NATIONAL COOLING STRATEGY OF NAMIBIA: DRAFT: INCOMPLETE AND NOT FOR CITATION

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LIST OF ACRONYMS

AC	AIR CONDITIONING
ARIA	AIR CONDITIONING AND REFRIGERATION INDUSTRY ASSOCIATION
BAU	BUSINESS AS USUAL
CDD	COOLING DEGREE DAYS
CFC	CHLOROFLUOROCARBON
COP	CONFERENCE OF THE PARTIES
EE	ENERGY EFFICIENCY
EU	EUROPEAN UNION
GHG	GREENHOUSE GAS
GIZ	DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT
GWP	GLOBAL WARMING POTENTIAL
HCFC	HYDROCHLOROFLUOROCARBON
HFC	HYDROFLUOROCARBON
HPMP	HCFC PHASE OUT MANAGEMENT PLAN
MAC	MOBILE AIR CONDITIONING
MEPS	MINIMUM ENERGY PERFORMANCE STANDARDS
MIT	MINISTRY OF INDUSTRIALISATION AND TRADE
MLF	MULTILATERAL FUND
MP	MONTREAL PROTOCOL
NAMA	NATIONALLY APPROPRIATE MITIGATION ACTIONS
NCS	NATIONAL COOLING STRATEGY
NIRAC	NAMIBIAN INSTITUTE OF REFRIGERATION AND AIR CONDITIONING
NCCP	NATIONAL CLIMATE CHANGE POLICY
NDC	NATIONALLY DETERMINED CONTRIBUTION
NOU	NATIONAL OZONE UNIT
ODP	OZONE DEPLETING POTENTIAL
ODS	OZONE DEPLETING SUBSTANCES
RAC	REFRIGERATION AND AIR-CONDITIONING
RACHP	REFRIGERATION AND AIR-CONDITIONING AND HEAT PUMPS
UNEP	UNITED NATIONS ENVIRONMENT PROGRAMME
UNFCCC	UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

1. EXECUTIVE SUMMARY

The cooling sector is one of the most critical yet important industries for the sustainability and development of the economy of the country. It is important to ensure that homes, offices, and cars are comfortable; industrial processes run safely and efficiently while ensuring societies have preserved foods and medicaments for consumption. Notwithstanding being identified as essential, cooling also has a significant adverse environmental impact, due to its contribution to global warming and ozone layer depletion. This is because the refrigeration and air-conditioning (RAC) sector (cooling sector) contributes to global warming both directly and indirectly. The demand for cooling is growing; thus, there is an urgent need to cut cooling related pollution and energy wastage. Without effective mitigating action, cooling may account for almost 20% of global greenhouse gas (GHG) emissions by 2050 (Peters, 2018). The direct impact of cooling on the environment is due to the refrigerant emissions and depends on the global warming potential (GWP) of the refrigerant used, the refrigerant charge in the equipment and the leakage rates (annual and during maintenance and decommissioning) of the equipment. The cooling technology used for RAC mainly utilises synthetic refrigerants that can either deplete the ozone layer or have a high GWP. Hydrofluorocarbon (HFC) refrigerants were introduced to replace their ozone-depleting counterparts but are greenhouse gases that can have a high GWP. HFCs contribute to the increases in temperature currently experienced worldwide, and thus, the demand for cooling also increases. The indirect influence of cooling technologies on climate change is due to the use of fossil fuels to generate electricity to power equipment. The burning of fossil fuels to generate electricity increases CO2 emissions, which then contributes to global warming and increases the demand for cooling and cooling equipment. To ensure that Namibia is prepared for the increased demand for cooling and ready to mitigate the identified threats to the environment and sustainability, the National Cooling Strategy (NCS) of Namibia has been developed. This NCS will support sustainable, energy-efficient, low-GWP cooling in Namibia, enhancing the phase-out and phase-down targets under the Montreal Protocol and its recent Kigali Amendment.

2. INTRODUCTION

Many of Namibia's Sustainable Development Goals (SDG's) are supported by the Cooling sector to attain their functionality, prosperity, and sustainability. The future demand for cooling will increase, based on an estimate that there will be more than 9.5 billion cooling appliances worldwide by the year 2050, which is 2.5 times more than today's 3.6 billion. The need for cooling is growing, thus there is an urgent need to cut cooling related pollution and energy wastage. Without effective mitigating action, cooling could account for almost 20% of global greenhouse gas emissions by 2050 (Peters, 2018). An economy depends on cooling as a critical element for a variety of purposes—from industrial and commercial sectors to private use. Cooling is expected to make homes, offices, and cars more comfortable; while industries such as steel, chemicals, and plastics, depend on cooling for their processes, and if deprived of it, some economies could be at risk of collapse. The commercial and telecommunication sectors are highly dependent on cooling due to the growing use of cold chain technology, servers, and data centres. Similarly, refrigeration is critical for the storage of medicines, including vaccines, and mortuaries. Despite being identified as essential, cooling also has a substantial adverse environmental impact. The primary cooling technology used for RAC applications run mostly on synthetic refrigerants that can deplete the ozone layer and have a high GWP. The high GWP of some refrigerants contributes to the rise in global temperatures and thus the demand for cooling also increases. Synthetic refrigerants used for cooling include hydrochlorofluorocarbons (HCFC), which is ODS and HFC. HFC also referred to as F gases, were primarily developed and promoted as alternatives to ODS and have been used in several sectors in the last 30 years, mainly as a refrigerant in refrigeration, air conditioning, and heat pumps (RACHP) applications. HFCs are greenhouse gases that can have high or very high GWP, up to 14,800. (UNEP, 2016). Left unchecked, F-gases could account for nearly 20 percent of climate pollution by 2050 (EC, 2019). The climate impact related to cooling applications consists of direct and indirect contributions. The direct result is due to the refrigerant emissions and depends on the GWP of the refrigerant, the refrigerant charge in the equipment and the leakage rates (annual and during maintenance and decommissioning) of the equipment. The indirect contribution of cooling technologies to climate change is due to the use of fossil fuels to generate electricity, which powers the increasing number of cooling equipment. The burning of fossil fuels to generate electricity increases CO2 emissions, which will increase as the demand for cooling equipment increases, mainly if low-efficiency cooling technologies are utilised. Globally, there is an increase in the development of more efficient

cooling technologies. However, these technologies have not achieved the necessary market penetrations in developing countries, such as Namibia yet. Thus, energy consumption is expected to increase over the next decade if no effort is made to adopt more efficient cooling technologies. To ensure that Namibia is prepared for the increased demand for cooling and to mitigate the identified threats to the environment and sustainability, the National Cooling Strategy has been developed. This strategy will support energy-efficient, Low- GWP cooling in Namibia, enhancing phase-out and phase-down targets under the Montreal Protocol and the Kigali Amendment, which the country is a signatory to.

Namibia's National Cooling Strategy outlines the findings of a recent assessment of the current and future market for cooling products. It includes recommended actions that would expand access to cooling while conserving precious resources. It assesses Namibia's domestic and commercial cooling appliances; Energy policies; inclusion of the RAC sector into the Nationally Determined Contributions; incentives and strategies to support industrialization in the cooling sector and proposes cooling strategies including the adoption of minimum energy performance standards for room ACs and residential refrigerators

3. RAC RELATED LEGISLATIVE AND POLICY FRAMEWORK

Vision 2030, the document which guides Namibia's long-term development, aims at a high and sustained economic growth to create employment and move the country towards increased income equality. The current Fifth National Development Plan (NDP5), running over the period 2017/18 to 2021/22, translates this vision into strategies and plans for implementation. The objective of the vision is to have a prosperous and industrialized Namibia, developed by its human resources, enjoying peace, harmony and political stability. The NDP5 rests on four pillars, Economic Progression, Social Transformation, Environmental Sustainability and Good Governance. Climate Change is one out of two of the areas to be addressed under Environmental Sustainability.

Namibia is one of the biggest and driest countries in sub-Saharan Africa. It is characterized by high climatic variability in the form of persistent droughts, unpredictable and variable rainfall patterns, variability in temperatures and scarcity of water. Rainfall ranges from an average of 25 mm in the west to over 600 mm in the northeast. From a hydrological point of view, Namibia is an arid, water deficit country. High solar radiation, low humidity and high temperature lead

to very high evaporation rates, which vary between 3800 mm per annum in the south to 2600 mm per annum in the north. Over most of the country, potential evaporation is at least five times greater than average rainfall. The lowest temperatures occur during the dry season months of June to August. Mean monthly minimum temperatures do not, on average, fall below 0°C.

Namibia is a signatory to the Montreal Protocol of 1987 on substances that deplete the Ozone Layer. As an obligation, Namibia ratified the Montreal Protocol and Vienna Convention in 1993, the London Amendment in 1993, Copenhagen Amendment in 2002 and also the Montreal Amendment & Beijing Amendment in 2007. In May 2019, Namibia ratified the Kigali Amendment that aims to phase down HFCs used in cooling appliances. The Kigali Amendment brings the future production and consumption of HFCs under the control of the Protocol and will make a major contribution to the fight against climate change. Control of HFC production and consumption will add to the climate benefits already achieved by the Montreal Protocol through the phase-out of ozone-depleting substances (ODS) including CFCs and HCFCs.

Encouraged by the potential scenarios of climate change and the combined environmental changes, Namibia's government is determined to take necessary actions to mitigate and adapt to climate change. Namibia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1995 as a Non-Annex 1 Party, and as such, also became a Party to the Paris Agreement after its ratification in 2016. The National Policy on Climate Change was initiated in 2011 to translate the government's will and commitment to tackle global warming. Furthermore, a National Climate Change Strategy and Action Plan for the period 2013-2020 has been developed and paves the way to coping with climate change challenges. This plan should also contribute to the goals of the international agenda adopted by the Conference of the Parties (COP). The refrigeration and air conditioning (RAC) sector is currently targeted by the activities outlined in the HCFC Phase-out Management Plan (HPMP):

- ✓ Licensing and quota system for HCFCs bans on imports of new HCFC-based equipment and imports of HCFC-141b in bulk in place since 1 January 2015;
- ✓ Training of customs officers on identification and control of import of ozone-depleting substances (ODS) and ODS-based equipment;
- ✓ Provision of refrigerant identifiers for ODS blends for border posts;

- ✓ Technician training on good service practices, use of hydrocarbon refrigerants (mainly R290 and R600a) and safety measures;
- ✓ Provision of service tool kits (charging station, nitrogen cylinder, regulators) to technicians for assisting with hydrocarbon refrigerants;
- ✓ Procurement of R290-based air-conditioning units and further equipment for training and demonstration purposes;
- ✓ Awareness-raising activities including regular coordination meetings with stakeholders to create an enabling environment for HCFC phase-out and several newspaper advertisements on HCFC controls, licensing and quota system and phase-out targets;
- ✓ The National Ozone Unit (NOU) showcased R290-based air-conditioning split units to industrial stakeholders aiming to shift the market towards HCFC- and HFC alternatives.

4. OVERVIEW OF NAMBIA'S DOMESTIC AND COMMERCIAL COOLING SECTORS

HFCs, blends, hydrocarbon and ammonia are the main alternatives to ODS in the domestic and commercial RAC sectors. Namibia's consumption of ODS alternatives has been steadily increased during the past 5 years and the trend is expected to continue due to market penetration of alternatives to HCFCs. The 2019 statistics by type of refrigerant shows that the share of HFC-134a was the highest and is followed by R-404A and R-410A respectively. The 2012-2015 ODS alternatives survey shows that the first three largest ODS alternatives consumption sub-sectors were mobile air-conditioning (MAC) at 68%, domestic refrigerator and freezers at 11% and commercial & domestic air conditioning at 9% of the total ODS alternatives consumption respectively.

Sector-specific detail on the use of ODS alternatives are as follow

- ✓ *Room air-conditioning and commercial air-conditioning (Large split type, VRF):* There has been a rising trend of R-410A to replace HCFC-22 for this sub-sector, but the growth rate is not high. Although HFC-32 had entered the local market in 2016, the market is still dominated by R-410A technology. There is a slow penetration of R-290 room air-conditioner in the country;
- ✓ *Chillers*: Chillers operating on ODS alternatives mainly use HFC-134a for centrifugal chillers and R-410A for small chillers. Due to the economic growth of the country, there has been more installation of chillers in the shopping mall and irrigation projects;

- ✓ *Domestic refrigerators*: The domestic refrigerators were imported as the new pre-charged equipment, only servicing usage was observed. Only HFC-134a and HC-600a are used in this domestic refrigerator. While R22, R417a, R407a dominated in this subsector, the share of the HFC-134a system is expected to decline due to higher penetration of HC-600a;
- ✓ *Commercial refrigerators*: HFC- R22, R417a, R407a are used as a refrigerant in this sub-sector with the possibility of HC-600a and HC-290 penetrating the market;
- ✓ *Large refrigeration system (cold storage and industrial refrigeration system)*: The share by refrigerant type is dominated by ammonia R717 system;
- ✓ *Mobile Air-conditioner (MAC)*: This sub-sector only uses HFC-134a as a refrigerant.

5. INCLUSION OF THE RAC SECTOR INTO THE NATIONALLY DETERMINED CONTRIBUTIONS

According to the Fourth National Communication (Government of Namibia, 2020), the RAC sector is responsible for some 113 Gg CO_2eq in 2015, i.e. approx. 22% of the total Industrial Processes and Product Use (IPPU) sector's emissions, estimated at 518 Gg CO_2eq in the same year.

Direct emissions in the RAC sectors are due to devices that contain refrigerants with high GWP such as HFCs which are released in the atmosphere during their lifetime (including periodic refilling when the refrigerant gas is depleted) and also at disposal. Indirect emissions are due to the energy consumption of air conditioning and refrigerating devices. The indirect emissions can be significant and are usually reported under the Energy sector.

The RAC sector has been included in Namibia's recent NDC update of 2021 and the Fourth National Communication to progressively become more inclusive of the national economy and enhancing its mitigation ambition. The emissions from the RAC sector, and particularly the HFCs emissions, are preliminary addressed under the Kigali Amendment to the Montreal Protocol. The Kigali Amendment sets a timeline for Parties (Article 5 countries, Group1) to freeze HFC consumption in 2024 and to commence the step-down phases to progressively reduce HFCs by 2029. This means that there is a significant window of opportunity for reducing HFC emissions before 2029 and Namibia intends to exploit this mitigation potential until 2030.

The goal of the Government of Namibia is to reduce the emissions associated with the refrigeration and air conditioning sector, including both mobile and stationary air conditioning equipment by leapfrogging directly to energy-efficient and climate-friendly technologies. This is reached through multiple measures that introduce climate-friendly, refrigerators and air conditioners utilizing low-GWP gases that replace environmentally harmful equipment, thereby.

The following measures have been identified for implementation:

- ✓ Controlled disposal of end-of-life refrigerators and mobile air conditioning systems. This measure is contained in the 4th National Communication to the UNFCCC (Government of Namibia, 2020);
- ✓ Dissemination of climate-friendly (low-GWP) and more energy efficient refrigerators for both residential and commercial uses;
- ✓ Dissemination of climate-friendly (low-GWP) and energy-efficient air conditioning.

The above measures will result in a reduction of direct emissions, i.e. the emissions associated with the refrigerant gases used by the refrigerators and air conditioning devices during their operational lifetime and at disposal and also indirect emissions, i.e. those related to the electricity consumption of such equipment. The natural refrigerants that are Low in GWP refrigerants will substitute existing high-GWP gases are:

- ✓ R290 to substitute R410a in the air conditioning sub-sector;
- ✓ R290, R600a and R744 to substitute HFC-507 and HFC-134a in the refrigeration sub-sector.

The mitigation potential for the domestic refrigeration sub-sector considers that in 2020 all-new refrigerators entering the Namibian market are expected to be utilizing R600a.

Regarding the disposal, the implementation of the programme to ensure environmentally safe handling of devices at their end-of-life will be expanded in the coming years to explore the utilization of the national cement factories, where technical and financial constraints allow, for contributing to the HFCs destruction. This measure is not yet implemented and may be considered in future.

The enhanced management of the mobile air conditioners and refrigerators at the end of their lifetime will reduce emissions associated with uncontrolled disposal that is still common practice in the country.

For mobile air conditioning, only cars are considered. The mitigation potential that could be achieved by the substitution of the refrigerant gas (R1234yf to substitute R134a, with the former having a lower GWP) is not considered in the NDC as the substitution of the gases is already occurring in the car manufacturing industry and Namibia is an importer of cars.

It is important to note that the introduction of energy-efficient technologies will have an indirect mitigation benefit related to the reduction of energy consumed during the operation of the devices, thereby resulting in emission reductions. These emission reductions, however, are reported as part of the Energy sector emissions, noting that the total mitigation potential has been estimated as described in the following section. The grid emission factor used for the estimations was sourced from the approved Standardized Baseline Grid Emission Factor for the Southern African Power Pool (UNFCCC, 2018), which amounts to 0.9481 tCO_2e/MWh.
The Government of Namibia is aiming to lower emissions throughout the IPPU sector, specifically in the RAC sub-sector, with the inclusion of the above-mentioned measures. These are new aspects that have not been part of the previous versions of the country's NDC.

6. COOLING DEMAND THROUGH BUILDING CODES, COOL ROOFS AND CERTIFICATION SCHEME

A standardization path considered alongside MEPS is minimum energy efficiency standards (MEES) for buildings, which would establish a minimum energy rating for buildings and a certification scheme. The MEES requires the review of existing building codes to incorporate energy efficiency and clean energy into the high-performance design of buildings and homes, which would, directly and indirectly, reduce cooling demand. The introduction of EE building standards (codes) for social housing projects are a good starting point as most of these buildings are not adapted to tropical climates leading to low comfort and high electricity costs if occupants purchase air-conditioning systems to lower high room temperatures. Innovative to high-performance building design approaches like insulation of roofs and sun-exposed walls coupled with improved ventilation and the use of EE RAC technologies and EE glass can leverage substantial increases in comfort and energy savings.

High-Performance Building Design to reduce cooling requirements (Passive Energy Efficiency) and Certification of Energy Service Companies (ESCOs)

High-performance building designs can reduce the heat transfer from the outside through the building envelope (walls, roof, windows, and doors) to the inside of the building, thereby reducing the need for or a load of an A/C system to reject this heat from the conditioned space. Also, increasing the energy efficiency of lighting and other appliances that give off heat have the compound benefit of reducing cooling demand as well as direct energy consumption. The inclusion of trees into the design of buildings and their surrounding area can also reduce cooling demand as trees provide shade and cooling via transpiration.

To support the move toward high-performance building design and the implementation of the MEES for building it is essential to have companies that are effectively able to establish a baseline for the energy consumption of buildings and effectively report and advise on energy-saving strategies. The role of an ESCO is to carry out energy audits to determine if air conditioning units are performing at optimum efficiency or if they should be replaced with more cost-effective energy-efficient alternatives. ESCOs can also propose, implement, and help clients finance energy management projects that can result in significant electricity cost savings and mitigate GHG and refrigerant emissions.

To this end, the Government of Namibia in collaboration with relevant stakeholders shall:

- ✓ Adopt Green Building Codes in municipal buildings by law for compliance in all new construction to bring about an overall shift towards energy-efficient building practices;
- ✓ Adopt Building codes and performance standards such as but not limited to ASHRAE and the Chartered Institute of Building (CIOB) for commercial and residential buildings and the International Energy Conservation Code (IECC) to substantially reduce cooling demand and subsequent energy consumption relative to non-compliant structures;
- ✓ Promote the introduction of EE building standards (codes) for social housing projects and all public and government buildings in the first instance;
- ✓ Promote High-Performance Building Design in Building practices;
- ✓ Promote Innovative to high-performance building design such as insulation of roofs and sun-exposed walls coupled with improved ventilation and the use of EE RAC technologies and EE glass can leverage substantial increases in comfort and energy savings;
- ✓ Promote market awareness campaigns to sensitize both the construction community as well as the consumers towards the multiple benefits of efficient buildings – reduced operational costs, improved health and comfort, environmental and societal benefits;
- ✓ Engage with industry associations to promote high-performance building design;

- ✓ Promote Sustainable Building Design courses at the post-secondary institutions (construction curriculum) to support the market / cultural change;
- ✓ Implement a system for the certification of ESCOs as this initiative would also contribute to existing fiscal policy measures.

7. THE ADOPTION OF MINIMUM ENERGY PERFORMANCE STANDARDS FOR ROOM ACS AND RESIDENTIAL REFRIGERATORS

Energy efficiency labels are informative labels indicating the products' energy performance and efficiency in a way that allows for comparison or endorses the products' use. Energy Efficiency Standards and Labels (S&L) are complementary regulatory tools that are instrumental in promoting a sustainable energy path. MEPS and labels are meant to help enable the market to recognize energy efficiency and migrate towards the use of these products in the RAC sector. In the absence of the information provided by labels, consumers and other end-users would be unable to make an informed decision about the actual value of products. Manufacturers, suppliers, and retailers will also lack the incentive to improve the energy performance of their product offering, as there is no way for the market to recognise and value EE equipment. Energy labelling of products and MEPS increase the general product quality and make consumers aware of the differences between similar products on the market. Energy Efficiency Labelling Programme and MEPS should be implemented together as push and pull market strategies maximizing the impact towards transitioning the air conditioning market to high efficiency. One of the challenges of energy labelling is the testing and verification process to ensure that the stated levels are accurate and have been verified. It is therefore crucial for Trinidad and Tobago to generate the appropriate infrastructure for product testing and confirmation on product compliance. However, this can be overcome with the establishment of existing regional accredited testing facilities. The main barrier to these partnerships, however, would be the cost of transportation of equipment for testing; therefore, a study of the feasibility of in-country testing versus external testing would have to be performed.

The need to comply with Minimum Energy Performance Standards (MEPS) and labelling requirements, which many countries have been adopting recently, leads to substantial improvement in energy efficiency as well as reduced GHG emissions of available RAC appliances. These energy improvements, applicable to nearly all RAC appliances, were triggered by key innovations such as:

- ✓ Variable speed inverter-driven compressors, which adjust to the required cooling load;
- ✓ Improved evaporator or compressor heat exchangers;
- ✓ Variable auxiliary components such as pumps and vans;
- ✓ Sensor-linked controllers with smart adjustment functions and better insulation systems to lower the required cooling loads.

Furthermore, strong MEPS and labels not only form the core of an effective cooling plan, but position countries well to maximize opportunities from the rapidly growing cooling industry globally. Strong MEPS maximize efficiency and access to cooling benefits, with the associated energy savings, health, productivity, and climate benefits.

This NCS identifies how energy consumption data will be collected, monitored, and operationalized to allow key recommended actions in the NCS (such as stronger MEPS) to be put into practice. The introduction and enforcement of MEPS have been well elaborated in Strategy 1 below.

New equipment purchases generally occur at the time of new construction and equipment failure/end of life, and consumers are limited to products that are readily available through their local distributor channels or RAC contractor. The consumer may not consider the lifetime energy savings from high-efficiency equipment when they need to make a purchase, due to a lack of information by which to make an informed decision.

In selecting new equipment, thermal comfort, noise level, price, and other non-energy factors constitute the most significant influence on buying decisions. Education and awareness programmes for energy efficiency in refrigeration and air-conditioning should specifically target RAC wholesale and retail sales professionals, procurement officers, and consumers.

A potential concern during the transition to more energy-efficient non-HFC appliances is the possibility that manufacturers will export less-efficient HFC-containing machines to countries not yet subject to the Kigali Amendment's requirements or have the systems in place to regulate these types of imports. These items would include new, second-hand, recycled, repaired, or refurbished appliances.

To this end, the Government in collaboration with relevant stakeholders shall:

- ✓ Guard against the importation of low-efficiency products and product components by implementing strong national efficiency policies for imported new, imported second-hand/ recycled/repaired/refurbished cooling appliances, and any such domestically manufactured or reconditioned second-hand appliances;
- ✓ Ensure that relevant national policies include MEPS, mandatory and voluntary labelling, prior notification of product imports, and pre-shipment verification of product conformity mechanisms be applied to all import of appliances and effectively implemented;
- ✓ Promote energy efficiency by mandating it in tendering processes during the public procurement of RAC equipment (installation and maintenance) for state-owned buildings in either new building construction or Retrofitting and retro-commissioning existing buildings to reduce cooling requirement and energy consumption;
- ✓ Drive widespread adoption of energy-efficient traditional and alternative cooling equipment in new and existing public buildings and implement campaigns to encourage the private sector and consumers to do the same;
- ✓ Issue public procurement guidelines for trained and certified RAC service technicians for public buildings;
- ✓ Develop and implement a procedure for commissioning of new RAC equipment above a specified size;
- ✓ Implement pre-shipment verification of conformity (PVoC) process, to ensure products destined for import meet all importing-country standards and requirements.
- ✓ Improve energy efficiency through trade-related incentives or government procurement specifications that encourage the importation of high-efficiency equipment;
- ✓ Review and revise tariffs to encourage high-efficiency products in the RAC Sector;
- ✓ Train sales professionals to be able to offer solutions rather than merely a price by communicating to consumers that high-efficiency RAC equipment can incorporate these additional benefits, as well as save money on monthly electricity bills, to achieve substantial and rapid market adoption.

8. INCENTIVES AND STRATEGIES TO SUPPORT INDUSTRIALIZATION IN THE COOLING SECTOR

To identify the potential to use financial mechanisms, such as bulk procurement of high-efficiency cooling equipment the sector is required to address cost barriers from the gradual transition of RAC technology to climate-friendly and energy efficiency. To achieve this a set of supporting measures is required to address existing barriers that prevent the deployment of more climate-friendly and energy-efficient technology.

For both air conditioning and refrigerators, specific regulations (such as a ban) could be introduced to discontinue the use of refrigerants that exceed a certain GWP threshold and to support the introduction of more climate-friendly alternatives. In parallel, the introduction of equipment labelling and Minimum Efficiency Performance Standards (MEPS) could be introduced to increase the energy efficiency of the selected devices.

For both interventions, it is estimated that two (2) years will be required for the design and implementation, including the training of customs officials for the monitoring of actual enforcement. Monitoring activities will be also needed to quantify emission reductions (both direct and indirect) with sufficient accuracy and according to international requirements. Training of technicians is also necessary for the proper handling and safe disposal of refrigerants.

Emission reductions that can be achieved by these activities are expected to start only after the implementation of these regulatory measures, i.e. from 2023. It is assumed that a progressively increasing number of climate-friendly devices will be introduced, reaching a penetration of 30% in 2025, and increasing to 60% between 2027 until 2030.\

Overall, training of technicians will contribute to the identification of other emission sources that can be tackled during the lifetime of the devices: for instance, leaks from operating devices could be addressed, as well as provision for proper refilling of equipment (where technically feasible without any safety concern) using low-GWP refrigerants. The potential saving associated with this measure is not quantified here due to the high uncertainty, however, the cost for the training is estimated to amount to some 200,000 USD.

The implementation cost of the proposed supporting measures is estimated to amount to some 206 Million USD which includes the following aspects:

- Design of the regulations to ban high-GWP refrigerants and design measures to ensure enforcement, estimated to cost between 200,000 and 400,000 USD;
- Design of MEPS and associated enforcement measures estimated to cost around 500,000 USD for the different components, including the training of inspectors and technicians;
- The actual incremental cost for the substitution of existing devices with more efficient ones, including for:
    - ✓ Refrigerators: 176 Million USD;
    - ✓ Split air conditioners: 6 Million USD;
    - ✓ Commercial refrigerators (stand-alone and condensing units): 23 Million USD.

The incremental investment cost (i.e. the portion of the investment cost required to switch to devices using low-GWP refrigerants and with higher efficiency) is based on select Namibian price estimates in September 2020 and considers only the investment cost (not the cost for installation or maintenance, nor electricity savings). These costs will be on the consumers' side, due to the introduction of the MEPS and regulatory measures high-GWP gases.

The cost for the implementation of the collection and safe disposal of devices (i.e. refrigerators and mobile air conditioning devices) at the end of their life is still being evaluated.

The implementation of the proposed measures is also expected to contribute to the achievement of the Sustainable Development Goals (SDGs) as presented in the following table. In addition, sustainable and climate-friendly cooling can make a significant contribution towards food and health security due to improvements in cost-effective and reliable cold chains.

9. THE NATIONAL COOLING STRATEGY

The National Cooling Strategy (NCS) of Namibia provides a framework and a vision for transforming Namibia's RAC sector by outlining the strategies Namibia will employ to realise sustainable and environmentally friendly cooling. The national approach to address the country's needs in the RAC sector, identifies policies to drive a rapid transition to high-performance cooling equipment, linking the ODS phase-out and HFC phase-down activities under the Montreal Protocol, to climate protection efforts. The implementation of the NCS will

save residential consumers and businesses money on their utility bills, reduce electricity waste, enable greater comfort and productivity for building occupants, create employment, mitigate GHG emissions, and support Namibia's efforts to meet the Sustainable Development Goals (SDGs) and its obligations towards the Paris Agreement.

RAC appliances are rapidly spreading across Africa. With an emerging middle class and an increasing population, the number of RAC appliances are estimated to double by 2030. This will contribute to increased energy needs in many African countries. To limit the energy consumption and resulting GHG emissions, there is a need to establish and engage a network to help identify and sustainably form a broad range of low GWP technologies for green cooling. This report serves as a basis for recommendations on suitable technologies and policies to transform the market in terms of energy consumption and GHG emissions. Additionally, further project proposals can establish their impact calculations based on the foundation laid by this inventory.

9.1. PROPOSED COOLING STRATEGIES OF NAMIBIA

Concerning the transition to low-GWP RAC systems, there are several technical, market- and policy-related barriers to be addressed. As a further step, appropriate solutions need to be identified and implemented to surmount these barriers. The strategies presented in this section target the main barriers hindering the uptake of highly efficient, low GWP RAC appliances. Table 1 provides a detailed review of the most significant barriers and possible solutions to overcome those.

Table 1: Barriers hindering the uptake of highly efficient and solutions

Topic	Barrier	Possible Solutions
Refrigerants	Lack of qualified technicians	Define qualification levels and implement mandatory training and certification/licensing of RAC technicians;
	Lack of leakage controls	Implement mandatory reporting for the use of (high) GWP refrigerants (refrigerant registry) and leakage testing for operators and service companies;
	Lack of availability of low-GWP refrigerants	Low-GWP refrigerants, such as R290 and R600a, are generally available in all markets with sufficient demand; In case of an initial lack of low-GWP refrigerants, there could be specific incentives such as reduced taxes or subsidies to refrigerant traders implemented to make these refrigerants available on the market. Such refrigerant suppliers could be attracted from regional countries such as South Africa;

	Lack of safety standards for the safe handling of low-GWP/ flammable refrigerants	The transition to low-GWP refrigerants, will in many cases, result in the introduction of refrigerants with higher flammability the market; The safe handling of flammable refrigerants requires that RAC appliances conform to international best practice standards on safety for the installation, operation and maintenance of the equipment; technicians have to be trained and certified/licensed to comply with such standards;
	Safe conversion	Conversion could potentially result in lowering refrigerants leakage related emissions. However, it is risky to make a general recommendation towards conversion, since few appliances are suitable for conversion and safe handling cannot be safeguarded in many cases;
	Lack of control for high GWP refrigerants;	Ban of high GWP refrigerants for RAC subsectors that can use low-GWP alternatives;
Energy efficiency	Lack of applicable Minimum Energy Efficiency (MEPS) Standards and Labels	Countries with effective MEPS and Labels have been making significant progress regarding the energy efficiency of RAC appliances and the ban of ineffective appliances from entering the market; International best practice standards on MEPS and Labels are available from other countries and regions (EU, Australia, Korea, US, Vietnam) and can be gradually adopted by Namibia. It is recommended to start with mass appliances widely used in the country, such as refrigerators and unitary air conditioning;
	Lack of effective Monitoring, Verification and Enforcement (MVE)	MEPS and Labels are only effective with a robust MVE regime. Appliance testing facilities have imported equipment checked on its compliance with MEPS and labels. Since such testing facilities are costly to establish and operate, it is recommendable to share regional testing facilities;
	Lack of availability of low-GWP RAC appliances and components;	Low-GWP RAC appliances need to be introduced to the market as an attractive investment; Green government procurement programmes can be an effective instrument to introduce low-GWP RAC appliances with low-GWP refrigerants and high energy efficiency to the market;
Appliances in general	Lack of coordinated policy approach	The GHG emissions of the RAC sector are most effectively addressed if policies on energy efficiency and low-GWP refrigerants are closely coordinated. A central product base register for RAC appliances and refrigerants can be an effective policy monitoring instrument. Through a central RAC registry, the progress of mitigating related GHG emissions can be closely monitored and reviewed and the results could be included in the country's NDCs;
	Lack of financing for the implementation of an integrated policy approach	Through an integrated and comprehensive approach and proposal, Namibia could potentially attract international donors to support the establishment of an enabling framework and adequate incentives for the transition to low-GWP RAC appliances. Such a sectoral plan can be accompanied by appropriate funding with international support.

Since parts of the roadmap might be conditional to obtain access to international funding, an additional barrier is the absence of a sector monitoring system. Means to monitor the impact of policy changes and other projects are not only necessary for internationally funded projects, but also very helpful for national policy decisions. A crucial point for the successful

implementation of any measure is sufficient ownership within the respective ministry. It is the task of the ministry to entrust responsible bodies with the implementation and enforcement of agreed measures. Four strategies are suggested, each with a bundle of actions, targeting the four identified main barriers. For each strategy, specific measures targeting the key subsectors or the whole sector as a cross-cutting issue are outlined.

Strategy 1: Improvement of energy efficiency in smaller RAC appliances in the short term and larger systems in the medium term

The target of Strategy 1 is the improvement of energy efficiency in smaller RAC appliances in the short term and larger systems in the medium term. The following actions are suggested:

- ✓ Introduction and enforcement of MEPS
- ✓ Introduction and enforcement of labelling scheme
- ✓ Tax advantages for highly efficient products
- ✓ Green public procurement preferring highly efficient products

The setup MEPS and a labelling scheme can be integrated into one process, where the lower labelling classes can be successively banned under the MEPS. The setpoint of MEPS is to be found according to a national (or regional) life cycle cost (LCC) assessment. Depending on investment costs and energy prices, the breakeven point between inefficient units with low investment, high operation costs and efficient units with higher investment costs and lower operating costs is a guide to a suitable level of a MEPS. European Union's (EU) Eco-design requirements can be taken as an example, but need to be reviewed for suitability for the Namibian circumstances.

The following tasks need to be fulfilled for a labelling scheme to work reliably:

- ✓ Clearly define and delimit product groups targeted by the labelling scheme
- ✓ Standard measurement and calculation method for labelling metric (Energy Efficiency Ratio (EER), Seasonal Energy Efficiency Ratio (SEER) or Energy Efficiency Index (EEI) depending on product group). Label format and the format of the required product information sheets are to be defined. The EU Eco-design requirements could be taken as an example and adapted.
- ✓ Independent verification of the correctness of the stated energy parameters and the resulting label class. Responsibilities within the government are to be defined and sufficient funds provided for sufficient random testing.

- ✓ Sanctions for wrong or missing data are to be defined and executed. Responsible bodies are to be named for prosecution.

It is recommended to start with product groups that are easy to specify such as smaller appliances like self-contained and split ACs, domestic refrigerators and commercial stand-alone units. The highest impact can be expected where unit numbers are high or high growth rates are expected. This is the case for domestic refrigerators and split ACs.

For self-contained AC units, the EU Eco-design requirements (in which they are called single and double duct ACs) distinguish between units using a refrigerant above and below a GWP of 150. The MEPS is set to an EER of 2.6 for units using refrigerants above a GWP of 150 and an EER of 2.34 for units using a lower GWP refrigerant. The MEPS level could be successively reviewed and strengthened within pre-defined intervals. Since the average BAU unit is reported to have an EER of 3.4, the Roadmap scenario was plotted with the following steps: 2020: EER >= 3, 2025 EER>= 3.3. Labelling classes can also be established after the EU example13. A pre-defined product information sheet to be provided by the manufacturer/importer, containing all relevant calculation parameters is very useful.

For split ACs, the EU Eco-design requirements define a SEER as a benchmark metric. The SEER includes part-load efficiencies and represents the overall energy efficiency over a whole cooling season rather than at design conditions as the EER does. Seasonal EERs are also defined in other countries (e.g. China, India, USA) each using their temperature profile and slightly different calculation methods. The EU calculation method also includes energy consumption during standby and off modes. By including part-load efficiencies, units employing inverter technology are favoured, as those are most efficient during part-load conditions. Therefore, within a medium timeframe, the introduction of a seasonal energy efficiency rating is recommended to adequately reflect the efficiency gains achieved by inverter technology and provide an incentive for uptake. Similarly, the labelling framework is recommended to set classes for SEER in the medium term. However, it should use the same metrics as the MEPS. The labelling requirements should include a pre-defined product information sheet to be provided by the manufacturer/importer, containing all relevant calculation parameters.

As an immediate target, MEPS could be introduced by 2020 with an EER of 3.5 and EER >= 4 in 2025. The average BAU unit is assumed to have an EER of 3.3. For 2025, the introduction

of a SEER based MEPS system is recommended. This MEPS system could be set up as a regional scheme, providing one calculation method including several temperature profiles for the respective climate conditions in participating countries.

For domestic refrigerators, the metric used in the EU Eco-design requirements is the Energy Efficiency Index (EEI), which is a ratio between the energy consumption of the tested appliance and a standard appliance. The lower the EEI, the higher the energy efficiency. The calculation method provides for several climate categories and could therefore be easily transferred to Namibia. The EU Eco-design requirement is presently an EEI of 42 or lower for compression-type refrigerators. To set a Namibian MEPS, an LCC assessment is recommended. The roadmap scenario uses a MEPS resulting in average annual energy consumption of 235 kWh/year in 2020 and 210 kWh/year in 2025. (The BAU energy consumption could not be determined during the inventory and is estimated to be 420 kWh/year). Labelling classes can also be established following the EU example14. Again, a pre-defined product information sheet to be provided by the manufacturer/importer, containing all relevant calculation parameters is very useful.

For stand-alone units, the EU Eco-design requirements are pending. The benchmark metric will be the same as for domestic refrigerators. Since stand-alone units are usually not bought by the public at large, a labelling scheme might not be necessary for an informed purchase decision. Though, a MEPS and a defined product information sheet containing all relevant technical parameters are recommended. The average BAU unit is assumed to have an annual energy consumption of 1770 kWh/year. The roadmap scenario uses a MEPS resulting in average annual energy consumption of 1730 kWh/year in 2020 and 1570 kWh/year in 2025.

Larger appliances are not as easily categorized as they usually consist of more parts and are often customised to the building where it is installed. Nevertheless, EU Eco-design requirements are formulated for “professional refrigerated storage cabinets” including condensing units and process chiller. Once experience with establishing MEPS for the product groups described above is gathered, larger appliances can be worked on.

Import taxes depending on energy efficiency can provide an incentive for green appliances and adds to balancing the higher investment cost for highly efficient products. Once a labelling scheme is introduced, import taxes can be graded accordingly.

Green public procurement can add to the uptake of energy-efficient units, as it sets a role model and provides a clear signal to the market that highly efficient units are wanted.

Additional measures to enhance the market uptake of energy-efficient units could be new for the old scheme, replacing old, inefficient refrigerators with new, highly efficient units. Similarly, a grant could be given to lower-income households to balance the high investment costs for highly efficient units.

Potential National Partners for Strategy 1:

Establishing MEPS and labelling scheme including testing facility:

- ✓ Namibian Standard institute
- ✓ National Energy Institute, University of Namibia
- ✓ Ministry of Mines and Energy
- ✓ Ministry of Environment and Tourism, Directorate of Environmental Affairs

Fiscal and Non Fiscal initiatives:

- ✓ Ministry of Industrialization and Trade
- ✓ Ministry of Works and Transport, especially on the issue of Green procurement

Strategy 2: selection of refrigerants used in RAC equipment

Strategy 2 targets the selection of refrigerants used in RAC equipment. Despite the Kigali Amendment, giving an expiry date to the widespread use of HFCs, the presently employed refrigerants are still usually HFCs. It requires a strong political signal for the market to shift towards low GWP refrigerants. The best-practice example is the EU Regulation on fluorinated greenhouse gases (EU F-gas regulation), setting a strict quota system to reduce the use of HFCs to 21% of its 2014 level until 2030. Additionally, the EU F-gas regulation bans the use of refrigerants above a certain threshold where low GWP alternatives are established.

While a general HFC phase-down might be too ambitious for Namibia at present, banning the use of high GWP refrigerants in selected applications still provides a strong market signal. The product group with a well-established low GWP alternative is domestic refrigeration. Banning the sale of domestic refrigerators using refrigerants with a GWP above 150 might not result in a high emission reduction, but shows international supplies that HFCs are no longer favoured. Similarly, self-contained ACs, single-split ACs and commercial stand-alone units could be targeted. Since the EU F-gas regulation targets the same product groups, the market will have

developed sufficient alternatives. The following dates are suggested and implemented in the roadmap scenario.

Potential national partners for strategy 2:
For successful regulatory controls i.e. bans

- ✓ Ministry of Industrialization and Trade
- ✓ NIRAC, the refrigeration association, to be able to encourage its members to support Green Cooling Initiatives.

Strategy 3: Establishment of a working formalised training and certification scheme for RAC technicians

Strategy 3 aims at establishing a working formalised training and certification scheme for RAC technicians. Work was undertaken for the development of a curriculum according to EN 13313. Nevertheless, the lack of sufficient skills of graduated technicians is observed by the industry. Concerns regarding the inclusion of people with incomplete basic education are voiced by the vocational training schools. A lack of demonstration projects and training equipment using natural refrigerants makes practical training difficult.

Being able to prove a certain skill level also to international technology suppliers is crucial for gaining market access to technologies using flammable and/ toxic refrigerants. In addition, skill is equally required to maintain high energy efficiency throughout the lifetime of the equipment. In absence of national safety standards, international standards could be adopted, providing legal security on the applying safety standards.

While new alternatives are environmentally safe, there are several technical challenges to overcome. For example, the use of flammable substances for refrigeration, as is the case with hydrocarbons, requires a different safety concept and control than for substances classified as not flammable. Public safety is a key concern when introducing new alternatives. Even though knowing that the introduction of such alternatives in products and installations in Europe achieves, without compromise, the same level of safety as with HFCs. The main reason being that the necessary qualitative infrastructure for the introduction of these technologies is missing. The introduction of new, often more complex, technologies, requires new skills, know-how and quality control. Conformity of process, product, or service with required good practice and standards can be enforced with certification, regulation and market incentives.

Companies, as well as technicians, need to conform to good practices and standards. Finally, the safety of the product or installed equipment needs to be verified.

Training builds the capacity of personnel. However, critical aspects of the impact of personnel on public or environmental safety need to be assessed through third-party verification.

In other words, the introduction of new alternatives will also depend on the availability of qualification and verification systems and intermediaries that enable certification of conformity of relevant processes, products and services. Therefore, the objective is to establish a qualitative infrastructure for RAC technologies at various levels through policy action, private sector cooperation and code of practice and commercial services & requirements that enable overall monitoring of the quality of products, services and processes.

Qualification systems need to ensure that personnel in the public and private sector are trained in fulfilling relevant technical standards and that requirements are enabled to qualify for examination and certification. For certificates to be reputable and accepted worldwide (e.g. by suppliers of parts and equipment), accreditation of third-party certification bodies (although not always mandatory) is strongly recommended.

Accreditation is validating the appropriateness of the structure and governance of the certifying body, the characteristics of the certification programme, the information required to be available to applicants, and the recertification initiatives of the certifying body.

Furthermore, accreditation is facilitating acceptance of the certification bodies and their certification schemes and mutual recognition of personnel competencies and services on national and international levels.

A staged training and certification process is recommended, including:

a) Qualification: Education, experience and knowledge are the basis for evaluating the qualification level of trainees. An entry exam helps to tailor training courses to the needs of the trainee.
b) Training: Courses can be conducted by any institution with demonstrated experience in the field. They can be supported by standardised curricula.

c) Training certificate for successful participation: Training institutes will certify successful completion of the training. However, this is in general not considered sufficient when liability issues are involved
d) Application for certification: With proven entry qualification 3rd party examination can be applied for. A diversified structure is needed to allow all levels of proficiency to acquire certified competence.
e) Examination by 3rd party: Internationally or nationally accredited training institute will issue a certificate based on locally adapted international standards for certification.
f) Registration: After certification, the certified person needs to be registered by a national body.

An example for skill levels defined by EN 13313 Annex A

a) Basic Appreciation (BA) Category I
    - ✓ Recognises the importance of Skill to business and society, and relevance to own job;
    - ✓ Interprets information on the Skill for own tasks;
    - ✓ Knows where to obtain professional help in the skill.

b) Working Knowledge (WK) Category II
    - ✓ Assesses and diagnoses issues in the Skill;
    - ✓ Provides reasoned challenges to specialists in the Skill;
    - ✓ Supervises or directly works with practitioners of the Skill.

c) Fully operational (FO) Category III
    - ✓ Performs all normal activities in the Skill;
    - ✓ Resolves problems and improves the Skill;
    - ✓ Applies and adapts best practices in the Skill to local conditions.

d) Leading Edge (LE) Category IV
    - ✓ Able to create major innovations in the Skill;
    - ✓ Creates best practice in the Skill; Acts as a recognised reference point for the Skill.

Specific steps towards a comprehensive training scheme have already started with the development of curricula according to EN 13313. The next step is to engage suitable trainers and set up training equipment.

Potential national partners for strategy 3:

- ✓ National Training Authority
- ✓ NIRAC
- ✓ Windhoek Vocational training centre
- ✓ Valombola Vocational Training centre
- ✓ Namibian Institute for Mining and Technology, NIMT
- ✓ Ministry of Higher Education, Training and Innovation

Strategy 4: Development of a Measurement, Reporting And Verification systems for RAC

The focus of Strategy 4 is to develop an MRV system to track the effects of any policy option, whether nationally or internationally funded. It is also aimed to collect activity data of the RAC sector to be integrated into the GHG inventory process. For detailed knowledge of equipment in use, it is important to know what is sold in the country. For an importing-only country such as Namibia, it might be sufficient to closely monitor imports and exports of equipment. The best practice is a database of sold RAC equipment including selected technical parameters such as cooling capacity, energy efficiency metric, labelling class (if applicable), initial charge and contained refrigerant.

Setting up such a comprehensive database requires an institutional framework, defining reporting obligations for all market participants. Nevertheless, it is a powerful information source, once established.

It is recommended to start with a product group like fridges or smaller AC, where technical parameters are either already defined by (parallel) labelling requirements or are unproblematic to define. The counting of sales can be established within customs, including the count of re-export. However, the assumption that all units that are imported are promptly sold and consequently in operation needs to be verified. If feasible, reporting obligations are best to be established at a level where double-counting can be avoided and all units sold are recorded.

Potential national partners for strategy 4:

- ✓ Namibia Energy Institute
- ✓ Ministry of Environment and Tourism, Climate Change Unit
- ✓ Customs department, Ministry of Finance
- ✓ Industry /NIRAC

12. CONCLUSION

This strategy was carefully drafted using country-specific information. However, a broad stakeholder process, involving government bodies, as well as industry and end-user representatives are needed to implement the process on a national level. The dynamic nature of the RAC sector requires the NCS to be continuously reviewed to adjust to changes in technology and the industry catalysed by shifts in both the local and international environments. The NCS takes into consideration the components needed for Namibia to chart a sustainable cooling path based on information that's currently available. This may change as new challenges arise, and new information/data becomes available. The NCS would, therefore, be reviewed on a biennial basis to ensure that it remains relevant and to make necessary amendments. The NCS integrates current activity into a synergistic pathway for sustainable cooling. The Government of the Republic of Namibia hopes to realize the resulting energy cost savings and pollution reduction benefits by encouraging the use of high-efficiency, low-GWP equipment through market-transformation programs that include standards, labelling, procurement, performance assurance requirements for imports, and incentive programs. This integrated strategy replaces current refrigerants with climate-friendly alternatives while simultaneously improving the equipment's energy efficiency and could double the climate benefits from the HFC phasedown alone, while also supporting development through enhanced energy security, reduced energy costs to the government and consumers. Once we stay the course concerning the execution of the identified initiatives outlined in this cooling Strategy coupled with monitoring and continuous improvement to cater for changes in the internal and external environments the country can reap all the benefits identified and further contribute to a globally sustainable cooling future.

Seeking links to ongoing projects and processes is strongly recommended. List of the current ongoing initiatives:

- ✓ National HCFC Phase-out Management Plan: Support and engage in initiatives by the MLF to leapfrog HFCs. Integrate energy efficiency issues into the planning of further phase-out activities.
- ✓ Green Cooling Initiative 22: Engage with partners to establish technology cooperation and technology transfer to promote the dissemination of green cooling technologies.

The network aims to demonstrate, through pilot projects, the viability of green cooling technologies and build capacities through the training of technical personnel.

- ✓ NAMA Proposal: Prioritize suggested roadmap actions or define additional ones and registering a detailed action plan with the UNFCCC. Funding can be sought at the German-UK NAMA Facility, the Global Environmental Facility (GEF) or the Green Climate Fund (GCF).
- ✓ Regional energy efficiency activities: Find synergies and establish institutionalized networks with the relevant industry associations, institutes and government ministries and organisations in the respective countries.

NATIONAL COOLING STRATEGY OF NAMIBIA

Role Players

1. **Electricity Control Board:** Will support the relevant stakeholder in developing and applying regulations under the EE compliance framework.
2. **Ministry of Mines and Energy (MME):** As custodian of Namibia's energy resources, MME will provide enabling policies to support the development of the country's energy resources sustainably including adoption of EE technologies and services.
3. **Ministry of Environment and Tourism, Directorate of Environmental Affairs:** Will ensure that the EE activities are well captured in the climate change and environment related the reporting such as the Nationally Determined Contributions (NDCs). The Department will explore access to funding for EE and climate related activities.
4. **Ministry of Industrialization and Trade: Nodal Ministry**-National Ozone Unit and Sectoral Value Chain Development
5. **Ministry of Works and Transport:** Will support procurement of EE appliances through development, adoption and application of green procurement guidelines.
6. **Namibian Standard institute (NSI):** will develop, adopt and publish Namibian standards (NAMS) including MEPS in compliance to World Trade Organisation requirements. NSI will certify products and organisations' management systems through the Marks of Conformity as well as provide training on selected standards.
7. **National Energy Institute (NEI)**: as an energy research institution, NEI will enhance public understanding of energy resources and EE technologies and their role in society, in order to address the barriers that hinder increased use and access to modern EE cooling technologies/appliances.
8. **Namibian University of Science and Technology (NUST) and the University of Namibia (UNAM)**: as institutions of higher learning focusing on education, applied research, innovation and service, the universities will provide training on cooling MEPS and enhanced research on EE and innovative cooling technologies/appliances.
9. **NIRAC:** the refrigeration association will encourage its members to support Green Cooling Initiatives and ensure that they supply only EE cooling appliances.
10. **National Training Authority and vocational training centres**: Will ensure that they are constantly producing qualified artisans and technicians with competence in EE appliances.
11. **NAMRA**: Will facilitate and control movement of goods to facilitate international trade in line with the compliance frameworks.

12. **SADC Centre for Renewable Energy and Energy Efficiency (SACREEE):** is a regional organisation with a mandate to promote renewable energy and energy efficiency to contribute to improved energy access and energy security across all member states. SADC will work with regional organisations to develop harmonised regional minimum energy performance standards (MEPS) and promote the adoption of these standards. SACREEE will promote the adoption of energy efficient (EE) appliances as well as provide training.