Techno-economic Study on the Feasibility of District Cooling System (DCS) in India

Request for Proposal

1. Background

India is a Party to the Montreal Protocol since 1992 and has been implementing phase-out of production and consumption of Ozone Depleting Substances (ODSs). The production and consumption of Chlorofluorocarbons (CFCs), Carbon tetrachloride (CTC) and Halons has been successfully phased out in India as of 1st January, 2010. The phase-out of Hydrochlorofluorocarbons (HCFCs) is ongoing as per the accelerated phase-out schedule of HCFCs under the Montreal Protocol.

The HCFC Phase-out Management Plan (HPMP) is being implemented in the country. The Executive Committee (ExCom) of the Multilateral Fund (MLF) it its 77th meeting vide decision 77/43 approved the HPMP Stage-II for India. The UNDP is the lead implementing agency for implementation of HPMP Stage-II. United Nations Environment Programme (UNEP) and Deutsche Gesellschaftfür Internationale Zusammenarbeit, (GIZ) Proklima, Government of Germany are the cooperating agencies.

UNEP is the implementing agency, to implement the enabling activities under the non-investment component of India's HPMP Stage-II. Activities related to Cold Chain Interventions is part of the non-investment component of HPMP Stage-II. The UNEP implements the programme through the Project Management Unit (PMU), Ozone Cell, Ministry of Environment, Forest and Climate Change (MoEF&CC).

India launched Indian Cooling Action Plan (ICAP) in 2019 addressing cooling requirement across sectors including reducing cooling demand, refrigerant transition, enhancing energy efficiency and advancing cooling technology options and improving access to cooling in a more equitable manner.

According to the ICAP, the no. of residential households in India are expected to increase from 272 million in 2017 to 386 million by 2037, while the commercial built-up area is projected to increase from 1.2 billion m^2 in 2017 to 3.1 billion m^2 by 2037. The adoption of air conditioning (AC) systems in residential, commercial, and industrial buildings is also projected to increase significantly. The penetration rate of Room ACs in Indian households is expected to grow from 7-9% in 2017 to approximately 40% by 2037. Commercial and industrial sectors are also anticipated to see a rise in AC adoption due to changing consumer preferences and technological advancements. However, this upward trend raises concerns about its impact on carbon emissions, peak and energy demand, and environmental sustainability.

District Cooling System (DCS) is one of the identified alternate cooling strategies in implementing ICAP. This technology will have multiple advantages like reduced cost or complexity, increased reliability, peak demand reduction, energy savings and GHG reduction etc. DC systems typically require about 15% less capacity than conventional distributed cooling systems for the same cooling loads due to load diversity and flexibility in capacity design and installation. The key challenges are high initial investment, lack of technical expertise for

design, little policy level support, and absence of favourable financial and business mechanisms. DCS enable higher flexibility to incorporate multiple energy vectors (solar cooling, tri-generation, and waste cold) to meet cooling requirements and provide ability to exploit thermal storage options or to adopt a system level management of cooling consumption

The PMU, Ozone Cell, MoEF&CC invites proposal for carrying out the activities listed in scope of work and deliverables given in Section 3 and 4 below respectively.

2. Objective

The primary objective of this assessment is to identify the potential energy, environmental and economic benefits of adopting District Cooling Systems (DCS), which include the application of low- and/or no-Global Warming Potential (GWP) refrigerants to replace Hydrochlorofluorocarbon or Hydrofluorocarbon (HCFC/HFC) refrigerants. This study will focus on both greenfield and brownfield projects in India.

3. Scope of Work

3.1 Identify and describe the current (year 2024) and projected (year 2034) cooling demand for a minimum of 5 urban or industrial clusters in India. These clusters should be chosen from coastal and landlocked regions, encompassing both greenfield and brownfield projects. Each identified cluster should have a minimum cooling demand of 10,000 Tonnes of Refrigeration (TR). The selection of clusters for analysis will be finalized in consultation with the Ozone Cell.

3.2 Analyze the technical feasibility of District Cooling Systems (DCS) for the identified clusters

a. Evaluate the energy and environmental impacts of the current and future cooling demand under the Business-as-Usual (BAU) scenario. This involves stocktaking of the prevalent cooling technologies, usage patterns, and operational efficiencies.
b. Identify and describe the optimal DCS solution based on industrial best practices and technical design standards, tailored to the local context.
c. Estimate the energy, water, and refrigerant requirements under the DCS and the BAU scenario and present a comparative analysis.
d. Assess the various benefits of adopting DCS, including:
    i. Reduction in the installed cooling capacities.
    ii. Decrease in power demand, energy consumption, and water usage.
    iii. Reduction in associated capital expenditure (CAPEX) (including electrical infrastructure) and operational expenditure (OPEX).
    iv. Minimization of GHG emissions, including improved refrigerant management.
    v. Alleviation of the Urban Heat Island effect.
    vi. Utilisation of available energy sources, waste heat, heat sinks, sea water, recycled water.
e. Identify and describe key success factors and potential risks, including:
    i. Low diversity in the cooling loads.
    ii. Low electricity charges.
    iii. Retrofitting of old systems (building readiness level to adopt DCS).

iv. Buyback schemes for existing cooling equipment.
v. Installation of underground distribution networks.
vi. Distribution network losses.

3.3 Conduct a cost-benefit analysis of DCS compared to the BAU scenario.

3.4 Provide recommendations to enhance the viability of DCS for the analysed clusters covering policy and regulatory interventions.

3.5 Compile minimum 5 case studies from India and worldwide (e.g., Denmark, Canada, Singapore). The case study selection will be utilized in consultation with the Ozone Cell and include use of recycled water or sea water for the water requirement. Moreover, identify case studies where sea water is utilized as a heat sink.

3.6 Facilitate two stakeholder consultations in partnership with the Ozone Cell. The first consultation will be convened after submission of the initial assessment report, and the second after submitting the draft feasibility report.

4.Schedule

The duration of completion of all the activities as per the scope of work is 6 months from the date of award of the assignment.

5.Timeline and reporting

1) Inception report– Within 1st month of project inception, covering the following:

a. Venue, agenda, list of speakers and tentative dates for the workshops.
b. Timelines for study and publication of report.
c. Format of WCR

2) Mid-term report– End of 3rd month, covering progress on each activity and submission of WCR for workshops organized.

3) Final report with remaining WCR – End of 6th month

6.Terms of Payment

a. 50% after signing the agreement.
b. 30% after submission of mid-term report.
c. 20% after submission of final report and WCR and acceptance by MoEF&CC.

7. Eligibility Criteria

a. Average Annual financial turnover during the last three years, ending 31st March, 2024, should be at least INR 10 lakhs (to be supported with financial statements / audited balance sheets of the last three financial years).

b. Minimum 3 years' experience working in the field of Montreal Protocol and related areas such as energy efficiency and decarbonization in space cooling sector in buildings, district cooling system, cold chain, ODS phase-out projects for government/ PSUs, autonomous bodies, international organizations, bilateral and multilateral bodies (to be supported by letter of award and contract).

c. Experience of executing at least 3 assignments of order value INR 15 lakhs in the field of Montreal Protocol, energy efficiency, district cooling system, international/multilateral conventions for government/PSUs, autonomous bodies, international organizations, bilateral and multilateral bodies (to be supported by letter of award and contract).

8. Submission of Proposal

The proposal will be submitted in two parts involving Technical and Financial Proposals in two separate sealed envelopes. Proposal sent by Email/Fax will not be entertained. Last date of acceptance of the duly filled and completed bids is extended till 23rd August, 2024 by 17:30 Hours at the following address:

The Director
Ozone Cell
Ministry of Environment, Forest and Climate Change (MoEF&CC)
1st Floor, 9 Institutional Area, Lodhi Road,
New Delhi – 110003

a. Technical Proposal

The Technical Proposal should include the following:

i. Introduction.
ii. Details of experience of similar work.
iii. Approach and Methodology.
iv. Work Plan.
v. Details of Technical Team (include one page CV each of the persons to be associated) including qualification in relevant areas.

b. Financial Proposal

The Financial Proposals should include the total lump-sum cost in INR inclusive of all taxes, travel and other expenses related to the assignment.

9. Evaluation and Selection

Evaluation Criteria (will be applied only to those who meet the eligibility criteria and their marks

Sr. No.	Criteria	Marks	
	Sub-criteria	Total criteria	Sub-criteria
1	Past Experience of the Firm	40	

	• Number of years relevant experience
	  o 3 –6 Years
	  o More than 6 Years
	
	• Experience of working with government/ PSUs, autonomous bodies, international organizations, bilateral and multilateral bodies
	  o 3 -6 Assignments
	  o More than 6 Assignments
			20
			10
			20
			
			20
			
			10
			20

2	Methodology, Work Plan and Understanding of TOR	20	
	• Understanding of TOR • Approach and methodology • Work plan with timelines		06 08 06
3	General profile of qualifications, experience and number of key staff	25	
	• Qualifications • Relevant experience		10 15
4	Overall financial strength of the firm in terms of turnover, profitability and cash flow (liquid assets) situation	15	
	Turnover figure for last three years • 15 - 20 lakhs • 20 - 25 lakhs • 25 lakhs and above		 5 10 15
5	Total	100	

The minimum cut off will be 75 (Seventy-Five) marks for technical proposal and competency.

10. Selection Methodology

Quality and cost-based selection

a. Technical proposal -70%
b. Financial proposal -30%

Financial proposals will be opened only for the technically qualified bidders and will be given cost score based on relative ranking of prices, with 100 marks for the lowest bidder and pro-rated lower marks for higher priced offers. The total score shall be obtained by weighting the quality and cost scores and the bidder that obtains the combined highest score will be considered for award.