ANGAN 2022: Making the Zero-Carbon Transition in Buildings

Thematic Session 6: Emerging Low-Carbon Cooling Practices and Technologies

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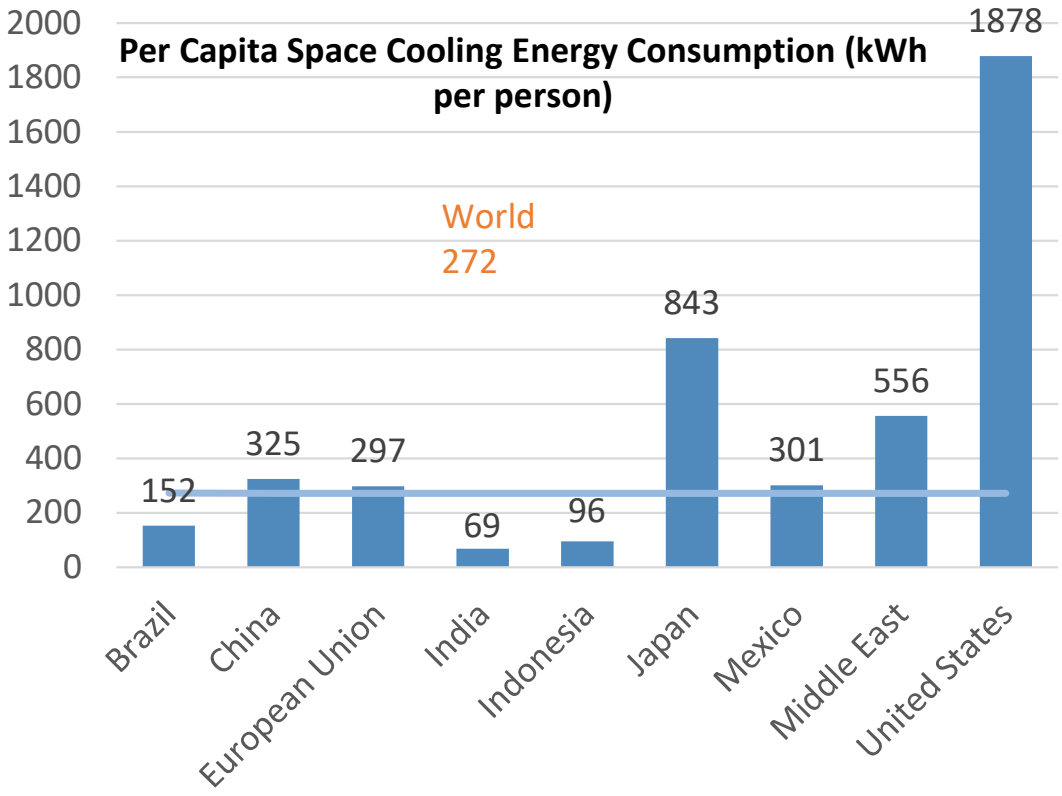
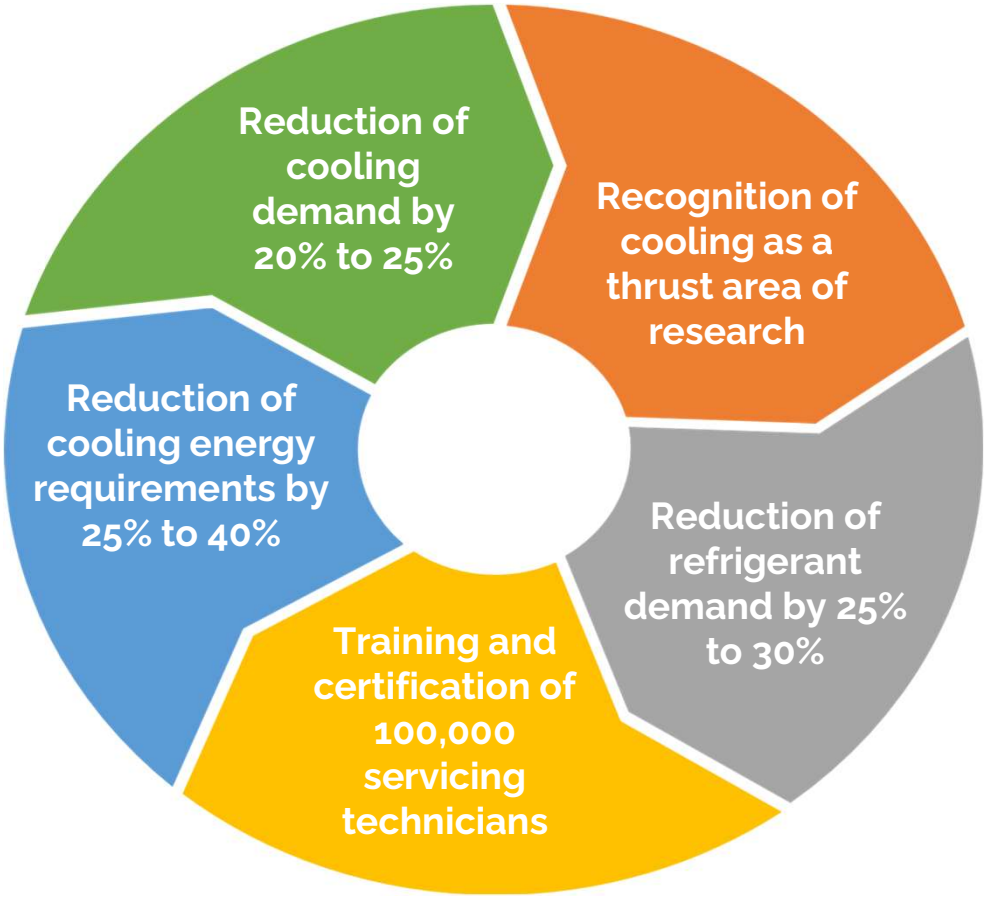
Context

- Cooling is a **development need** linked with **Sustainable developmental Goals**
- **India has one of the lowest access to cooling** across the world BUT increasing population, per capita income and urbanization will drive increase in cooling demand
- Two important aspects of active cooling – refrigerant and energy use
  - Refrigerants are regulated under the Montreal Protocol regime
  - The **Kigali Amendment** has recognized linkages between maintaining and/or improving energy efficiency of refrigeration and air-conditioning equipment with refrigerant transition

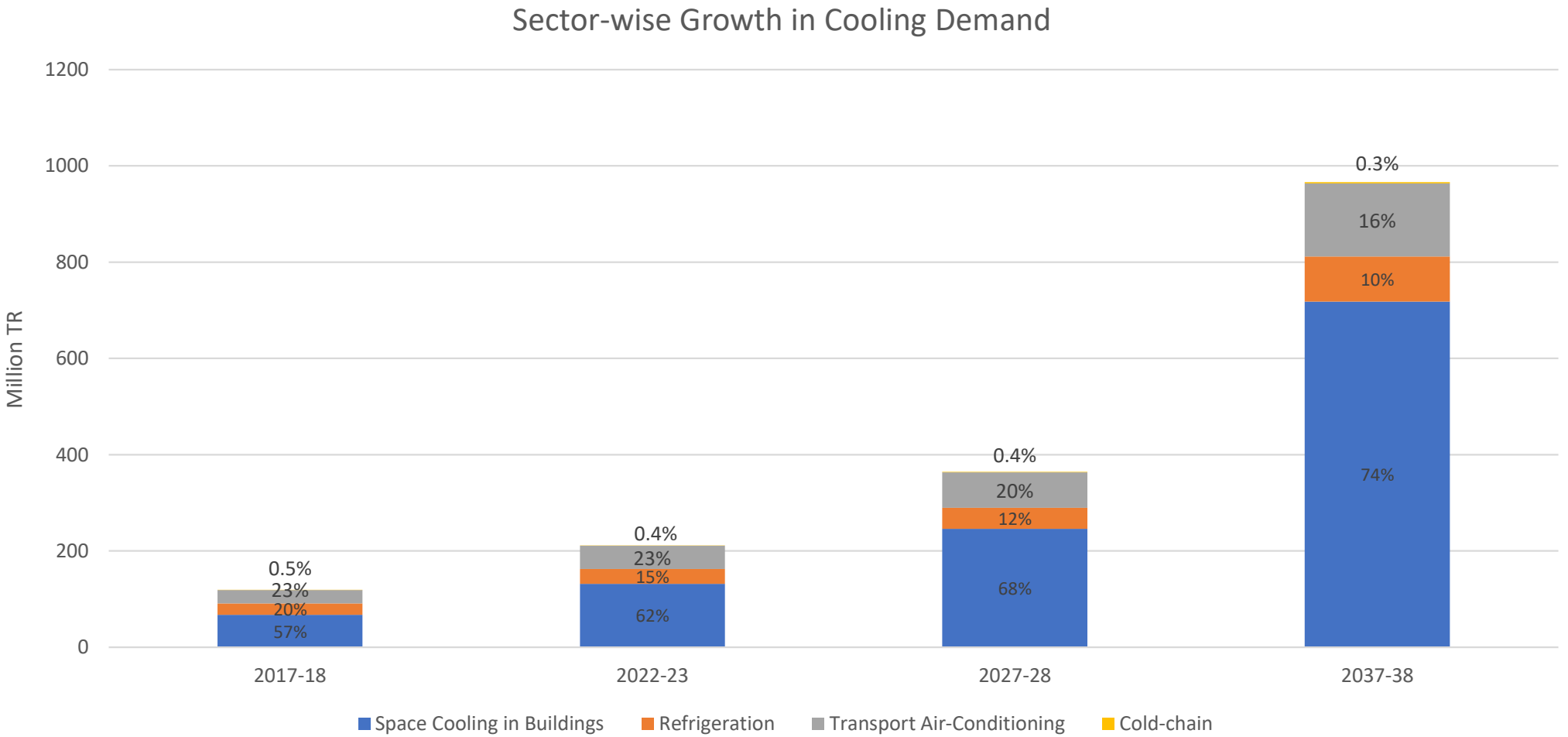


Broad Goals of ICAP By 2037-38



- ICAP is a **flagship initiative by MoEF&CC**, Govt. of India - first country in the world to develop a cooling action plan
- A long-term integrated **20 year (2017-18 to 2037-38) outlook across sectors** on India's cooling demand, technology options, refrigerant use and energy consumption
- To develop and formulate a cooling plan that will resonate with multiple stakeholders in the Government, private sector and academia/think tanks and research organizations (**triple-sector approach)**

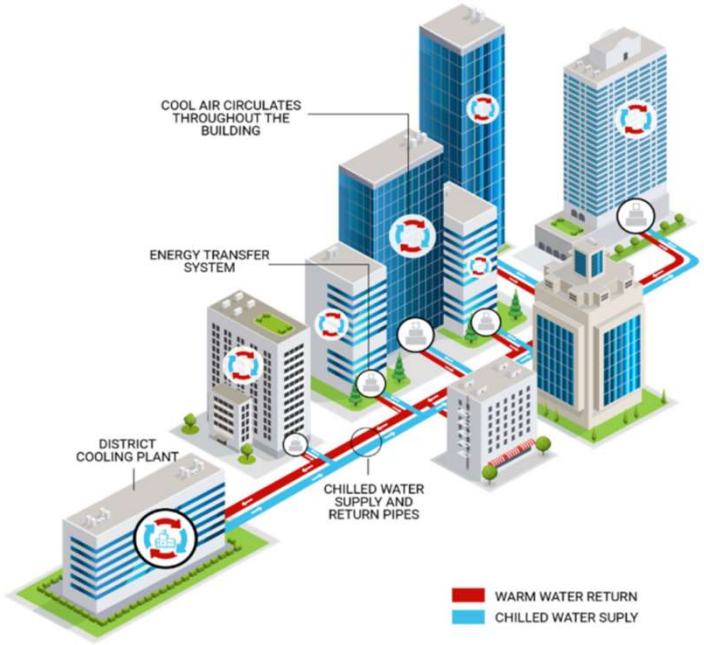
Cooling Demand



8X growth in cooling demand in 2 decades
Maximum share is from Space Cooling in Buildings

District Cooling System (DCS)

District Cooling (DC): Efficient way to air-condition clusters of buildings - chilled water supplied to multiple buildings through an insulated underground piping network

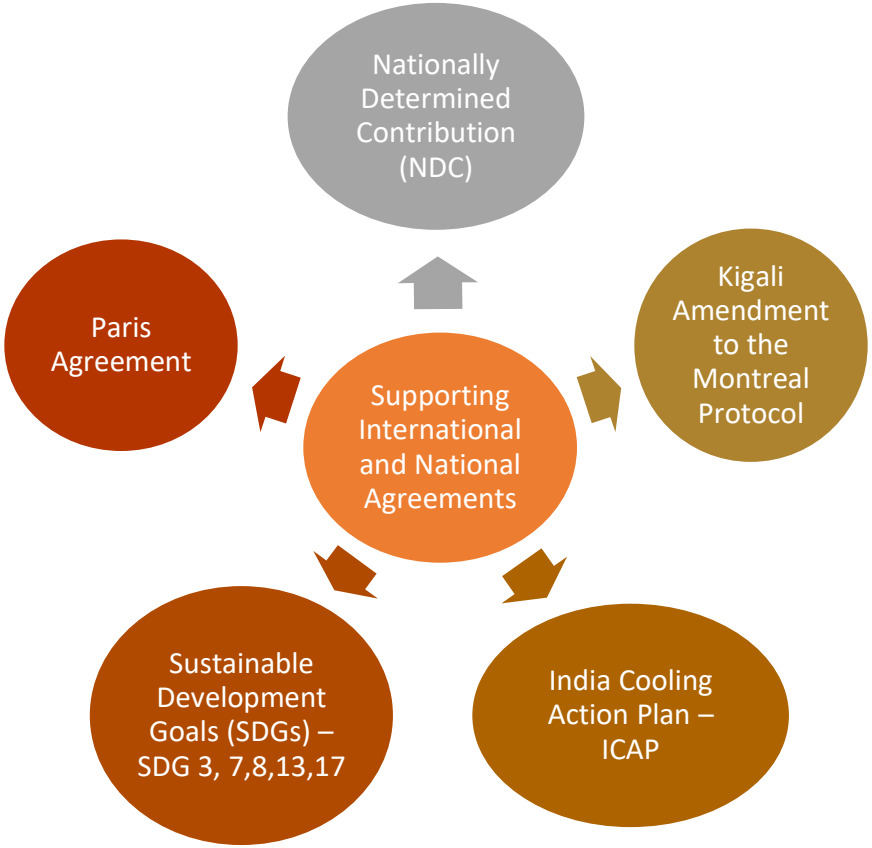


- ICAP also recommends promoting not-in-kind technologies such as **district cooling** for the building sector
- DCS also has a potential for the application of natural **refrigerants with low or zero GWP**
- **Potential users** include commercial, residential, and industrial buildings or even the entire city.
- **Risk and Challenges for technology implementation:** Design and technical risk, lack of skilled resources, limited knowledge on M&V, Scalable business models, regulatory risk such as interest rates, tariff and tax

“District Cooling is already happening in India”

Key Benefits of DC technology

- Cost avoidance: Chillers and cooling towers are not required at the building level
- Freed up area: Valuable rooftop and building space
- Economies of scale: Aggregating the cooling needs of multiple buildings
- Reduction in installed cooling capacity: Up to 50% reduction
- Reduction in peak load and energy demand: Up to 40% reduction in energy demand
- Lower lifetime cooling costs: Around 20% lower lifetime cooling costs
- Effective refrigerant management and operation
- Better acoustic management



District cooling Supports Climate Change Mitigation

Progress Made So Far

- Submitted first draft of DC guidelines for inputs from TC
- Identification of demonstration projects: 10 projects reviewed; 2 not feasible, 7 discussion ongoing; 1 feasibility study under preparation (IIT Delhi)
- Inclusion of District Cooling in Climate Smart Cities Assessment Framework (CSCAF) of MoHUA
- Collaborated with GIFT City (only Govt. DC project providing Cooling-as-a-service in India) as a knowledge partner
- Study tour to GIFT City with delegation from IIT Delhi, CPWD, and UNEP in March 2022
- Discussion with CPWD for training and capacity building workshops for officials for incorporating DCS in upcoming projects is in advanced stage
- Agreement with UNEP for building on the knowledge and supporting the training and capacity building programs
- 3 Outreach events conducted for building awareness about DC

Highlights from GIFT City Study Tour

GIFT City acts as the municipality within the region and provided Electricity, Water, Gas and Cooling

They have **mandated the use of DCS in buildings through the Development Control Regulations (DCR)** of the region

They consider definition **of DCS as a system that provides cooling to multiple clients/buildings**

A **Central Control City Centre (C4 Building)** allows them to monitor and manage the entire city from a single room

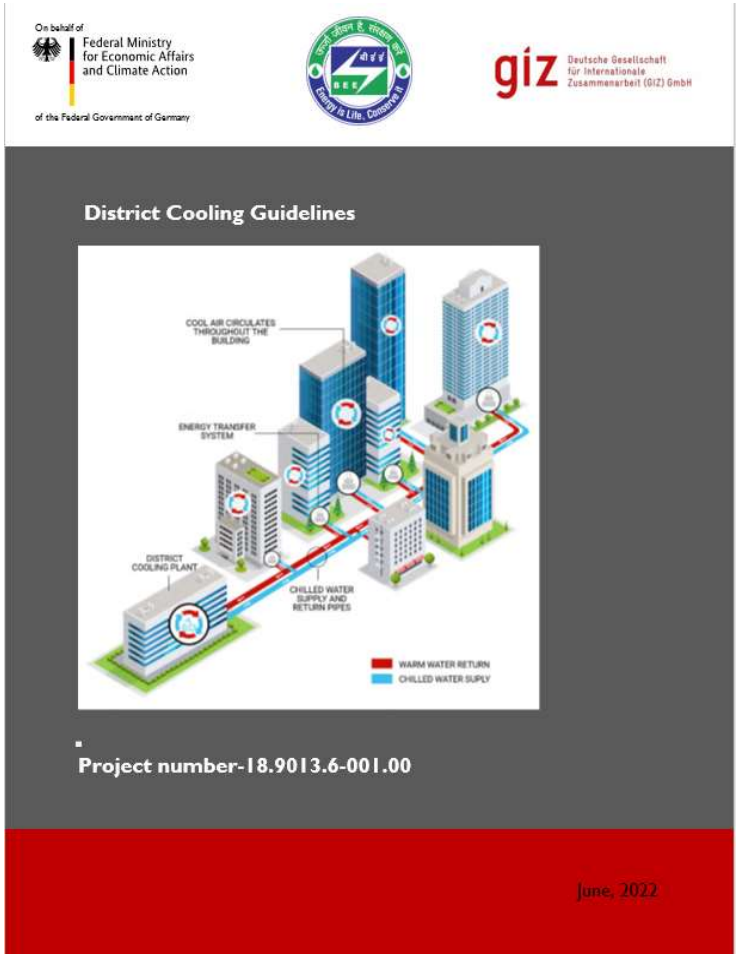
An **integrated approach while planning a city** with relevant stakeholders including state level actors.

Standard operating policies shall be made and consensually agreed by different actors working in close vicinity of the projects.

Digging-free policy and planned underground utility corridor provides with easy access and low maintenance and operations issues

District Cooling Guidelines

1. Overview of district cooling in India
2. Key components in a DCS
3. Key stakeholders in DCS in India
4. Project evaluation criteria for District Cooling System
5. District cooling project cycle: Concept & Planning
6. District cooling project cycle: Designing, Construction and Commissioning
7. District cooling project cycle: Operation and Maintenance
8. Economics of DCS
9. Bidding choices for DC projects
10. State level actions for promotion of DCS
11. Key definitions



State Level Actions For Promotion Of DCS

01	 **As Planner & Regulator**	• Civic Authorities can stimulate the growth of district cooling by adjusting the local regulatory framework through vision and target setting, integrated energy planning and mapping, policies that encourage connection, and waste-to-energy regulations.
02	 **As Facilitator**	• Several economic and institutional impediments to district cooling investment can be overcome through local government facilitation. • Local governments can act as enablers to ease access to low-cost finance in order to stimulate private investment and industry activity.
03	 **As Provider & Consumer**	• A city direct the local district cooling strategy toward social and economic objectives as an infrastructure service provider. • As a consumer of cooling services, the city is in a unique position to demand the energy services it considers best, as well as providing anchor load and connection certainty.
04	 **As Coordinator & Advocate**	• Effective coordination from civic authorities between public utility companies, infrastructure service providers, city officials and private players is needed for DCS implementation. • Advocating DCS to higher levels of government for supporting policies and funding commitments, including grants and taxation policies