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# India Cooling Action Plan (ICAP)

14 FEBRUARY 2024

# Background



- India is the first Country in the World to develop a comprehensive cooling action plan.
- India Cooling Action Plan was launched in March, 2019
  - ✓ long-term integrated vision to address the cooling requirement with a 20 years' time horizon.
  - ✓ Reduction of cooling demands
  - ✓ Reduction in Refrigerant demand
  - ✓ Enhancing energy efficiency
  - ✓ Better technology options
- Integrated actions with respect to cooling across sectors will have a higher impact during the implementation of Kigali Amendment than actions taken in isolation.
- Maximising economic and social co-benefits, besides environmental gains.

# Development Process

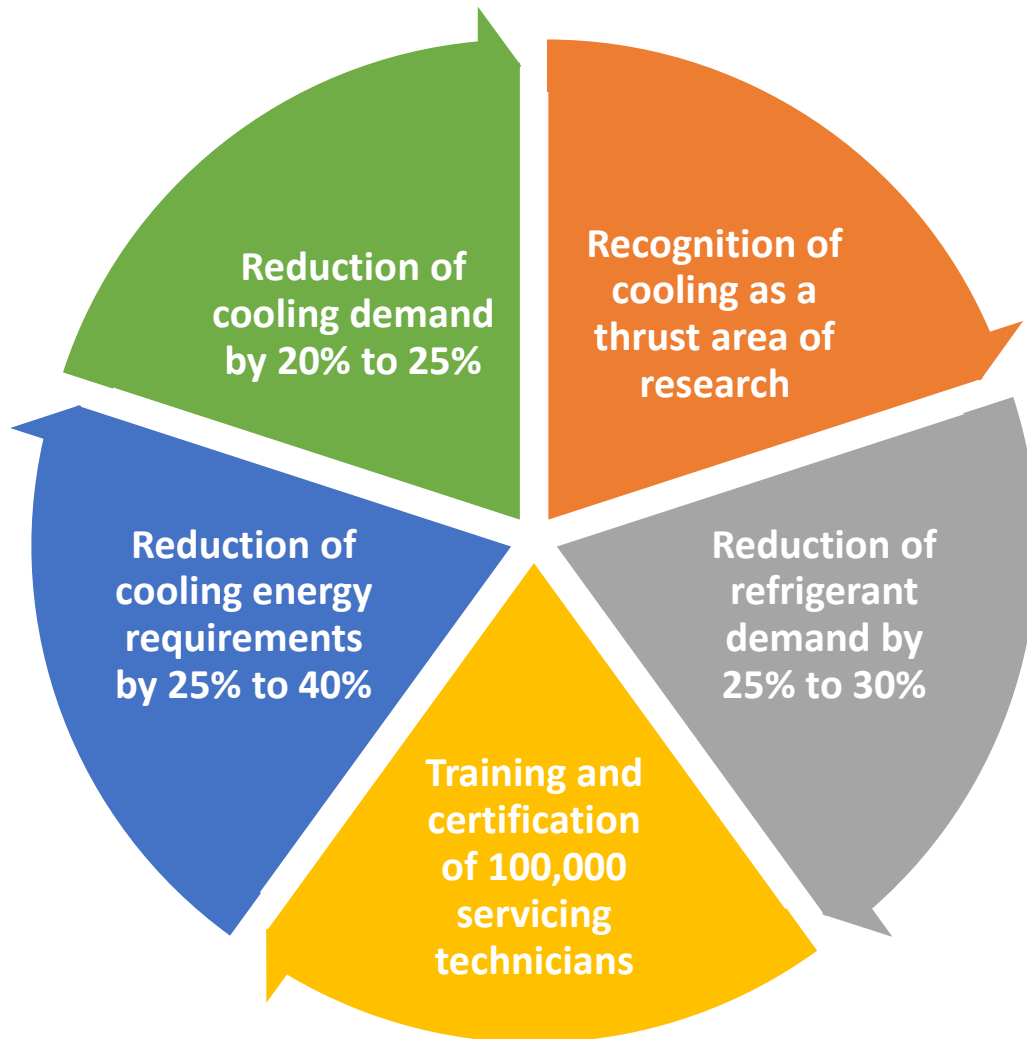


- **Multi-stakeholder inclusive process**
  - Government Ministries/departments/organisations
  - Industry and Industry Associations
  - Think tanks
  - R&D and academic Institutions
- **7 thematic groups**
  - Space Cooling in Buildings
  - Air-conditioning Technology
  - Cold-chain and Refrigeration
  - Transport Air-conditioning
  - Refrigeration and Air-conditioning Servicing Sector
  - Refrigerant Demand and Indigenous Production
  - Research & Development
- **Steering Committee** - Guide and oversee

# Broad Goals



## ICAP Goals by 2037-38

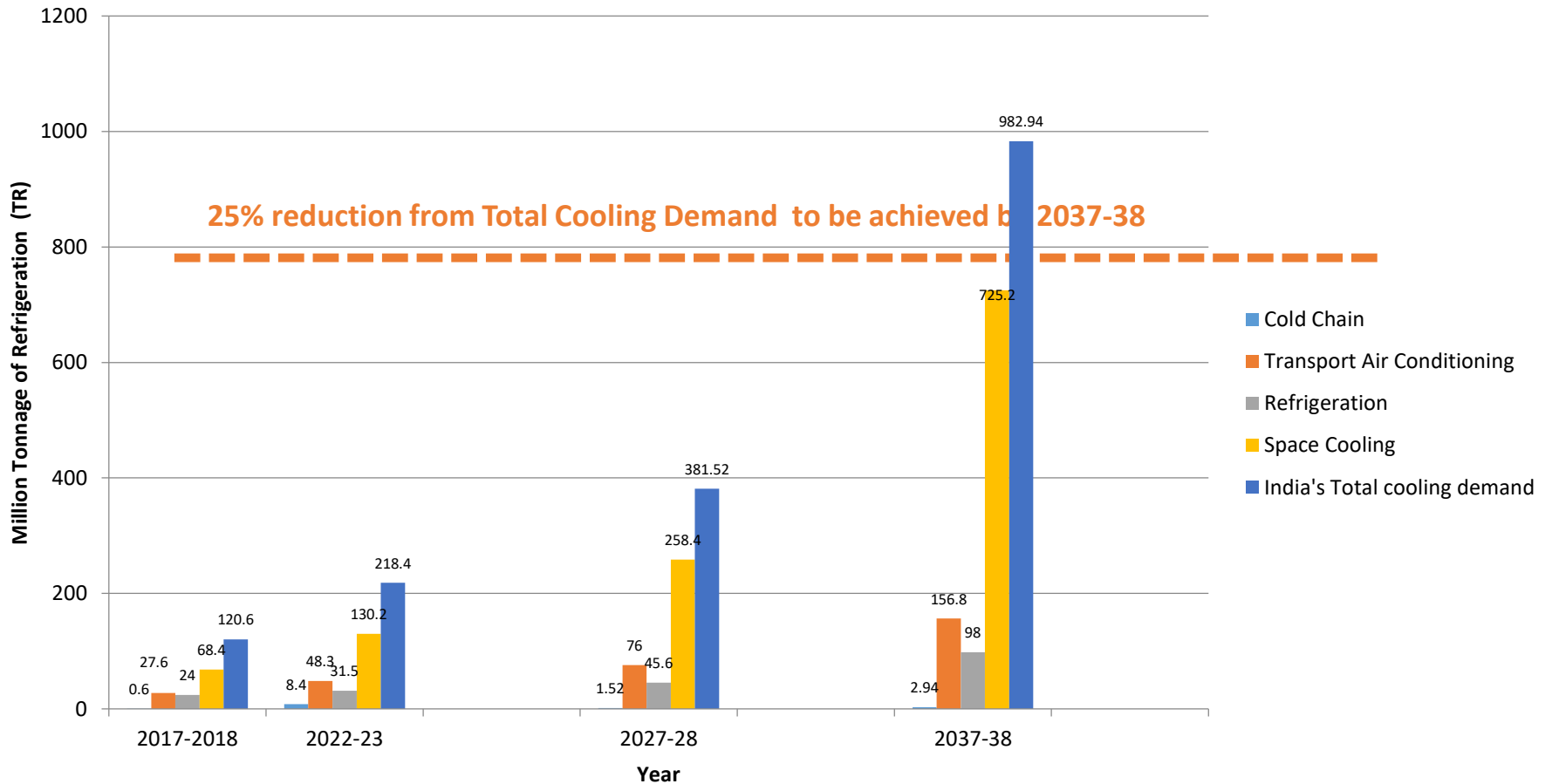


- Thermal Comfort for All
- Sustainable Cooling
- Synergies with on going policies and programmes

# Growth in cooling demand by 2037-38



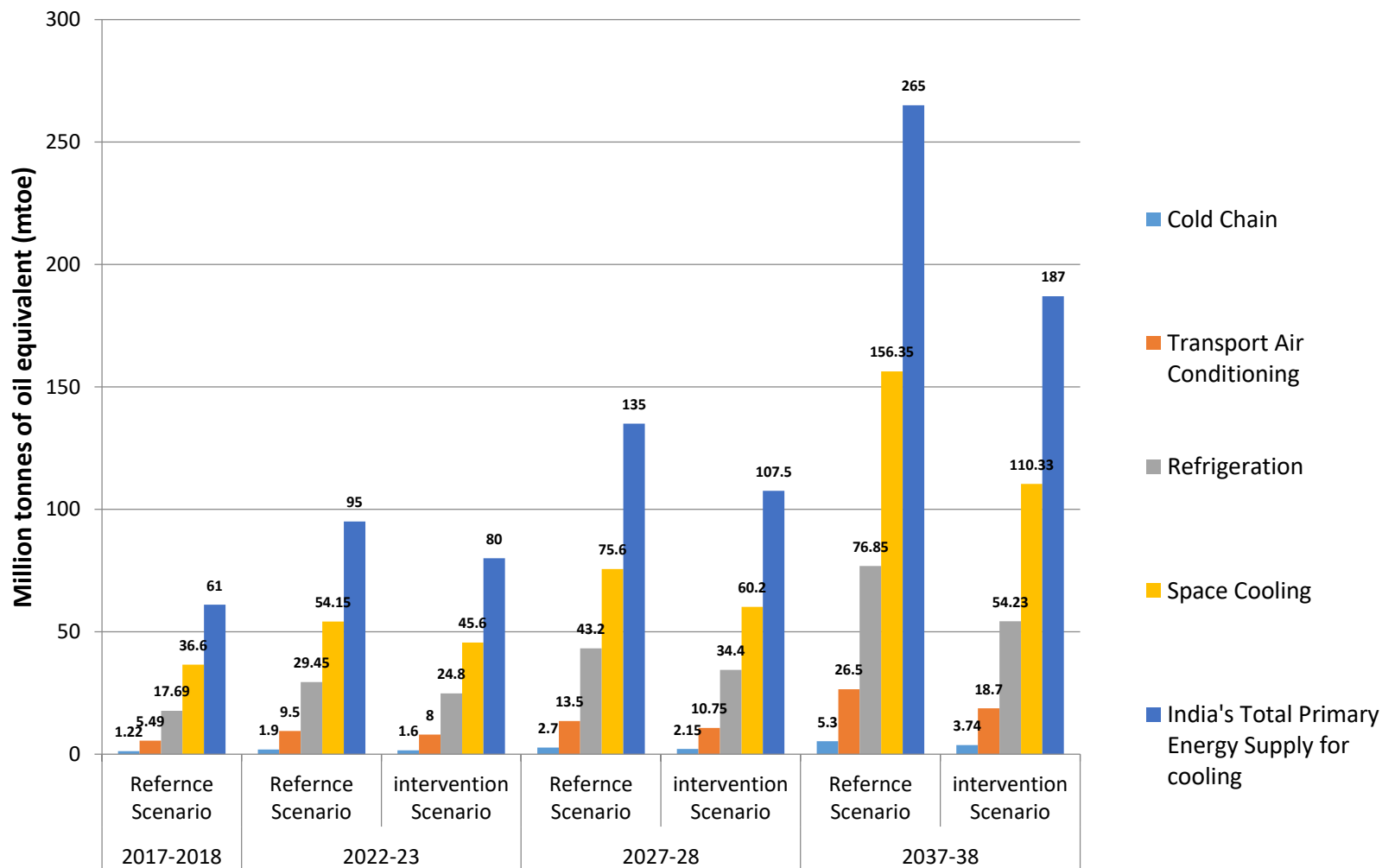
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# India's Total Primary Energy Requirement for Cooling



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# Space Cooling in Buildings Thematic Area



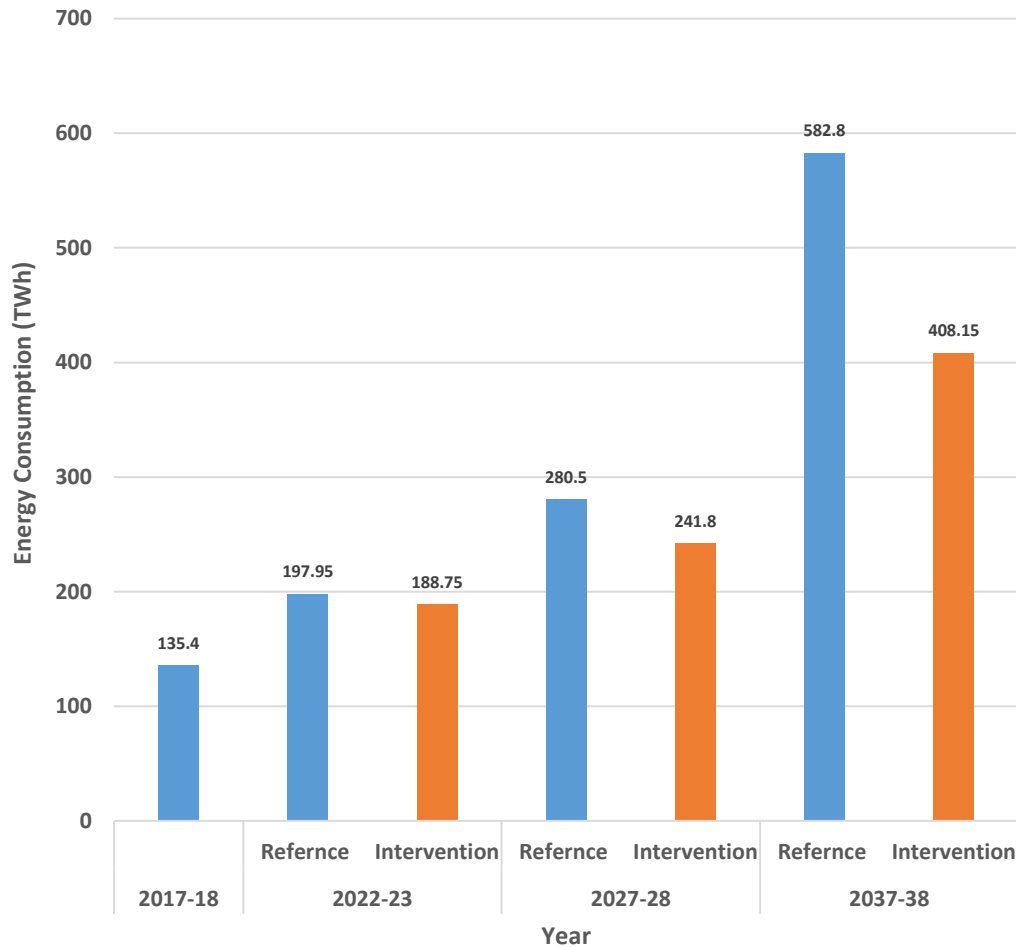
Thematic Area	Status	Actions	Action Initiated	Remarks
Space Cooling in Buildings	Finalized and Published Action Plan on 16 September 2021	<p><b><u>Passive Cooling Framework</u></b></p> <ul style="list-style-type: none"> <li>• Energy Conservation Building Code of Bureau of Energy Efficiency (BEE) for Commercial Buildings</li> <li>• Eco Niwas Samhita (ENS) for Residential Buildings</li> </ul> <p><b><u>Active Cooling</u></b></p> <p>Following initiatives taken by BEE:</p> <ul style="list-style-type: none"> <li>• Minimum Energy Performance Standards (MEPS) for Refrigerators and Room ACs</li> <li>• Star Labeling Programme for Refrigerators and Air conditioners</li> </ul>	<ul style="list-style-type: none"> <li>• Wider adoption of ECBC and ECBC-R (ENS) in various building infrastructure construction schemes of Government.</li> <li>• Advisory issued by BEE to preset minimum temperature of 24° C in all room air conditioners</li> <li>• BEE is implementing star and labelled programme for all refrigerators and air conditioners.</li> <li>• BEE is implementing MEPS for refrigerators and room air conditioners</li> <li>• Government e Market has created a new category namely Green category for promotion of energy efficient and low GWP refrigerant based AC.</li> <li>• The new energy consumption standards for Room Air Conditioners have been notified, which are applicable from 1st July, 2022 to 31st December, 2024.</li> <li>• Cooling strategies incorporated in the Addendum to Urban Development Plan Formulation (URDPFI) Guidelines and circulated to all the States /UTS for implementation.</li> </ul>	<ul style="list-style-type: none"> <li>• ICAP recommendations have been mapped with Government Schemes for implementation.</li> <li>• 20 States/ UTs have notified ECBC.</li> <li>• 5 states/UTs are in the final leg of notification.</li> <li>• BEE is working with State Designated Agencies and state UDDs to implement ENS.</li> <li>• ECBC to be implemented in Building infrastructure construction Project/schemes: <ul style="list-style-type: none"> <li>• Affordable housing of MoHUA</li> <li>• University building projects of Min. of Education</li> <li>• Airport Project</li> <li>• Railway Station</li> <li>• Metro Station</li> <li>• Hospitals</li> <li>• Defense Related Buildings</li> <li>• Industrial Development Schemes</li> </ul> </li> <li>• Training on ECBC and ENS being imparted by BEE across the country</li> <li>• CPWD, MOHUA imparting training on ECBC</li> <li>• Ozone Cell, MOEF&amp;CC in collaboration with Construction Industry Development Council (CIDC) is promoting awareness on Good Management Practices for energy efficient buildings amongst all types of construction personnel</li> </ul>



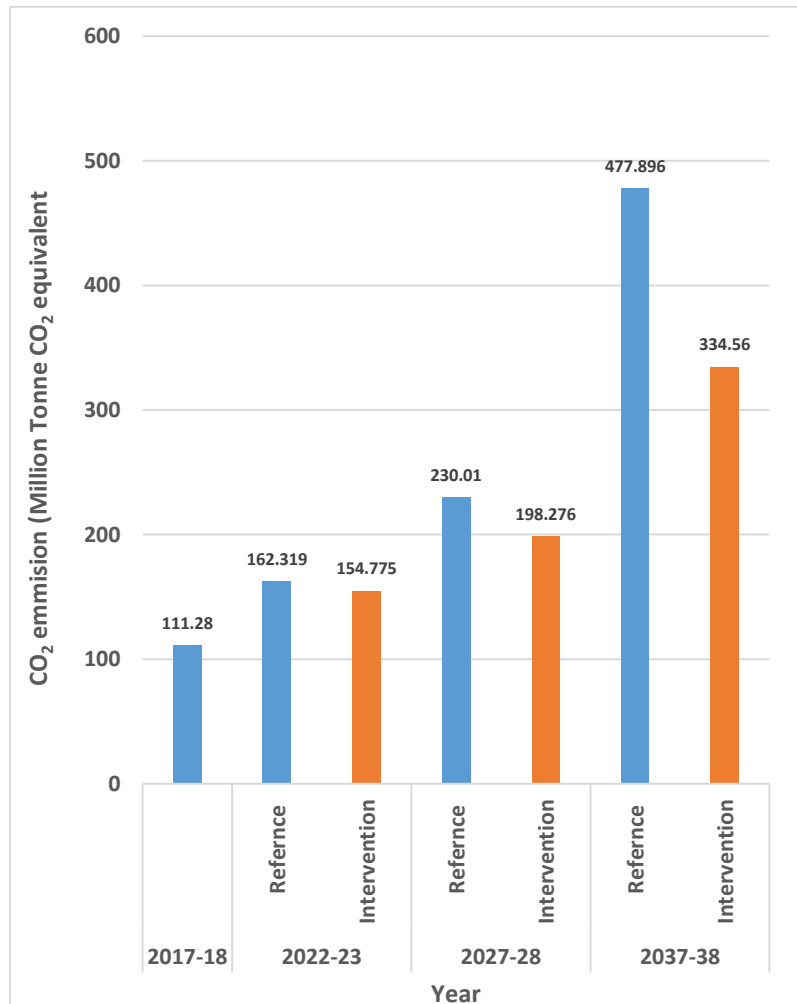
# Annual Energy Consumption and CO<sub>2</sub> Emissions Reduction (Space Cooling in Buildings)



## Space Cooling in Buildings-Energy Consumption



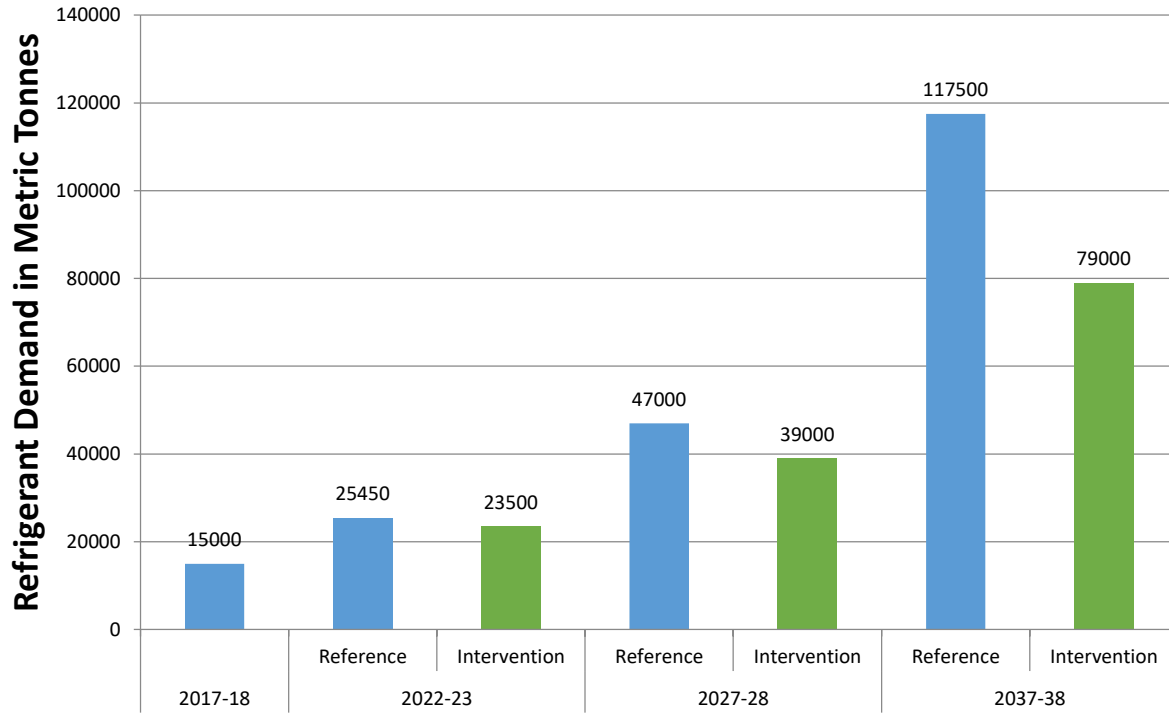
## Space Cooling in Buildings-CO<sub>2</sub> Emissions-Million Tonne Equivalent



# Refrigerant Demand in (Space Cooling in Buildings)



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# Cold chain and Refrigeration Thematic Area



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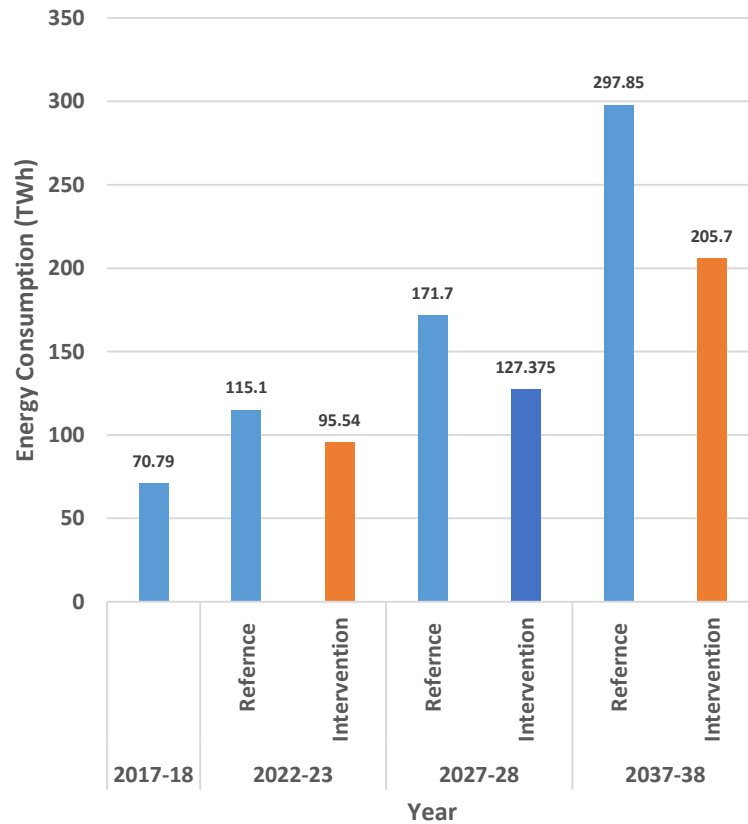
Nature Protects if She is Protected

Thematic Area	Status	Actions	Action Initiated	Remarks
Cold Chain and Refrigeration Sector	Finalized and Published Action Plan on 16 September 2022	<ul style="list-style-type: none"> <li>Finalised action points to the concerned Ministries /Department for implementation</li> <li>Development of safety standards for flammable and toxic refrigerants for cold storage and other segments of the cold chain</li> <li>Standardize design, construction and associated specifications for small, medium and large cold chain infrastructure components</li> <li>Specialized training facilities for cold chain professionals and technicians</li> </ul>	<ul style="list-style-type: none"> <li>Identified and mapped establishment of new and retrofitment of Cold Chain related Government schemes:                             <ul style="list-style-type: none"> <li>✓ Ministry of Agriculture and Farmer Welfare</li> <li>✓ Ministry of Food Processing</li> <li>✓ Ministry of Commerce and Industry</li> </ul> </li> <li>Standards for flammable and toxic refrigerants for cold storage and other segments of the cold chain developed by BIS.</li> <li>IS 17773 : 2022 Closed-Circuit Ammonia Refrigeration System — Code of Practice for Design and Installation, has been published in September 2022.</li> <li>IS 2370:2014 Walk in cold rooms is the latest version published and active.</li> <li>IS 13288 (Part 2) : 2020/ ISO 1496-2 : 2018 Series 1 Freight Containers — Specification and Testing Part 2 Thermal Containers ( Third Revision ) is the latest version published and active.</li> <li>Refrigeration appliances are covered under Star and labelling programme of BEE.</li> <li>Agriculture Skill Council of India (ASCI) has developed several QPs for skill training in cold storages.</li> </ul>	<ul style="list-style-type: none"> <li>BEE has recently launched a report on 'Cold Chain Energy Efficiency in India: Analysis of Energy Efficiency Opportunities in Pack-Houses'.</li> <li>Ozone Cell, MoEF&amp;CC has developed and launched a study report on "Cold Chain sector in India for promoting non-ODS, low GWP refrigerants".</li> <li>Ozone Cell, MoEF&amp;CC is undertaking a study on "Good Management Practices for Cold Storage (warehouse) infrastructure used in e-commerce business focusing on application of non-HCFC and low GWP refrigerant based energy efficient cooling system.</li> <li>BIS Panel has recommended to wide circulate the Draft Indian Standard based on ISO 22712:2023 Refrigerating systems and heat pumps - Competence of personnel for 2 months time, after Committee approval. The approval will be taken in the next Committee meeting during 1<sup>st</sup> quarter of 2024.</li> </ul>

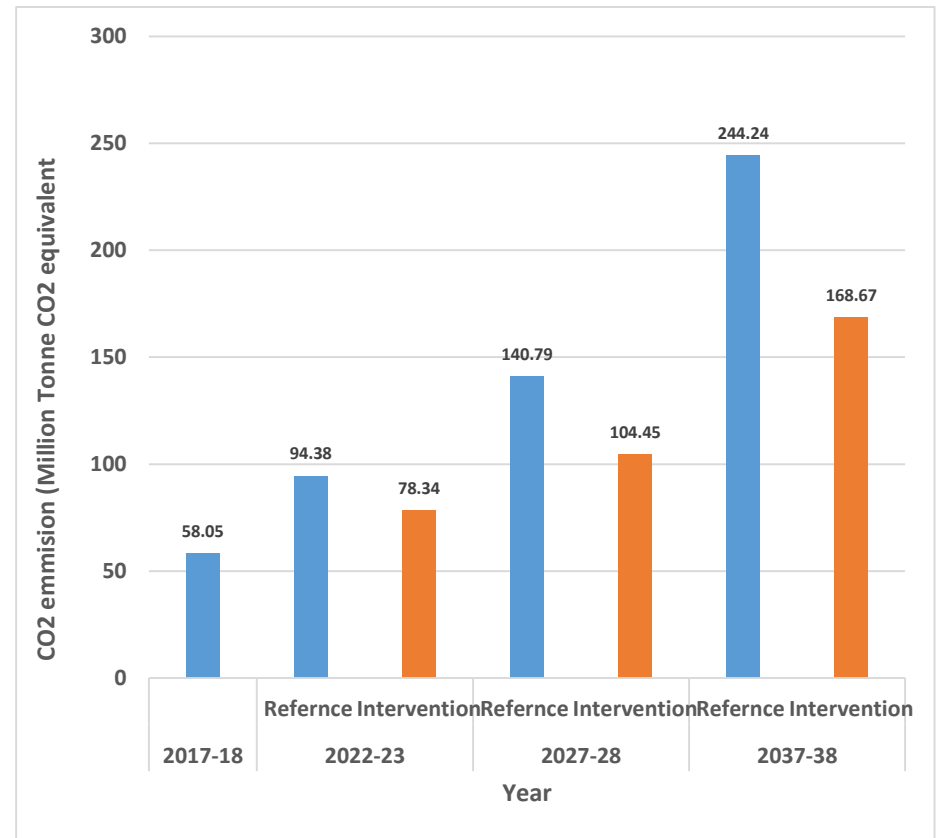
# Annual Energy Consumption and CO2 Emissions Reduction (Cold Chain and Refrigeration)



## Cold Chain and Refrigeration-Energy Consumption



## Cold Chain and Refrigeration-CO<sub>2</sub> Emissions-Million Tonne Equivalent



# Thematic Areas – Progress on Implementation



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Thematic Area	Status	Actions	Action initiated	Remarks
Refrigeration and Air Conditioning servicing sector	Finalized and Published Action Plan on 16 September 2023	<ul style="list-style-type: none"> <li>Assessment of demand and availability of trained RAC service technicians across the country, as well as the availability and quality of training institutions</li> <li>Integration with vocational training centre platform of National Council for Vocational Education and Training (NCVT) to have real-time information on trained service technicians</li> <li>Development of standardized curricula and training processes for both technicians and master trainers including training duration, trainers qualification and training infrastructure across multiple agencies</li> <li>Operationalization of unified certification scheme through a single government entity under a single framework</li> <li>Promotion of online refresher training courses on new and upcoming technologies as skill enhancement support for technicians</li> </ul>	<ul style="list-style-type: none"> <li>Under MoU signed between MoEFCC and MSDE, ESSCI was allocated with a target of 60,000 candidates under RPL project of PMKVY. Out of allocated target, 55,916 and 42,603 candidates were oriented and certified, respectively.</li> <li>The data of skill training provided by ESSCI to RAC technicians is captured through the Skill India Digital (SID).</li> <li>For RAC related courses in long-term training, a committee has been constituted under the chairpersonship of Economic Advisor, MoEFCC.</li> <li>A committee for standardization of short term training curriculum for RAC service technician is to be notified with the representatives from ESSCI, NCVET and Industry Associations working with MoEFCC.</li> <li>Guidelines for 'Blended Learning for Vocational Education, Training &amp; Skilling' have been notified by NCVET on 13.07.2022.</li> <li>Development of informative Videos on 6 various themes of servicing of Air conditioners.</li> <li>Booklet on Good Servicing Practices published</li> <li>Survey of service sector Enterprises /Technicians.</li> <li>Development of Knowledge products</li> <li>Quarterly News letter for technicians</li> </ul>	<ul style="list-style-type: none"> <li>A RPL project has been approved under PMKVY 4.0 for training of balance RAC technicians and will be implemented by ESSCI in coordination with Ozone Cell.</li> <li>28000 technicians trained under HCFC phase out Management Plan (HPMP) Stage-I and Stage-II</li> <li>GeM has included trained RAC service technicians under public procurement</li> <li>All schemes of MSDE are on SID. Also, various skilling schemes of other Ministries/Departments are on-boarded on Skill India Digital (SID).</li> <li>The courses under ICAP will be developed by ESSCI, based on the recommendations of the proposed Committee for standardization of training curriculum for RAC service technician, will be in line with the extant guidelines.</li> <li>Accidental Insurance with one year of coverage with Sum assured of Rs. 1 Lakh is provided to all candidates being skilled under PMKVY 4.0.</li> </ul>

# Thematic Areas – Progress on Implementation



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Thematic Area	Status	Actions	Action initiated	Remarks
Refrigerant Demand & Indigenous Production	Finalized and Published Action Plan on 16 September 2023	<ul style="list-style-type: none"> <li>Standardization of testing and calibration of equipment for checking purity of refrigerant gases</li> <li>Development and production of low-GWP alternative refrigerants to the widely used high-GWP HFCs like R-404A and R-407C</li> <li>Indigenous development and initiation of production of HFOs and low-GWP blends of HFO and HFCs</li> <li>Commercial Scale production of HFOs</li> <li>Recognise cooling as a National Thrust Area and Promote R&amp;D for cooling including areas related to building design and materials, new molecule development, equipment servicing, refrigerant management, etc.</li> </ul>	<ul style="list-style-type: none"> <li>BIS updated Standards for flammable refrigerants.</li> <li>DST, based on recommendations of Ozone Cell, has sponsored a project on development of Low GWP alternative technologies to HFCs, to CSIR- Indian Institute of Chemical Technology (IICT).</li> <li>Ozone Cell, MoEFCC has collaborated with 8 IITs for carrying out R&amp;D on low GWP refrigerants including blends.</li> <li>2 Refrigerant producers have facilities to manufacture low GWP refrigerants.</li> <li>CSIR-IICT has developed a laboratory scale process for HFO-1234yf, a low-GWP alternative technologies to HFCs, with the financial support of DST. Proof of concept is done and scale up is required.</li> <li>DST will establish Clean Energy Incubators, CoE on sustainable cooling, supporting Start-ups.</li> </ul>	<ul style="list-style-type: none"> <li>Both thematic areas have been merged considering interrelationship among them. However, all recommendations for both thematic areas will be addressed</li> <li>Further work required for the development of economically viable and scalable process technology for HFO-1234yf.</li> <li>Funding support will be extended by DST to the selected projects for the upscaling and deployment of R&amp;D outcomes. Industry will be engaged in the process.</li> <li>Monitoring mechanism for disposable refrigerant cylinders may not be necessary as the Gas Cylinder Rules 2016 has provisions for disposal of such cylinders.</li> </ul>
Research and Development				

