

## **Subject: Expression of Interest from Refrigeration and Airconditioning Manufacturing enterprises for implementing Pilot Demonstration Projects under the Kigali Amendment to the Montreal Protocol**

### **Background**

India, as Party to the Montreal Protocol on Substances that Deplete the Ozone Layer, is mandated to phase out substances controlled under the Protocol. Hydrofluorocarbons, commonly known as HFCs were included as controlled substances under the Montreal Protocol pursuant to the Kigali Amendment to the Montreal Protocol adopted by the Parties during October 2016.

2. As per the agreed phase-down of HFCs under the Kigali Amendment, India will have to complete its phase down the production and consumption of HFCs in 4 steps from 2032 onwards with reduction of 10% from the baseline of production and consumption in 2032, 20% in 2037, 30% in 2042 and 85% in 2047 respectively. The baseline constitutes the average of production and consumption of HFCs for the period 2024-2026 and the freeze applicable for India is 2028.

### **About Pilot Demonstration Projects**

3. The Executive Committee (ExCom) of the Multilateral Fund has funding window for pilot projects to maintain and/or enhance efficiency of replacement low Global Warming Potential (GWP) technologies and equipment in the following sectors/subsectors:

- i. Manufacturing activities comprising conversion projects with priority to domestic refrigeration, standalone commercial refrigeration, residential and commercial air conditioning and heat pumps sectors
- ii. Assembly and installation activities of large commercial and industrial refrigeration, air conditioning and heat pump equipment
- iii. Technical assistance for SMEs in manufacturing and assembly /installation

As per the criteria and guidelines framed, the pilot projects are to be submitted in the context of phase down of HFCs under the Kigali Amendment to the Montreal Protocol and the energy efficiency activities should consider incentivising opportunities to avoid continued growth of HFCs.

### **Rationale for the Pilot Demonstration Projects**

4. Considering the size of Indian market and the multitude of sectors present in the country, submitting pilot projects for demonstrating transition from HFCs to low global warming potential alternative technologies along with maintaining and/or enhancing efficiency of replacement GWP technologies and equipment in the context of HFC phase down would be highly useful. The lessons learnt from these projects can be appropriately applied in preparation and implementation of Kigali HFC phase down Plans (KIPs) for the country.

5. Some of the potential projects that could be considered as follows:

- i. Develop and built prototypes of energy-Efficient Room Air Conditioner (RAC) with Optimized Humidity Control Using Inverter Technology and deploy a XX qty of units to selected end-users to conduct real life monitoring to assess energy gains in comparison to Capital Costs (CAPEX) and operating Costs (OPEX) for both manufacturing sector and clients.

Inverter RACs can modulate compressor speed and airflow, enabling finer control over evaporator coil temperature and moisture removal. This allows maintaining coil temperature just below the dew point to remove humidity while avoiding excessively low temperatures that cause overcooling

The project can be implemented by one of the Room AC manufacturers and potential clients for demonstration/testing will be building developers or small commercial buildings that use split type ACs.

- ii. Develop prototype and test direct moisture removal (latent load reduction) technology in commercial AC systems.

Instead of overcooling air for dehumidification like conventional cooling systems, this idea aims to use a liquid desiccant cooling system (LDC) that uses a high-salinity hygroscopic solution to directly absorb moisture from incoming air to the AC unit and is an efficient way to remove moisture from air before it enters the refrigerated aisles, significantly reducing both cooling and refrigeration loads. This project would serve to explore scalable solutions that can later be mainstreamed into Kigali Implementation Plans, being critical for India considering the projects due to urbanization and future increase of building stocks in the country.

The project can be implemented by one of the Commercial AC manufacturers and potential clients for demonstration/testing will be commercial building owners or operators using rooftop/package/ducted AC systems.

- iii. Demonstrate the energy efficiency of R-290 based condensing units for small retail shops/convenience stores that include procurement of condensing units and cabinets (preferably at least 5 units per store) + installation services + energy efficiency monitoring tools + technical assistance and training for servicing personnel.

The project can be implemented by one of the Commercial refrigeration manufacturers and potential clients for demonstration/testing will be small retail independent owners or chains of convenience stores.

- iv. Demonstrate the energy efficiency of a trans-critical CO<sub>2</sub> cooling plant with low-global-warming-potential (GWP) technologies or testing sub-critical cascade CO<sub>2</sub>/NH<sub>3</sub> + glycol to replace the R-410A or R-404a based chillers to respond to the increased demand for refrigerated food supply chain in India

The project can be implemented by one of the commercial refrigerator manufacturers/installer and potential clients for demonstration/testing will be large supermarkets / cold storage facilities / industrial food processing facilities

- v. Demonstrate efficiency and convert manufacturer of commercial AC equipment or process chillers from R-410a/R-404a to R-290

The project can be implemented by one of the local commercial refrigeration equipment manufacturers

***Note: While the above are a few ideas, interested enterprises can consider submitting other project ideas in line with the scope given at Para 3 above.***

6. Interested enterprises with Indian ownership involved in manufacturing of Refrigeration and Airconditioning equipment prior to 1.1.2024 and wish to participate in the process of submitting pilot projects for demonstrating transition from Hydrofluorocarbons (HFCs) to low global warming potential (GWP) alternative technologies along with maintaining and/or enhancing efficiency of replacement low GWP technologies and equipment in the context of HFC phase down under the Kigali Amendment to the Montreal Protocol, may submit the Expression of interest strictly in the **proforma**.

7. The last date for receipt of the Expression of Interest is **30 March 2026 by 1730 hrs**. Proposals should be addressed to the following:

The Director  
Ozone Cell  
Ministry of Environment, Forest and Climate Change  
1<sup>st</sup> Floor, 9 Institutional Area  
Lodhi Road,  
New Delhi – 110003  
Tel: 91 11 24642176  
Email: aditya.narayan@nic.in;  
pmucfc-mef@nic.in

## Proforma for submission of Expression of Interest

### ENTERPRISE PROFILE

1	Enterprise Name	
2	Address of manufacturing facility /plant along with Pin code	
3	Name of owner/proprietor /Managing Director/Chief Executive in case of companies	
4	Mobile Number of (3) above	
5	Email address of (3) above	
6	Name of Authorized Contact Person	
7	Designation of (6) above	
8	Email address of (6) above	

### STATUTORY DATA

9	Date of Commencement of Manufacturing operations using HFCs		
10	Details of RAC Products Manufactured using HFCs	Product name	Units per annum (for each product)
11	No. of RAC manufacturing lines		
12	Ownership profile	Indigenous shareholding (%)	

		Foreign shareholding, if any (%)		
		Country (ies) (in case of foreign shareholding)		
13	Is any portion of the production exported?	Yes		If yes, what proportion of the annual production is exported (%)
		No		
14	If yes to (13), countries to which products are exported			

### 3. DETAILS OF HFC CONSUMPTION

Applications	Name of HFCs /HFC blends used	Consumption (KG) in each calendar year		
		2023	2024	2025

### 4. DETAILS OF CAPITAL EQUIPMENT USED IN THE MANUFACTURING PROCESS

Sr. No.	Equipment Details	Make	Model	Quantity	Year of Installation

### 5 BRIEF DESCRIPTION OF MANUFACTURING PROCESS

*(Process flow diagram would be desirable)*

### 6. LOW GWP TECHNOLOGY OPTIONS

Choice of low global warming potential technology Option		Reason for the option
--	--	-----------------------

**7. DEMONSTRATIONS OF ENERGY EFFICIENCY ENHACEMENT THROUGH IMPLEMENTATION OF THE PROJECTY**

*Brief description to be provided*

**8. SIGNATURE OF ENTERPRISE REPRESENTATIVE (AUTHORIZED REPRESENTATIVE)**

Name:
Designation:
Mobile Number:
Email:
Seal
Date

***\*\* In case of companies, in case a person other than the Managing Director/Chief Executive is signing, letter from the Managing Director/Chief Executive authorizing the signatory for the proposed project is to be enclosed.***