assistance and Grants:** Provide technical assistance and funding for government capacity building, regulatory development, and pilot projects.	
			Climate Funds (GCF, GEF): Offer grants for regulatory framework development, capacity building, pilot projects, and market preparation efforts, including awareness raising.	**Public-Private Partnerships (PPPs):** Facilitate joint funding for large-scale capacity-building initiatives, training programs, and pilot projects, combining public and private investments.
SUPPORTING INFRASTRUCTURE AND SYSTEMS	**Private Equity and Venture Capital:** Invest in innovation and R&D for localized energy-efficient materials and technologies.		**MDBs and Climate Funds:** Support infrastructure development through concessional loans and grants for R&D, innovation, and supply chain improvements.	**Blended Finance:** Combine concessional funds with private investments to reduce risks associated with developing supply chains and implementing monitoring systems.
	ESCOs: Fund supply chain development and			**PPPs:** Joint funding for building

Area requiring finance	Private sources	Public sources	International sources	Hybrid sources
	systems needed to support performance-based contracts for building energy upgrades.			monitoring, reporting, and verification systems, as well as supply chain development for energy-efficient materials.

Effective financing strategies for Grenada's NZEB transition must not only match sources to needs but also create synergies between public, private, and international actors. For example, blended finance mechanisms can combine concessional public funds with private investments to de-risk projects, thereby encouraging private-sector involvement in critical areas like R&D and supply chain development. Similarly, public-private partnerships can pool resources for large-scale capacity-building and infrastructure initiatives.

3.2 Intervention area II: Shifting to low-emission equipment

This intervention area focuses on the promotion of appliances that are energy efficient and use natural refrigerants. As both aspects are directed to the very same appliances, combining both requirements in a single market guidance and monitoring scheme presents opportunities for synergies. In addition, for existing equipment that has a remaining lifetime of over 10 years, the substitution to lower GWP refrigerants is considered

3.2.1 Mitigation action II.1: Update and strengthen MEPS for appliances

Description

After the reduction of cooling needs due to improved building insulation, the remaining cooling need should be met by highly efficient appliances. Minimum energy performance standards (MEPS) and labelling schemes providing easy-to-understand information to customers are the preferred means to increase the market uptake of efficient appliances.

The scope of appliances are room ACs, such as monoblock and split ACs, as well as domestic refrigerators, freezers and a combination thereof. In addition, commercial plug-in appliances such as bottle coolers and (ice-cream) freezer can be targeted with MEPS and labels.

Smart technologies, including Internet of Things (IoT) can help consumer optimise the use of ACs. For buildings with rooftop solar, smart appliances will allow better integration between cooling demand and solar hours.

For large consumers, a study (UNIDO, 2021) identified 8 large end-users of refrigerants and developed an analysis for 8 facilities. It identified pilot projects preparation to define technical solutions and financial opportunities for future implementation. This study provides detailed information to the solutions that large consumers may adopt, and provides insights to the technical know-how on cooling in Grenada

Goal

Keeping up with technological improvements requires regular review and updates of MEPS and labelling. Guidance for ambition levels is provided by several appliance specific model regulations published by United for Efficiency (U4E), a UNEP initiative to promote efficient appliances, and by Collaborative Labelling and Appliance Standards Program (CLASP) as US-based NGO focused on standards and labelling. The U4E model regulation targets are based on the ISO 16358-1 standard. For room ACs, high efficiency is considered to start at 8 for appliances up to 4.5kW cooling capacity and measured as Cooling Season Performance Factor[2] (CSPF) in kWh/kWh as defined in ISO 16358-1.

Policy action area

To attain these energy performance levels, the proposed policy action involves the progressive enhancement of Minimum Energy Performance Standards (MEPS) for appliances, achieved through the iterative strengthening over time. To untap the full emissions reductions potential, MEPS need to be mandatory, and ensuring compliance is a precondition to achieve the suggested pathway. The shift from voluntary standards to technical regulations is being considered in the Grenada´s Bureau of Standards workplan for 2024.

Accelerated market uptake can be supported by targeted financial support programmes providing help to lower income customers to cover the higher up-front cost. Grenada has implemented MEPS for

[2] CSPF is measured in W/W - as the ratio of the total annual amount of heat removed from the indoor air (in kilowatt-hours, kWh) to the total annual amount of energy consumed by the equipment (also in kWh) during the same period. A cooling season is defined by a standard bin temperature profile and available for different climate groups.

smaller ACs, and refrigerators based on the Caricom Standard but added more stringent requirements for energy efficiency. **the targets are for single Split AC, single -package, window or Room AC. Split ACs are the majority of the AC market, with over 90% share.

Table 7 (next page) shows these requirements, while ***Table 6*** reiterates the targets presented in the National Cooling Action Plan.

The Government is considering a differentiated tax scheme to promote low-global-warming-potential (GWP) alternatives to HCFCs, and energy-efficient RAC equipment, and a number of importers have already benefitted from the tax and duty concessions that are provided on importation of equipment using natural refrigerants. There is also a plan to update the Public Procurement Act to include a green procurement component.

Table 6: Energy Efficiency targets (EER) for Split ACs** (NCAP, 2021)

Scenario	Indicator	2017	2020	2022	2026	2030	2035	2050
BAU	Avg. EER [W/W]	**3.2**	**3.26**	**3.28**	**3.32**	**3.36**	**3.46**	**3.56**
BAU	Avg. CSPF [W/W], est	**3.87***	**3.95***	**3.97***	**4.02***	**4.07***	**4.19***	**4.31***
MIT	**Avg. EER [W/W]**	**3.2**	**3.26**	**3.28**	**3.75**	**5.5**	**6.51**	**6.51**
MIT	**Avg. CSPF [W/W], est**	**3.87***	**3.95***	**3.97***	**4.54***	**6.66***	**7.88***	**7.88***
All split ACs	MEPS: EER, [W/W] est	-	-	3		5.3*	6.3*	6.3*
	MEPS CSPF [W/W]			4.6*		6.1	7.1	7.1

*Estimated

**the targets are for single Split AC, single -package, window or Room AC. Split ACs are the majority of the AC market, with over 90% share.

Table 7: Energy Efficiency levels for different labelling requirements in Air Conditioners

Label	Category	EER	CSPF	COP
U4E model regulation <= 4.5 kW cooling capacity	High efficiency	6.6*	8.00	
	Intermediate efficiency	5.9*	7.10	
	Low efficiency	5.1*	6.10	
Grenada labelling	A+++	3.8	4.6*	3.6
	A++	3.6	4.35*	3.4
	A+	3.4	4.11*	3.2
	B	3.2	3.87*	2.8
	C	3	3.63*	2.6

*Estimated

Table 8: Requirement of the Grenadian Standards

Standards	Description
Grenada National Standard: Energy Labelling – Air Conditioners – Requirements (CRS 59: 2019, MOD) GDS 1: Part 11: 2022	Modified adoption of CARICOM Regional Standards CRS 59:2019 Modifications were done to Requirement tables Scope: non-ducted ACs, single package and/or single split-systems Metric: EER and COP
Grenada National Standard: Energy Labelling – Refrigerating Appliances – Requirements (CRS 57: 2019, MOD) GDS 1: Part 10: 2022	Modified adoption of CARICOM Regional Standards CRS 57:2019 Modification to add the type for refrigerant onto the label Scope: refrigerating appliances Metric: EEI

Annual expected GHG mitigation in 2030

The successful implementation of an enhanced MEPS will result in emissions reductions.
These reductions are measured when considering a baseline emission of 2020

For the analysis we consider *low ambition scenario ("BAU")*, which corresponds to a 210% increase compared to 2020 baseline levels.

When comparing the mitigation potential from the use of appliances for the timeframe of this implementation plan of 2025-2030 and the longer-term target to 2050 the emissions reductions are:

- **7% emission rection can be achieved in 2030, compared to 2020 baseline, avoiding 0.07 Mt CO_2eq, and**
- **23% emission reduction by 2050. This is equivalent to avoiding around 0.8 Mt CO_2eq**

Governance and institutional responsibility
The following government agencies have a role to play to support the adoption of MEPS

- **The Energy Division can work with the National Bureau of Standards in setting the targets and adoption this regulation**
- **The NOU supporting low emission equipment adoption, by simultaneously addressing the use of low emission/GWP refrigerants in high energy performance equipment**
- **The Customs Authority by controlling and enforcing that appliances that are imported to the country meet the MEPS requirements**
- **The Ministry of Finance can provide fiscal incentives and subsidies**

Relevant regulatory frameworks
The relevant standards are

1. **Grenada National Standard: Energy labelling – Air conditioners – requirements GDS 1: Part 11: 2022 (modified from CARICOM Regional Standard CRS 59:2019)**

Table 9:Grenada Energy efficiency classes for single split systems, single-package, window and room appliances

Energy efficiency class	Cooling mode		Heating mode	
	EER [W/W]	EER [BTU/h/W]	COP [W/W]	COP [BTU/h/W]
A+++	>3.8	>12.92	>3.6	>12.24
A++	>3.6	>12.24	>3.4	>11.56
A+	>3.4	>11.56	>3.2	>10.88
B	>3.2	>10.88	>2.8	>9.52
C	>3	>10.2	>2.6	>8.84

EPS are not included in the labelling standard for ACs

2. **Grenada National Standard: Energy labelling – Refrigerating appliances – requirements GDS 1: Part 10: 2022 (modified from CARICOM Regional Standard CRS 57:2019)**

MEPS for 18 appliance types, based on defined maximum energy consumption per year (Emax) depending on the Adjusted Volume (AV)

AEC= E*365, where E [kWh/day] is the determined based on AHAM HRF - 2016

EEI=AEC/Emax*100%

Table 10:Grenada Energy efficiency classes for refrigeration appliances

Energy efficiency class	EEI
A	<= 60
B	60 < EEI <= 70
C	70 < EEI <=80
D	80 < EEI <=90
E	90 < EEI <=100
F	100

Key enabling activities

1. **Support to standards committee and quality infrastructure to ensure periodical review of MEPS (this is foreseen in the KIP stage I, as detailed in section 3.2.2 of this document)**
2. **Market vigilance: A critical function of a government market surveillance authority is to conduct regular, on-going monitoring of the market to ensure that the products being supplied to the market are compliant (UNEP, 2022). In Grenada, the Government is considering creating a product registration system for cooling equipment. This would be included under national program for the development of statistical data. It would require the involvement of the Customs Agency.**
3. **A market survey is planned under the additional activities to maintain energy efficiency in the servicing sector[3]**
4. **Training for technicians to advocate benefits with customers, proper maintenance routines to retain initial efficiency**
5. **Training for sales personnel to promote the benefits of highly efficient appliances and to assist with accessing financial support**
6. **Awareness raising among customers about life cycle costs of equipment, as a driver to purchase higher efficiency products**
7. **Tax exemptions or rebates for higher efficiency equipment to mitigate the increased cost**
8. **Finance to end-user for equipment replacement and energy management**

[3] The MLF created a funding window for low volume countries, under decision 89/6 to o introduce alternatives to HCFCs with zero or low global warming potential (GWP) and to maintain energy efficiency in the refrigeration and air-conditioning (RAC) servicing sector

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Financing strategy

The adoption of higher efficiency equipment will occur both as the equipment stock increases, and as existing consumers need to replace equipment reaching its end of life. Considering that the equipment in this intervention targets domestic users, they would tend to utilise them over the expected lifetime. It is more likely that RAC equipment will be replaced due to lack of availability of banned refrigerants, such as R22 for ACs or HFC-134a for refrigerators.

Financial incentives, along with regulatory drivers, are two of the factors in speeding up the process of transition to higher efficiency products and equipment.

Affordability of efficient air conditioners can be a market barrier, thus an economic incentive to address the high first cost challenge with efficient air conditioners is recommended. Without an incentive the uptake could be limited. Under the KIP stage I, a differentiated tax scheme to promote low-global-warming-potential (GWP) alternatives to HCFCs, and energy-efficient RAC equipment could be set-up (as detailed in section 3.2.2 of this document)

Consumer awareness on the energy efficiency of the appliances, and the adoption of MEPS should be included in the communication to consumers.

Key areas requiring financing

Some of the energy efficiency activities in this sector are financed by the Multilateral Fund for the implementation of the Montreal Protocol, under two projects:

- **Additional activities for the introduction of alternatives to HCFCs with low or zero global-warming potential and for maintaining energy efficiency in the refrigeration servicing sector**
- **Kigali Implementation Plan**

In addition, funding should be sought for the following activities

- **Tax exemptions or rebates for higher efficiency equipment**
- **Financing for end user efficiency improvements**
- **Raising consumer awareness of energy efficiency labels**

Potential financing sources

To meet the financial demands of these areas, Grenada can tap into various funding sources. The financing options include private, public, and international mechanisms. Below, in Table 11: Overview of areas requiring finance and potential funding sources for energy efficiency (non-exhaustive) weTable 11: Overview of areas requiring finance and potential funding sources for energy efficiency (non-exhaustive) explore how these sources can be matched with specific financing needs.

Table 11: Overview of areas requiring finance and potential funding sources for energy efficiency (non-exhaustive)

Area requiring finance	Private sources	Public sources	International sources
1. Policy and normative support		**Government Budgets**: to develop and implement policies	**Climate Funds (GCF, GEF, MLF):** to develop and implement policies
2. Market vigilance		**Government Budgets**: for market monitoring	**Climate Funds (GCF, GEF, MLF):** to improve the capacity of agencies involved, such as in the KIP
3. Technician capacity building		**Government Budgets**: support vocational and educational training on energy efficiency	**Climate Funds (GCF, GEF, MLF):** develop programmes to promote the use of energy efficient equipment and energy management systems
4. Distributors and importers capacity building	**Local Financial institutions:** client lending for importing higher efficiency products	**Government Budgets**: Offer subsidies and incentives to provide rebates for new equipment	**Climate Funds (GCF, GEF, MLF):** Support energy-efficient equipment replacement projects through grants and concessional loans[4].
5. Awareness raising among consumers	**Local Financial institutions:** marketing campaigns to customers for investment in higher efficiency products	**Government Budgets**: Offer subsidies and incentives to provide rebates for new equipment	**Climate Funds (GCF, GEF, MLF):** Support energy-efficient equipment replacement projects through grants and concessional loans[5].

[4] Under the KIP Stage I, some energy efficiency activities have been integrated, such as the update of the MEPs. The KIP state that they plan to submit a pilot energy efficiency project under the MLF Executive Committee decisions 91/65 and 92/38

[5] Under the KIP Stage I, some energy efficiency activities have been integrated, such as the update of the MEPs. The KIP state that they plan to submit a pilot energy efficiency project under the MLF Executive Committee decisions 91/65 and 92/38

Area requiring finance	Private sources	Public sources	International sources
6. Tax rebate		**Government Budgets**: Offer subsidies and incentives to provide rebates for new equipment	**Multilateral Development Banks (MDBs):** Provide concessional loans for a tax or rebate scheme
		Development Financial Institutions (DFIs): Provide concessional loans or grants that could support government in tax rebates	
7. End user financing	**Commercial Banks and Financial Institutions**: Provide loans for energy-efficient upgrades.		**Climate Funds (GCF, GEF, MLF):** Support energy-efficient equipment replacement projects through grants and concessional loans[6].
	ESCOs (Energy Service Companies): Offer performance-based contracts for energy-saving renovations, including equipment.		

[6] Under the KIP Stage I, some energy efficiency activities have been integrated, such as the update of the MEPs. The KIP state that they plan to submit a pilot energy efficiency project under the MLF Executive Committee decisions 91/65 and 92/38

3.2.2 Mitigation action II.2: Phase-out of HFC refrigerants

Description
In line with the HFC Phase-Down plan, known as the Kigali Implementation Plan, Grenada will comply with the Kigali Amendment by reducing 7,042.37 t CO_2eq by 2030. This reduction is equivalent to Stage I phase down (2025-2029) of 10% of the consumption, of 5,281.78 tCOeq. For 2030, we accounted a linear contribution to mitigation, of one sixth of the Stage II phase down (2030-2035), which is equivalent to 1,760.59 t CO_2eq

Goal
To meet the commitments of the Kigali Amendment, by reaching the 10% phase-down planned for 2029, the KIP also integrates actions related to energy efficiency.

In this section, the actions to control substance emissions are described, while the replacement of equipment in different sectors will be motivated by business demands, availability of more efficient technologies were dealt with in the prior section.

Policy action area
The Government is finalizing the Montreal Protocol Controlled Substance Act (the ODS Act) which includes a ban on the import of HCFC-based equipment; a ban on the import of HFC-based domestic refrigerators with refrigerants that have a GWP greater than 150; and a ban on the import of unitary air-conditioning (AC) units (capacity up to 24,000 British Thermal Unit (BTU) with refrigerants that have a GWP greater than 750. The ODS Act was expected to come into effect within the Stage I of the KIP, but there is no set date for its publication.

Policy and legislation to control import and export of HFCs: Reviewing and updating policy and regulations, safety standards, and codes for handling flammable refrigerants; and implementing the licensing and quota system for HFCs including mandatory reporting by HFC importers

Customs capacity-building: Reviewing and updating customs training modules to include HFCs; adoption of 2022 Harmonized Systems (HS) codes

Refrigerant recovery and recycling and procurement of equipment: Procurement of equipment and tools for two training institutions (R-290 AC training units, R-600a domestic refrigerator inverter training system, R-290 commercial refrigeration training unit, R-290 monobloc cold room training unit, leak detector); and procurement and delivery of additional equipment to recovery and reclamation centre (recovery cylinders, identifiers and others)

Strengthening the RAC Association: Employing a consultant to review its constitution and functions, initial consultation for RAC Association restructuring

Public awareness: Outreach activities (print media, seminars, radio and TV interviews, and visits to schools and interest groups) to raise awareness for HFC phase-down

Gender mainstreaming: Conducting a training workshop on good servicing practices and on handling low-GWP alternative technologies specifically for 13 female technicians; and a public-awareness activity to promote female technicians as role models

Table 12: Annual expected GHG mitigation in 2030 (KIP Stage I)

Stage	Target year	Phase down % compared to baseline	Maximum HFC consumption in t CO_2eq
Consumption freeze	2024	-	52,817.76
Stage I	2029	10%	47,535.98
Stage II	2035	30%	36,972.43

Governance and institutional responsibility

The following government agencies have a role to play to support the implementation of the KIP

1. National Ozone Unit, Energy Division, Grenada's Ministry of Climate Resilience, the Environment and Renewable Energy which covers the energy and chemicals aspects of the KIP

2. Grenada Bureau of Standards to develop and implement safety standards for the safe management of flammable refrigerants (GSD 139:2018) and the labelling standards listed in the following section

3. Dept. of Trade, is the customs agency responsible for control and enforcement of the licensing and quota system. They are also responsible for the approval of refrigerant import licenses

4. Grenada Solid Waste Management Authority who operates the refrigerant recovery, recycling and reclamation centre, assist in the life cycle management of refrigerants.

Relevant regulatory frameworks

The main policy documents related to the control of HFC and climate action in the sector include the Kigali HFC Phase down Plan Stage I, approved in the 93rd Executive Committee meeting in December 2023 and funded in 2024.

A Grenada Montreal Protocol Controlled Substance Act (the ODS Act) has been drafted in 2021 but not passed as law yet.

In addition, the following codes, technical regulations and standards are applicable:

- **Grenada National Standard - Code of Practice for the safe use, handling, storage and transportation of refrigerants GSD 139: 2018**
- **Grenada National Standard – Requirements for labelling: labelling of refrigerant containers GSD 135: 2016**
- **Grenada National Standard – Energy labelling – Refrigeration appliances –requirements GDS 1: Part 10: 2022**
- **Grenada National Standard – Energy labelling – Air conditioners –requirements GDS 1: Part 11: 2022**
- **CARICOM Regional Energy Efficiency Building Code 2018**
- **Grenada National Standards - Code of Practice for the safe use, handling, storage and transportation of refrigerants GDS 139:2018**

Key enabling activities

As planned in the Kigali Implementation Plan Stage I, the key activities include the following 1. Policy and legislation to control import and export of HFCs

This activity includes:

- **the development of the regulatory framework for HFCs, with the key step being to establish and implement quota system for HFCs.**
- **mandatory reporting by HFC importers and exporters will be implemented**
- **update of the established two standards on energy labelling, for AC and for refrigeration appliances (as described in section 3.2.1**
- **update of the code of practice for the safe handling, storage, transportation and disposal of refrigerants to ensure that low-GWP refrigerants can be safely adopted**

In addition, the Government is considering a differentiated tax scheme to promote low-global-warming-potential (GWP) alternatives to HCFCs, and energy-efficient RAC equipment. It is also recommended to promote more interinstitutional cooperation between government agencies to accelerate adoption.

2. Customs capacity building

This activity supports the Customs Agency in monitoring the import of controlled substances. The control of HFCs significantly increase the complexity of customs control as many new pure and blend substances need to be disaggregated in the World Customs Organisation Harmonised System (HS) codes. This activity includes increased monitoring from the NOU, training of customs officers, brokers and importers on safe handling, transportation, storage and disposal of refrigerants

3. Technicians capacity building

Technicians play a central role in ensuring that servicing or initial charge gases are recovered and not vented to the atmosphere. They also play a key role for the transition to low GWP refrigerant. Technicians are regularly trained under the HPMP programme, and there will be increased reach with the KIP funding.

In addition to the training, the national program considers that the validation of labour skills is a market enabler to guarantee users that technicians are qualified. The KIP includes activities related to personnel certification:

- **There is a voluntary system to certify technicians locally, and the sale of equipment using flammable refrigerants is currently only permitted to certified technicians by the NOU**
- **There are plans to develop a mandatory system as part of the requirements of the planned Ozone-Depleting Substances (ODS Act)**
- **Grenada is a participant of a pilot project to use a license to refrigeration technicians by UNEP and AHRI**

4. Recovery, recycling, reclamation and other investment activities

The NOU recognises that the future bank of HFC, estimated at 16.20mt of recovered refrigerants (including HFCs) will become an emission risk and need to be addressed. Under the HPMP stage II programme a refrigerant recovery and reclamation centre has been created. Under the KIP, additional capital investment will be made to expand the handling capacity for the RRR centre. The greenhouse gases inventory for the RAC sector estimates the size of the banks by substance, reaching 97.5 metric tonnes in 2030 (139,000 units). R134a has the largest number of refrigerant banks due to its dominant use in MAC and refrigerators, and its use is expected to decline after 2025, mainly due to its replacement in domestic refrigeration with R600a and increasing penetration of R1234yf in mobile AC (MAC).

Managing the HFC banks measures involves a financing mechanism which is closely linked to the establishment of a collection scheme and a regulatory framework. It is important to integrate the policy-defined measures into an existing environmental policy framework.

Grenada is already progressing in the establishment of an effective collective refrigerant gas and equipment collection mechanism for ODS under the HPMP stage II, that would need to be sustained for HFC banks management. In 2024, it officially opened a recovery, recycling and reclamation (RRR) center, operated by the Grenada Solid Waste Management Authority.

An assessment of existing policy framework to integrate the waste electric and electronic equipment (WEEE) regulation is recommended. Another key success factor is widely applying extended producer responsibility (EPR) schemes as a solution to avoid shifting all the financial burden associated with ODS collection and destruction to the end-user, technicians or the informal waste collection sector.

5. Social dimensions

Further activities that focus on increasing the social capital and addressing diversity in the RAC sector are part of the mitigation programme and include

- **strengthening the existing RAC association to support programme implementation.**

The country has a RAC Association, that has not been as active as they used to be. KIP plans the reorganisation of the association through consultations, meetings, and team buildings activities on a managerial level. It is expected that a reconstituted well-functioning Association will be a valuable stakeholder, supporting the KIP's implementation.

- **public awareness on issues related to the market transition of consumer goods the HFC phase-down is more complex than HCFC phase-out, it introduces low GWP refrigerant that require safe handling. It is important to ensure the full understanding of Kigali Amendment and market transition. Public awareness will be raised through campaigns in print media, radio and TV interviews, visits to schools and interest groups (civil society organizations) and the development of multi-media material (documentaries, jingles).**

Gender mainstreaming to increase women´s participation in the sector Grenada has already implemented gender responsive action Under stage II of the HPMP The KIP will build on that strategy and will expand activities planned as well as add additional means to promote gender mainstreaming. The sex-disaggregated data will continue to be collected. The support to TVET students will specifically target female technicians. The NOU also plans to approach the Department of Gender Affairs (Ministry of Social & Community Development, Housing and Gender Affair) to create a partnership in promotion female involvement in STEM fields. In 2025, the NOU launched the "She Cool" project aimed at addressing gender related issues and promoting women in RAC

Key areas requiring financing

The HCFC and HFC phase out and phase down plans are comprehensive in their scope of work to ensure compliance to the Kigali Amendment and financed by the Multilateral fund to implement the Montreal Protocol (MLF). Bilateral cooperation funding contributes to additional activities within the same scopes of work.

The increased climate ambition in this sector is included in the funding for energy efficiency activities as described in 3.2.1 of document.

Financing strategy

The following table describes the sources of funding.

Table 13: Overview of areas requiring finance and potential funding sources for HFC control (non-exhaustive)

Area requiring finance	Private sources	Public sources	International sources
1. Policy and legislation to control import and export of HFCs		**Government Budgets**: to develop and implement policies	**Climate Funds (MLF)** is currently supporting policy development
			Bilateral Funds (IKI, EU) the EU and GIZ is supporting end of life activities
2. Customs capacity building			**Climate Funds (MLF)** is currently supporting policy development
3. Technicians capacity building			**Climate Funds (MLF)** is currently supporting policy development
			Bilateral Funds (IKI, EU) GIZ is supporting technician training
4. Recovery, recycling, reclamation and other investment activities		**Government Budgets:** government agencies such as the Grenada Solid Watse Management Association are contributing to the RRR centre operation	**Climate Funds (MLF)** is currently supporting policy development
			Bilateral Funds (IKI, EU) GIZ is supporting end of life activities and funding capital expenditures
5. Social development, and inclusion activities		**Government Budgets:** for awareness raising campaigns	**Climate Funds (MLF)** is currently supporting policy development
			Bilateral Funds (IKI) GIZ is supporting study dissemination and gender activities

4 Roadmap for upgrading building envelope and shifting to low-emissions equipment

Grenada's transition to more energy-efficient buildings will require a phased approach that prioritizes capacity building, regulatory reforms, market development, and scaling up innovations. Below is a timeline outlining key action items across short, medium, and long-term phases, ensuring momentum is built and sustained over time. A summary of the phase is presented in Table 14, and all actions are depicted in the timeline in Figure 6. Timeline of the roadmap key actions.

Table 14: Summary of key action items and priorities for the next years

Phase	Year Range	Key Actions
Short-term	**Now-2026**	Capacity Building, Pilots, Regulatory Reform
Medium-term	**2027-2030**	Market Development, Incentives for Private Sector, Stage I of the KIP
Long-term	**2030 +**	Scale-up, R&D, Continuous Monitoring

Disclaimer: The actions are not strictly assigned to phases. For example, activities that are the focus in the medium term should already be prepared in the short term. The categorization merely indicates where the main focus should lie in each respective phase.

Immediate Priorities (now- 2026)

Capacity Building and Training Programs

- **Launch nation-wide training programs targeting construction professionals, energy auditors, and local officials to ensure the workforce is equipped to implement energy-efficient building practices.**
- **Conducting a market survey to obtain a comprehensive inventory of the RAC sector in Grenada, including the type of equipment being used, energy consumption and rating, and the cost of the equipment, is planned with financing from the 89/6 MLF funding window for LVCs.**

Pilot Projects

- **Initiate pilot projects to demonstrate energy-efficient building upgrades and rooftop PV systems on both new and renovated structures. These pilots will showcase the feasibility and cost-benefits, helping to build public and investor confidence.**

Regulatory Framework Development

- **Strengthen building codes to include mandatory energy efficiency standards and establish Minimum Performance Standards for building envelopes and energy systems. These will ensure that new construction and renovations meet energy performance benchmarks.**
- **Strengthen MEPS as part of the Grenada´s Bureau of Standards workplan for 2026.**
- **Implement the licensing and quota system for HFCs including mandatory reporting by HFC importers.**

Medium-term Priorities (2027 - 2030)

Under this timeframe, most of the activities planned for the Stage I of the Kigali Implementation Plan will take place.

Market Development

- **Support the development of local supply chains by providing incentives for businesses involved in energy-efficient materials and PV technology. This includes fostering local production and import channels for green construction materials.**
- **Refrigerant recovery, recycling, reclamation and other investment activities**

Incentives for Private Sector

- **Implement financial mechanisms such as tax breaks, subsidies, and low-interest loans to incentivize energy-efficient construction and retrofitting. Encourage partnerships between private developers and public entities to co-invest in green building projects.**

Capacity budling

- **For the abatement of HFCs, capacity building activities focused on the customs agencies and technicians are planned.**

- **For energy efficiency, KIP training on low-GWP alternatives and energy efficiency are needed as prerequisites for implementation.**

Regulatory Framework Development

- **Adoption of the Montreal Protocol Controlled Substance Act (the ODS Act)**

Long-term Priorities (2030 + years)

Scaling Up Successful Pilots

- **Take successful pilot projects to scale by incorporating lessons learned and expanding coverage to wider areas. This includes increasing the number of energy-efficient buildings and solar PV installations, supported by regulatory and financial frameworks.**

Sustained R&D Investment

- **Continue investments in research and development to explore innovative materials and construction techniques that further enhance building performance. This should also focus on advanced solar technologies that can be integrated into the local market.**

Monitoring and Continuous Improvement

- **Establish robust monitoring and evaluation systems to track progress, measure impact, and make necessary policy or technical adjustments. Continuous assessment will ensure long-term sustainability and energy savings.**
- **Social capital and addressing diversity in the RAC sector by public awareness and gender mainstreaming to increase women´s participation in the sector.**

Regulatory Framework Development

Development and adoption of the Stage II of the KIP

From Roadmap to Results

Grenada's NDC Cooling Implementation Roadmap aims to set out a comprehensive and actionable framework to reduce greenhouse gas emissions and enhance climate resilience through sustainable cooling solutions.

The successful implementation of this roadmap will rely on three critical pillars: **coordinated policy action**, **sustained investment**, and **strong collaboration** between national stakeholders and international partners. By aligning efforts across government, the private sector, and civil society, and by leveraging technical and financial support, Grenada can unlock significant mitigation and adaptation benefits.

The years leading up to 2030 are decisive: Action taken now will shape the country's trajectory towards net-zero energy buildings and a climate-resilient future. With the right policies, technologies, and partnerships in place, Grenada has the opportunity to position itself as a regional leader in sustainable cooling and a frontrunner in climate innovation.

This roadmap is both a call to action and a guide for implementation. It invites all stakeholders to work together towards a shared vision of a cooler, cleaner, and more resilient Grenada.

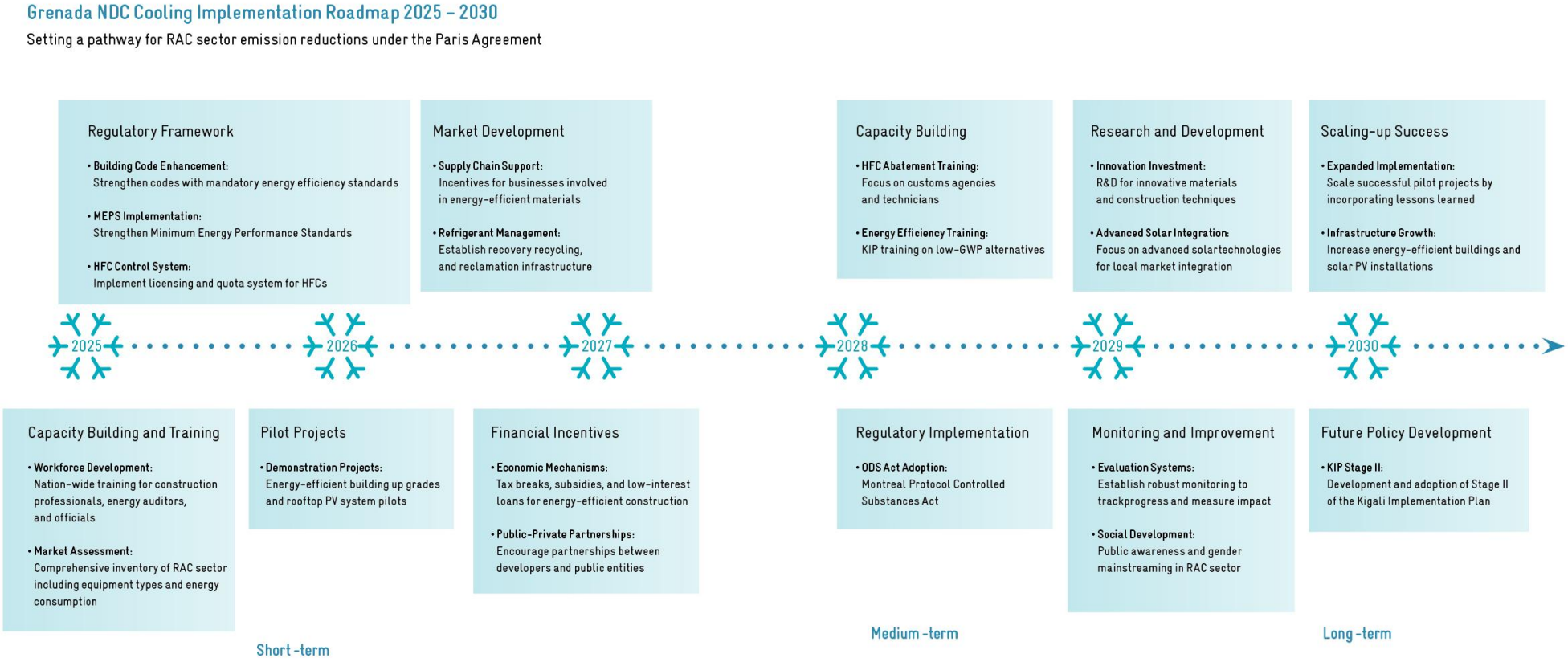

Figure 6. Timeline of the roadmap key actions.

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