



# National Cooling Policy

DRAFT

Ministry of Environment

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# 1. INTRODUCTION

## 1.1. Background

‘Cooling’ refers to any natural phenomenon, human activity, design, or technology that extracts heat and/or reduces temperatures, typically including refrigeration and air conditioning. It contributes to both the built and transport environments. Cooling is a growing necessity in different economic sectors. It helps to attain safe or adequate thermal comfort for humans and animals, preservation of products such as foods and medicines, and ensure the effectiveness and efficiency of technical processes in places like data centers, industrial establishments, and mines. Hence, cooling has become a service that every citizen must have a sufficient level of access to.

In a warming world, demand for cooling is sharply rising. A recent analysis reveals that in 2020, approximately 324 million rural poor, 714 million urban poor, 2.17 billion lower middle income, and 1.52 billion middle-income population were unable to satisfy their cooling requirements (Table 1). Among them, rural and urban poor exhibit the highest risk and the lower-middle-income group exhibits medium risk while the middle-income group exhibits a relatively lesser risk. Hence, cooling has become an issue of equity.

Table 1: Population at risk from lack of access to cooling

Risk Spectrum	High Risk		Medium Risk	Low Risk
		<ul style="list-style-type: none"> <li>No access to electricity</li> <li>Income below the poverty line</li> <li>Poor ventilation and construction</li> <li>No access to refrigeration for food</li> <li>Farmers lack access to controlled cold chains</li> <li>Vaccines exposed to high temperatures</li> </ul>		<ul style="list-style-type: none"> <li>Access to electricity</li> <li>Lower income levels</li> <li>Ability to run a fan, buildings constructed to older standards</li> <li>Food is refrigerated</li> <li>Farmers have access to intermittently reliable cold chains</li> <li>Vaccines may have exposure to occasional high temperatures</li> </ul>
Population at Risk	Rural Poor	Urban Poor	Lower-middle Income	Middle-income
Risk Indicators	<ul style="list-style-type: none"> <li>Lack of access to energy</li> <li>Proportion of rural population living in poverty</li> </ul>	<ul style="list-style-type: none"> <li>Lack of access to energy</li> <li>Proportion of the population living in urban slums</li> </ul>	<ul style="list-style-type: none"> <li>Proportion of the population living on less than USD 10.01 / day outside of rural or urban poverty</li> </ul>	<ul style="list-style-type: none"> <li>Proportion of the population living between \$10.01 and \$20.01 / day</li> </ul>

Source: (Sustainable Energy for All (SEforALL), 2021)

A large part of cooling requirements is fulfilled by refrigerant-based cooling systems. It has been identified that the existing refrigerants are potent greenhouse gases (GHG) that contribute to climate change, significantly. Moreover, the refrigeration and air conditioning (RAC) sector represents 25%-30% of global electricity consumption<sup>1</sup>, which has an indirect contribution to global CO<sub>2</sub> emissions estimated at 13% by 2030.<sup>2</sup> Hence, realising global cooling requirements while minimising any active and/or passive adverse impacts on the environment should be given the highest priority. As a result, cooling has been recognised as a development need that is connected to mitigation of GHG emissions as well as adaptation to impacts of climate change that in turn is linked invariably with global efforts for achieving Sustainable Development Goals (SDGs) too.

The Government of Sri Lanka is committed to complying with the phase-out plans for Hydrochlorofluorocarbons (HCFCs) and phase-down plans for Hydrofluorocarbons (HFCs) as a party to the Montreal Protocol (MP) on Substances that deplete the Ozone Layer. The National Ozone Unit (NOU) is taking the lead in this initiative. At present, plans for phasing out HCFC are in progress while phasing down HFC is planned to be commenced in 2024. The refrigerants and cooling (RAC) sector absorbs a significant share of the national energy supply. Thus, shifting towards energy-efficient cooling will enable the country to achieve co-benefits in terms of both climate mitigation and ozone restoration. Many countries have taken steps to develop cooling policies and action plans to ensure human comfort and health, food safety, retain the potency of drugs, and increase energy efficiency.

Against this backdrop, the MOE has taken an initiative to formulate a National Cooling Policy (NCP) for Sri Lanka with the assistance from United Nations Environment Programme (UNEP). The NCP will be the key policy document that guides policy actions regarding problems/issues related to cooling in Sri Lanka helping to fulfill the country's rapidly growing cooling needs in a climate-friendly manner. The NCP is intended to provide guidelines for reducing food waste, improving health, and increasing productivity through improved access to cooling, delivering cost savings through enhanced energy efficiency for stakeholders, and reducing GHG emissions, while creating a stronger and more sustainable energy-based cooling system and cleaner air.

## **1.2. Need & Rationale**

The Kigali Cooling Efficiency Program (K-CEP) emphasizes the need for countries to develop national cooling policies, action plans, and roadmaps for achieving the objectives set out by the Kigali amendment to the Montreal Protocol. As a result, more than 20 countries are currently in the process of formulating national cooling policies, action plans, and roadmaps. Sri Lanka too has already developed the Kigali Cooling Plan Strategy for Sri Lanka through a multi-stakeholder consultative process to achieve energy efficiency and succeed in HCFC phase-out and HFC phase-down strategies, thereby reducing direct and indirect GHG emissions. The cooling plan provides a set of recommendations with a time frame to achieve energy targets related to the cooling sector in Sri Lanka while considering the cooling requirement of the country in the current context, future perspectives, and recommendations towards achieving sustainable

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<sup>1</sup> (UN Environment Program (UNEP), 2018)

<sup>2</sup> (Munzinger & Gessner, 2015)

cooling solutions. However, since cooling is a sector that cuts across a wide range of other sectors, institutions, and policies, more deliberate policy efforts can drive even greater success in efficiency improvements.

Many countries around the world are engaged in formulating NCPs to address their unique challenges recognizing cooling as a development need. The NCPs are developed to ensure sustainable cooling in country-specific sectors such that cold-chains, food safety, and health while delivering equity in cooling. Against the backdrop of cooling as a growing developmental need and the international environmental agreements to which Sri Lanka is a signatory, the Ministry of Environment (MOE) has taken an initiative to develop and formulate an NCP for the GOSL with the assistance from United Nations Environment Programme (UNEP). The National Ozone Unit (NOU) of the MOE as the national focal point for MP takes the lead in this initiative.

### **1.3. Applicability & Scope**

The scope of the Policy is intended to cover the entire subject of the cooling sector in general through policy interventions proposed under four policy thematic areas. The broad set of interventions identified by policy statements under four thematic areas are to provide guidance and direction when making decisions on respective issues covered by these thematic areas. However, proposed broad interventions provide room for creative interpretations and applications also, which can be considered as an advanced way of using the policy. It is expected that proposed interventions will be converted into implementable actions through plans, programs, and projects through a hierarchical order of intermediate steps such as strategies, options, and activities.

## 2. VISION, MISSION, GOALS, AND OBJECTIVES

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The Vision, Mission, Goals, and Objectives of the NCP are presented in this section. This encompasses a broad vision statement, mission statement, a set of key policy objectives, and the scope of the NCP.

### 2.1 Vision

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Sustainable, Reliable, and Affordable Cooling for All

### 2.2 Mission

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“Ensure the equity of thermal comfort and, food and drug safety while minimizing wastes and hazards and, promoting energy efficiency and renewable energy use while minimizing global warming, protecting the ozone layer and, enhancing the economy.”

### 2.3 Goals

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The NCP aims to achieve the following goals:

- Increase the energy efficiency of the cooling sector to meet the increasing energy demand from fossil fuel burning to minimise greenhouse gas emissions and cooling costs (SDG13).
- Assurance of thermal comfort for all the vulnerable groups while making it affordable, sustainable, safe, and accessible to all (SDG 10).
- Minimise greenhouse gas emissions with the use of renewable energy sources in the cooling sector (SDG 7).
- Optimising cooling demand with proper guidelines to using passive cooling technologies where energy-efficient building concepts, system designs, urban planning, and indigenous knowledge are taken into account (SDG11).
- Phasing out and phasing down the use of HCFC and HFC respectively as refrigerants and shifting to alternatives with zero ODP and low GWP to reduce global warming(SDG13, SDG 12, SDG 17, SDG 14, SDG 15).
- Increasing the income of farmers and fishers by efficient cooling while preserving food & nutrition (SDG1, SDG2).
- To minimise food waste (SDG1) in agricultural and food value chains while reducing greenhouse gas emissions (SDG13).
- Ensure healthy lives and well-being of people with access to safe and effective medicines and vaccines (SDG3).
- To provide access to safe public transport facilities with thermal comfort (SDG 10).
- To minimise GHG emissions through Good Practices such as safer waste handling and disposal mechanisms of cooling equipment (SDG13).

- To improve product quality through optimum thermal conditions required at industrial and commercial sectors (SDG 9).
- To enhance employee productivity and health through thermal comfort (space cooling) and indoor air quality in working environments (SDG 3).

## 2.4 Objectives

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The overall objective of the NCP is to facilitate the implementation of phasing out of HCFC and phasing down of HFC while providing energy-efficient, climate-friendly, and safe cooling in compliance with the Montreal Protocol and the Kigali Amendment of the Montreal Protocol. This overall objective is to be attained through realising the following specific objectives:

- To build institutional capacity of public organizations with mandates deal with cooling sector and strengthen the institutional coordination among them
- To promote refrigeration and air-conditioning service as a formal and standard service that incorporates safe refrigerant disposal mechanisms, good practices, and worker and consumer safety
- To promote renewable energy use (solar energy, wind power, etc.) in meeting the cooling sector (clean cooling) energy demand
- To build awareness among cooling sector stakeholders and the general public on cooling sector policy developments (i.e.NCP), its importance, right to access, and their responsibility
- To identify and promote eco-friendly concepts and traditional methods used in cooling and food preservation
- To promote, popularise and formalise the use of the green building and passive cooling technologies among building sector professionals and the public
- To create and strengthen partnerships with international financial and technical assistance schemes to accelerate the policy implementation (Ex: UNDP, UNEP, etc.)
- To attract FDIs to local manufacturing of energy-efficient, climate-friendly cooling appliances which are not produced locally at the time of implementation of the NCP
- To build public-private partnerships and increase public and private financing to accelerate the policy implementation
- Capacity building of technical professionals of the cooling sector through technician training and certification programmes and skill development of trainers of vocational training institutes
- Introducing incentive schemes to enhance private sector investments for the technology transition and consumers for a smooth transition

### **3. KEY POLICY PRINCIPLES**

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The NCP is based on six main principles which are extracted from green economy principles and used in developing the National Environmental Policy (NEP) of Sri Lanka. Policy measures proposed to achieve the goals and objectives in the section on 'policy statements' were identified according to the guidance provided by these principles. In addition, the goals of the NCP covers most of the sustainable development goals.

#### **Sustainable development and green growth**

Sustainable Development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Green growth, on the other hand, is fostering economic growth and development while ensuring the human wellbeing of future generations. Green growth is not a replacement for sustainable development rather it provides a practical and flexible approach for achieving progress across its economic and environmental pillars.

#### **Life cycle, circular economy, carbon footprint, and 3R**

The life cycle principle (LCP) provides a holistic approach for assessing the environmental impacts at each stage of a particular product's life cycle. The circular economy (CE) is a new way of creating value, where products are designed for durability, reuse, and recyclability, and materials for new products come from old products by extending product lifespan through improved design and servicing, and relocating the waste from the end of the supply chain to the beginning—in effect, using resources more efficiently by using them over and over, not only once. 3R concept refers to reduce, reuse and recycle in the context of consumption and production. It emphasizes the need for increasing the ratio of recyclable materials, reusing raw material and decreasing manufacturing wastes and, an overall reduction in resources and energy. Recently, extended versions of the concept such as 5R (refuse, reduce, reuse, repurpose, recycle) and 7R (rethink, refuse, reduce, reuse, repair, regift, recycle) have emerged. The NCP recognises them as logical extensions of the 3R concept and is complementary to LCP and CE. Carbon footprint considers the amount of emissions from products during its life cycle from raw material extraction to disposal. It is measured per goods and services consumed by people or communities throughout the lifetime. Reducing carbon footprint includes energy efficiency, use of renewable energy, 3R, less energy consumption alternatives (cycling, insulation, etc.), and changing consumption patterns.

#### **Safe minimum standards**

The safe minimum standards (SMS) approach is a guide to managing risk. It is similar to a precautionary action or a rule for potential risk. Therefore, SMS is more or less a subjective policy tool. In NCP, global warming is considered as a potential risk, and phasing out/phasing down the use of substances that has a high global warming potential is considered as a rule to reduce the risk.



## **Precautionary principle**

The precautionary principle is a philosophical and legal approach that emphasises caution when making decisions in situations with a high level of uncertainty. It facilitates environmental decision making and comprises four components namely, taking preventive actions in the face of uncertainty, shifting the burden of proof to the proponents of activity, exploring a wide range of alternatives to possibly harmful actions, and increasing public participation in decision making.

## **Equity, inclusiveness, and no one left behind**

The NCP is guided by the equity principle in the sense that the benefits of transforming the technology to be distributed among all members of the society and be shared equitably to the maximum extent possible. Similarly, it upholds the inclusion of members of most vulnerable groups regardless of gender, class, racial or cultural differences. Moreover, all interventions aimed at achieving the goals and objectives of the policy are envisaged to be designed in such a way that no one is left behind.

## **Planetary boundaries**

The planetary boundary notion aimed to define the environmental limits within which humanity can safely operate. It presents a set of nine planetary boundaries namely; biosphere integrity, climate change, novel entities, stratospheric ozone depletion, atmospheric aerosol loading, ocean acidification, biochemical flows, freshwater use, and land system change. It invigorates the case for international cooperation so that the world community to maintain their actions within the limits of safe operation.

## **Common but differentiated responsibilities**

Common but differentiated responsibilities principle is applied, especially in international environmental challenges, to imply that all states are responsible for addressing global challenges yet maybe with differentiated responsibilities. While acknowledging the common responsibility for finding solutions to global problems by all states/parties, the principle also recognises the necessity of assigning differentiated responsibilities to each state/party/actor according to variable contributions by different parties/actors to the problem concerned, stage of development of respective countries and their distinct capacities to address the problem.

## 4. POLICY STATEMENTS

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This section constitutes the main body of the NCP. It presents the policy statements formulated to achieve the vision, goals, and objectives of the NCP. Policy statements come under four Policy Thematic Areas (PTAs) namely;

- Thermal Comfort
- Removing Heat and Maintaining Stable Temperatures for Industrial and Commercial Purposes
- Maintaining Stable Temperatures for Food and Medicine Transport, Storage and Preservation
- Cross-cutting issues and challenges

The policy statements identified under each PTA broadly cover technical solutions; incentives—positive and/or negative—to create enabling environment for those solutions as well as institutional mechanisms for implementation of them.

### 4.1. Thermal Comfort

Managing thermal comfort is necessary for the safety, resilience, and sustainability of human habitats especially cities and urban settlements. Enhancing thermal comfort is a definitive term of the fundamentals of cooling. As a result, two broad secondary level priority areas have been identified under thermal comfort namely; mobile air conditioning and space cooling.

Space cooling is an important component of the total cooling requirement of the country. It is widely accepted that indoor thermal comfort is related to the physiological and psychological well-being of inhabitants. Nevertheless, it is determined by the weather conditions, which differ across the country. majority of the country comprises of hot climate despite the relatively smaller proportion of the wet zone. Nevertheless, as per the Department of Meteorology (DOM), the maximum annual temperatures can reach 35<sup>o</sup>C. Moreover, the urban heat island effect in cities further aggravates the need for space cooling. Hence, thermal comfort can predominantly be linked to space cooling in buildings using both active and passive modes for space cooling. The demand for space cooling is expected to rise with population growth and global warming.

Transport is the major services subsector in the national economy, which is heavily dependent on fossil fuels. This sector includes road transport, railway transport, air transport, and sea transport. The transportation sector in Sri Lanka is dominated by land transport modes and the total vehicles fleet in the country has increased more than 3 times from 2000-2015, with annual growth exceeding 12% in certain years. City commuters and people from outside, travel to and from and within cities, using both intra-city and inter-city modes of mobility. Crowding is common in both modes of public transport, especially during peak hours. Moreover, public transport in Sri Lanka is often noted for the inferior quality of service. Traffic congestion in cities causes the busses to operate at a slower speed, confining large crowds in an enclosed space for extended periods. Moreover, cooling or thermal comfort is not a priority in the majority of the public transport modes in Sri Lanka wherein it has been made a luxury for a group of

people. Thus, the cooling and thermal comfort requirements are growing with the sharply rising daytime temperatures. Hence, this priority sub-sector would give special attention to cooling in buses, trains, planes, passenger cars, commercial vehicles, etc.

#### **4.1.1. Mobile Air-Conditioning (MAC)**

4.1.1.1. Current cooling requirements of the transport sector will be assessed and highly vulnerable transport modes/sectors will be identified and systematic projections for future cooling demand by the transport sector will be made available.

4.1.1.2. Importation and use of new refrigerants/technologies will be facilitated (financially and technically) and, encouraged for retrofitting of existing vehicles wherever possible and a certificate system will be implemented to assure the use of recommended refrigerants/technologies.

4.1.1.3. Public and private passenger transport sector service quality (railway, road, air, and sea/water) will be assessed based on cooling facility, and providing cooling facilities for railway and road passenger transport sectors will be considered.

4.1.1.4. Importation of vehicles with MAC systems driven by Hydrofluorocarbon (HFC) refrigerants will be regulated based on GWP.

#### **4.1.2. Space Cooling**

4.1.2.1. Passive cooling technology guidelines (green building guidelines including materials and design techniques, cool roofs, etc.) will be prepared for new buildings, urban settings, and housing to optimise the energy demand; and awareness will be developed among the general public and construction sector stakeholders.

4.1.2.2. Not-in-kind cooling technologies (such as district cooling which uses one central source instead of local systems for each building) will be facilitated for commercial/industrial/residential building cooling wherever possible.

4.1.2.3. New technologies initially for the urban sector (zero ODP, low GWP, and non-refrigerant, energy-efficient) will be introduced, promoted, and incentivised for space cooling in buildings including residential cooling.

4.1.2.4. Minimum Energy Performance (MEP) standards will be introduced for space cooling equipment followed by a labeling system (for energy efficiency) to create awareness among consumers and to facilitate regulation and monitoring of importation and local manufacturing of cooling equipment to meet the MEP standards.

4.1.2.5. MEP standards for building cooling will be introduced and incorporated into building codes and will be made mandatory for new buildings and after five years it will be mandatory to have annual energy audits to meet MEP standards for all the building cooling equipment (including old buildings).

4.1.2.6. Importation of Hydrochlorofluorocarbons (HCFCs) refrigerants and RAC equipment that use HCFCs will be banned and Hydrofluorocarbon (HFC) refrigerants and RAC equipment that use HFCs will be regulated based on GWP.

## **4.2. Removing Heat and Maintaining Stable Temperatures for Industrial and Commercial Purposes**

The second broad priority sector is 'removing heat and maintaining stable temperatures for industrial and commercial purposes; which is further classified under two main sub-sectors namely; industrial refrigeration and commercial refrigeration.

Industrial cooling or refrigeration has widespread cooling requirements. The cooling requirements by the industrial sector mainly fall under two main branches namely; process cooling and climate control or comfort cooling. Process cooling is needed when accurate and constant control of temperature within a process is required. The removal of unwanted heat from industrial processes is essential for ensuring the safe, reliable, and efficient operation of processes. In numerous industrial processes, the heat load must be managed carefully. The common method is the use of chillers to remove heat from a process. Chillers are favored mainly due to their ability to provide cooling capacity regardless of changes to the ambient temperature, heat load, and flow requirements of the application. The key process cooling areas include direct cooling of a product, cooling a specific process, or machine cooling. *Comfort cooling or climate control in the industry refers to regulating the temperature and humidity in a space. This type of cooling would be considered under the space cooling sub-sector of the thermal comfort priority sector.* Thus, industrial refrigeration employed by farms, and in food processing such that ice cream manufacturing, milk chilling plants, yogurt, and other milk products, and pharmaceutical factories and product distribution centers and industrial establishments would be given a key priority.

The cold storage equipment and technologies used in commercial settings such that supermarkets, restaurants, and other retail premises, e.g., display cabinets and cold rooms are referred to as commercial refrigeration. Commercial refrigeration is a component of cold chains. In Sri Lanka, approximately 30%-40% of the harvested perishable agricultural produce goes to waste largely due to improper handling, which includes inadequate cooling facilities at each phase of the agro-food value chain. In the cold chains, these perishables are safe and kept preserved for an extended period. The policy will observe the existing commercial cooling needs, technologies, and refrigerants, and the emissions profiles in large cold storages, hotels, supermarkets, ice plants, blast freezers, etc.

#### **4.2.1. Industrial Refrigeration**

4.2.1.1. Current demand for industrial refrigeration will be systematically assessed and projected; and the current technologies and refrigerants used will be assessed based on GWP, energy efficiency, and safety.

4.2.1.2. Minimum Energy Performance (MEP) standards will be introduced for the importation and manufacturing of refrigeration equipment and technologies used in industrial refrigeration with the involvement of relevant ministries and institutes.

4.2.1.3. Zero ODP, low GWP, safe, energy-efficient technologies, and renewable energy use, and retrofitting of existing refrigeration equipment will be introduced, promoted, facilitated, and incentivised.

4.2.1.4. Energy audits will be introduced and monitored periodically to assure the energy efficiency of refrigeration in collaboration with the relevant ministries and institutes.

4.2.1.5. A proper mechanism (Good Practices) for the maintenance of equipment, avoiding leakages of refrigerants, and safe disposal of equipment and refrigerants will be introduced, popularised, incentivised, and regulated.

4.2.1.6. Importation of equipment and technology driven by Hydrochlorofluorocarbons (HCFCs) and ODP substances will be banned and Hydrofluorocarbons (HFCs) will be regulated based on GWP.

#### **4.2.2. Commercial refrigeration**

4.2.2.1. Existing needs and gaps for commercial cooling (including laboratory cooling and mortuary cooling) will be systematically studied, identified, assessed, and projected.

4.2.2.2. Minimum Energy Performance (MEP) standards will be introduced for manufacturing and importation of refrigeration equipment and technologies followed by a labeling system (for energy efficiency).

4.2.2.3. Importation and manufacturing of low GWP refrigerant-based energy-efficient equipment and technologies, and renewable energy use will be introduced, promoted, facilitated, and incentivised.

4.2.2.4. A proper mechanism (Good Practices) for regular maintenance of equipment, avoiding leakages, storage, and safe disposal of equipment and refrigerants will be introduced, popularised, incentivised, and regulated.

4.2.2.5. Importation of equipment and technology driven by Hydrochlorofluorocarbons (HCFCs) will be banned and Hydrofluorocarbons (HFCs) will be regulated based on GWP.

### **4.3. Maintaining Stable Temperatures for Food, Medicine and other materials Transport, Storage and Preservation**

Transportation of products such as food, medicine, and some chemicals and materials requires stable temperatures to be maintained to secure its quality, effectiveness, and safety from the point of production to the intermediate stores and finally to reach the consumers. In refrigerated transport, specially designed temperature-regulated trucks are utilised. Moreover, in the fisheries sector, refrigeration is heavily used in multiday boats to preserve the catch until they reach the land. Sea and air transport refrigeration are important in international trade. Due to the high investment cost and skill gaps, Sri Lanka is still at a development stage to meet the demand for safe transportation of most of the perishable products.

#### ***4.3.1. Transport Refrigeration***

4.3.1.1. Existing needs and gaps for transport refrigeration by different sectors will be systematically studied, identified, assessed, and projected.

4.3.1.2. Standards and guidelines to be followed will be introduced for transport refrigeration in each identified sector based on product value chains and, regulated, monitored, and periodically updated referring to international standards.

4.3.1.3. A monitoring mechanism or mechanisms for *section 4.3.1.2* will be developed with the involvement of relevant ministries and institutes.

4.3.1.4. Minimum Energy Performance (MEP) standards for refrigeration equipment will be introduced, regulated, and monitored periodically with a certificate system.

4.3.1.5. Retrofitting of refrigeration equipment and use of zero GWP technologies and low GWP refrigerants will be promoted, facilitated, and incentivised.

4.3.1.6. Importation, manufacturing, assembling, and servicing of transport refrigeration equipment (reefer transport) for prioritised sectors will be financially and technically facilitated and regulated subjected to MEP and other sector-specific standards/licenses.

4.3.1.7. Robust transport refrigeration facilities will be developed to minimise the food waste in agriculture and food sectors with government involvement and public-private partnerships.

4.3.1.8. Cooling needs of the fisheries sector will be technically and financially supported.

4.3.1.9. Health sector transport refrigeration needs will be standardised (WHO guidelines), regulated, and monitored to ensure the safety and effectiveness (potency) of drugs, vaccines, and other needs.

4.3.1.10. A proper mechanism (Good Practices) for regular maintenance of equipment, avoiding leakages, storage, and safe disposal of equipment and refrigerants will be introduced, popularised, incentivised, and regulated.

4.3.1.11. Importation of equipment and technology driven by Hydrochlorofluorocarbons (HCFCs) will be banned and Hydrofluorocarbons (HFCs) will be regulated.

#### **4.3.2. Domestic Refrigeration**

4.3.2.1. Demand for domestic refrigeration will be assessed and projected; and the currently available technologies will be identified and assessed in terms of energy performance, safety, and GWP of refrigerants.

4.3.2.2. MEP standards will be introduced for domestic refrigerators and a labeling system (for energy efficiency) will be introduced in collaboration with the relevant ministries and institutes.

4.3.2.3. Local manufacturing, retrofitting and importation of refrigerants and refrigeration equipment will be regulated based on GWP of substances, safety, and MEP.

4.3.2.4. Shifting for energy-efficient, zero ODP, low GWP refrigerant use refrigerators will be incentivised and promoted in line with the existing programmes introduced by other ministries and institutes.

4.3.2.5. A proper mechanism (Good Practices) for maintenance, avoiding leakages of refrigerants, and; disposal of refrigerators and refrigerants will be introduced, popularised, and regulated.

4.3.2.6. Importation of equipment and technology driven by Hydrochlorofluorocarbons (HCFCs) will be banned and Hydrofluorocarbons (HFCs) will be regulated.

## **4.4. Cross-cutting Issues and Challenges**

Besides the technically specific policy statements dealing with above mentioned thematic areas; there are several cross-cutting areas of policy intervention that are generally applicable to one or more of the policy thematic areas (PTAs). This section presents the common policy statements that support these 'cross-cutting issues and challenges. The list of cross-cutting areas covered in the sections is Institutional coordination; resource mobilization; research and development; training, education, and awareness.

### ***4.4.1. Institutional coordination***

4.4.1.1. Ministry of Environment will be the apex body for implementing the NCP.

4.4.1.2. Appropriate mechanisms will be set up to ensure the coordination and efficiency (time duration) among multiple government agencies involved in the cold chain, vertically (between national and subnational level agencies) and horizontally (among national or subnational agencies) whenever necessary according to needs of actions/programs in operation.

4.4.1.3. Necessary institutional linkages will be established to enhance the cooperation between government institutions and non-state actors so that the strengths of respective stakeholders are harnessed to better overall outcomes.

### ***4.4.2. Resource mobilisation***

4.4.2.1. Sustainable means of finance and other resources will be mobilised to support the implementation of plans, programs, and projects to achieve the goals of NCP from a diverse range of sources that include budgetary finance, international donor funding, private sector investments, and sponsorships from other non-state actors.

4.4.2.2. Innovative schemes of funding and other assistance schemes will be encouraged and facilitated with the partnership of the Ministry of Finance, the private sector, international donors, and civil society organizations.

### ***4.4.3. Research and development***

4.4.3.1. Research and development for green building concepts, materials, technologies, and passive cooling technologies for buildings and urban development plans will be encouraged and facilitated by providing financial and institutional support to ensure evidence-based solutions.

4.4.3.2. Research and development on innovations in cooling sector technologies will be encouraged and facilitated by providing financial and institutional support to ensure evidence-based solutions



4.4.3.3. Research and development in renewable/sustainable energy use technologies in the cooling sector will be encouraged and facilitated to ensure evidence-based solutions.

4.4.3.4. Indigenous knowledge and traditional practices in cooling technologies, food preservation, and other related knowledge will be compiled, disseminated, and reintroduced wherever possible.

4.4.3.5. Evidence-based research and development outcomes will be popularised and commercialised through public-private partnerships and other necessary assistance, patents, etc.

#### ***4.4.4. Capacity building, training, education, and awareness***

4.4.4.1. Technical education programmes (technology streams in schools, vocational education institutes, technical colleges, technology faculties of universities, etc. ) will be introduced and the existing programmes will be improved (standardised) to accommodate knowledge and skills on new refrigerants, retrofitting, new technologies, transport refrigeration (reefer transport) and service of machinery and equipment.

4.4.4.2. Practitioners related to building space cooling (such as architects, building service engineers, designers ) will be trained and made aware of the introduced regulations.

4.4.4.3. Standardising training programmes and certification systems in the building industry.

4.4.4.4. Certifying and testing mechanism for MEP standards and other required standards testing will be developed and the employees will be trained.

4.4.4.5. A safe disposal mechanism for cooling sector waste management will be introduced.

4.4.4.6. Training will be provided (Good Practices) to refrigeration and air-conditioning service sector employees (both formal and informal sector) on new technology installation, equipment servicing, worker and consumer safety, and proper disposal.

4.4.4.7. A licensing scheme for RAC servicing sector employees will be introduced.

4.4.4.8. Specific training will be given to enhance the skills of trainers in the reefer transport sector (transport refrigeration, manufacturing, and assembling) and will be financially facilitated to generate employees in the reefer transport sector.

4.4.4.9. Awareness programmes will be conducted on MEP and labeling, regular maintenance and service, energy audits, zero ODP and low GWP refrigerants, passive cooling technologies, and traditional preservation technologies.

4.4.4.10. Training opportunities will be facilitated to enable the transition process of introducing new refrigerants and proper disposal.

#### **4.4.5. Procurement of equipment/technologies**

4.4.5.1. Procurement of equipment will be generally based on government procurement guidelines for the government sector.

4.4.5.2 Generally, reaching the best available technology (modern technology) and appropriate technology will be considered in the procurement of cooling equipment.

### **5. POLICY IMPLEMENTATION**

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The main responsibility of implementation of the National Cooling Policy lies with the Ministry of Environment (MOE). The MOE is vested with the leadership in addressing the problems relating to the environment by means of formulating and implementing appropriate policies, strategies, and plans covering broad areas of environmental management. Cooling is a subsector of environmental management which directly comes under the Air Resource Management and National Ozone Unit of the MOE.

However, different segments of the cooling sector overlap its subjects with other ministries, line agencies, and local government bodies making it too broad to be handled effectively by a single line ministry or agency in practice. Hence, despite the leadership role to be played by the MOE, the institutional responsibility of handling different aspects of NCP is scattered among several ministries, line agencies, and local government bodies. Figure 1 presents a list of government agencies that are vested with responsibilities relating to different aspects of the cooling sector.

Hence, implementation of NCP requires a complex coordination mechanism where the MOE is taking the leadership role while involving several other line ministries and line agencies too. The National Cooling Action Plan (NCAP), is a dedicated plan to implement the policies identified in NCP. The NCAP will include a hierarchical order of policy interventions such as strategies and actions that convert the policy statements of NCP into specific time-bound activities together with relevant agencies/stakeholders to implement them. The NCAP will be a rolling plan to be updated periodically with necessary arrangements for monitoring and evaluation. Hence, the NCAP can be considered as the main implementation mechanism associated with the NCP.

In the process of implementation, the Ministry will have to coordinate not only with its own line agencies but with several other ministries. In this connection, depending on the area of policy interventions, the Ministry will be assisted by the line agencies coming under their own purview as well as other ministries and line agencies concerned.

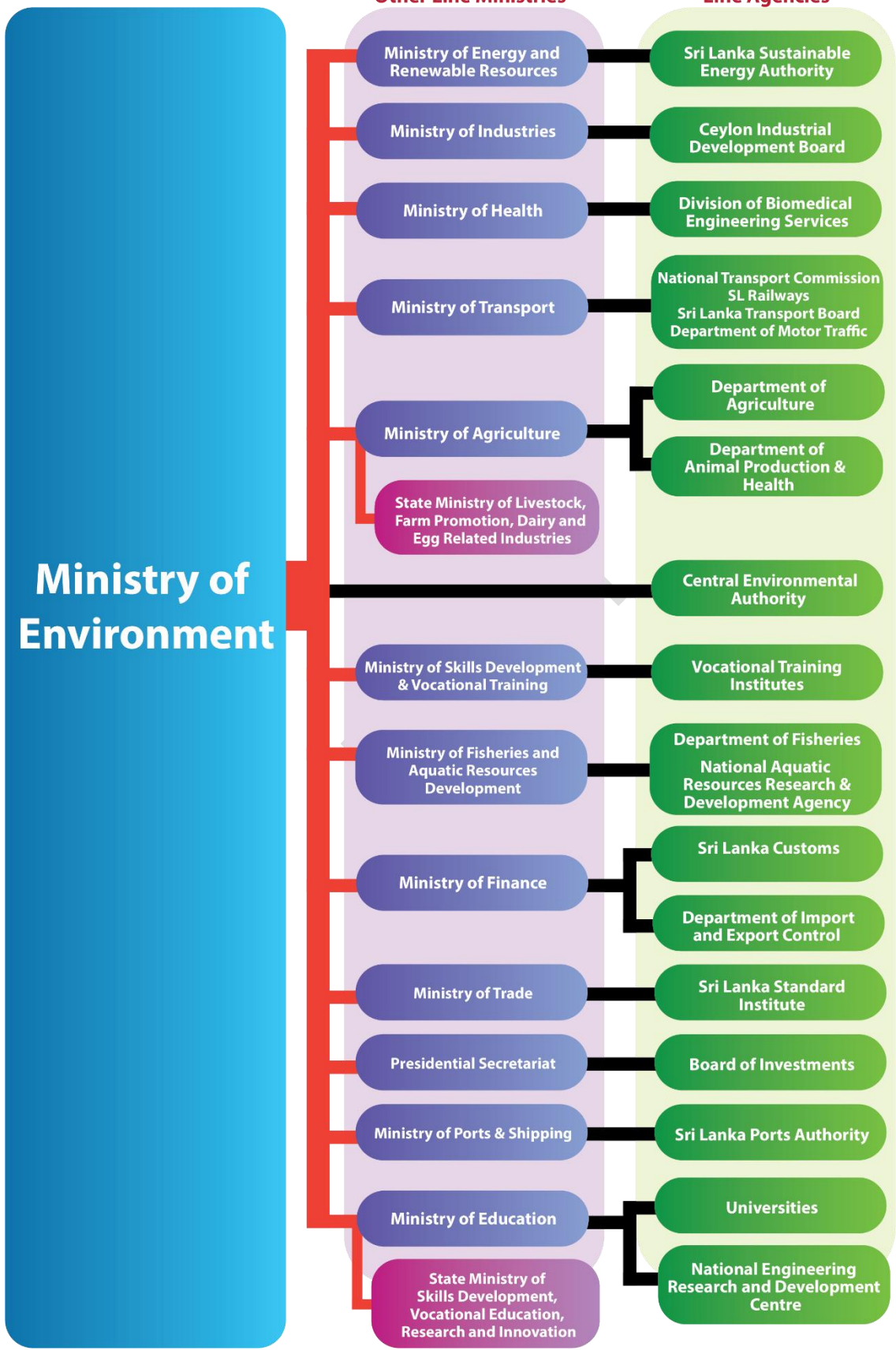
For instance, the Ministry of Energy, and Sustainable Energy Authority are responsible for preparing minimum energy efficiency standards for appliances, building codes, and energy audits. Regulation of the

mobile air conditioning sector (MAC) has to be monitored by the Ministry of Transport. Ministry of Health is responsible for monitoring the standards of the health sector cool chain while the Ministry of Agriculture has the responsibility to develop agricultural produce handling infrastructure and the Ministry of Fisheries and Aquatic Resources has the responsibility for fisheries sector requirements. The Ministry of Finance has the responsibility for financial resource mobilisation including budgetary finance.

The NCP comprises of interventions that need the support of sub-national agencies such as Local Government Authorities and Provincial Councils as well. Ministry will take necessary measures to coordinate with sub-national agencies when their assistance is required for the implementation of the National Cooling Policy. The Ministry will also take action to establish new institutional arrangements to implement the proposed policy interventions where it is necessary, as proposed in the policy statements.

**Figure 1:** Implementation mechanism

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## Glossary

CAFE	Corporate Average Fuel Economy
CE	Circular Economy
DOM	Department of Meteorology
GHG	Greenhouse Gasses
HCFCs	Hydrochlorofluorocarbons
HFCs	Hydrofluorocarbons
K-CEP	Kigali Cooling Efficiency Program
LCP	Life Cycle Principle
MEP	Minimum Energy Performance
MOE	Ministry of Environment
NARA	National Aquatic Resources Research and Development Agency
NCAP	National Cooling Action Plan
NCP	National Cooling Policy
NOU	National Ozone Unit
ODP	Ozone Depleting Potential
PTAs	Policy Thematic Areas
RAC	Refrigeration and Air Conditioning
SDGs	Sustainable Development Goals
SMS	Safe Minimum Standards
UNEP	United Nations Environment Programme

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