International Copper Association India
Copper Alliance

COOLING THE HEAT STRESSED INDIA

Mainstreaming innovative solutions for sustainable and smart space cooling

19 May, 2022

Hotel Royal Plaza, New Delhi, India

About India Cooling Coalition

India Cooling Coalition is a multi-stakeholder group organization led by representation from non-profits, academic and research institutions, and industry associations engaged extensively in sustainable cooling research and application. It provides a national non-governmental platform for dialogue with various national and international stakeholders and jointly recommends policy initiatives to ensure the success of government programs on smart cities, smart grid, housing, buildings, universal access to power, cold-chain, transport sector, refrigeration servicing sector while ensuring affordable and sustainable cooling for all.

About the Event

While heat waves are a fairly common phenomena in India, typically in May and June, the country has experienced early onset of heatwaves this year from March itself - average maximum temperatures in the month were the highest in 122 years. Rising temperatures are driving increased demand for cooling as people look towards air conditioners, air coolers, and fans with the need to achieve thermal comfort for a billion lives. The cooling demand in India is expected to grow by a factor of 9 by 2038 and cooling is projected to contribute towards half of the peak electricity demand by 2050. Sustainable and smart space cooling solutions are the need of the hour and can help optimize the space cooling demand in India. **This workshop intends to discuss the pathways for enhancing energy efficiency of Room Air Conditioners (RACs), the highest energy intensive cooling technology.**

One potential pathway is by enabling component level efficiency gains and making them compatible with the new class of high-pressure, low-GWP refrigerants that are environmentally friendly and sustainable. AEEE with support from ICA thus conceptualized a study titled ***"5mm Copper Tubing: Enabling Just Transition in the RAC industry"*** to establish technical, environmental and value chain benefits of accelerating the adoption of small diameter 5 millimeter (mm) inner grooved copper tubes in RAC heat exchangers. The report further outlines the challenges as well as opportunities to promote the domestic manufacturing of these tubes to achieve enhanced income & employment outcomes and achieve a Just Transition scenario for the Indian RAC industry. As a way forward, the role of the decision-making entities in the country is envisaged to establish complementarities between climate and economic policies and create enabling mechanisms for the downstream sub segments within industries such as tube manufacturing.

Agenda

Time	Description
11:00 – 11:10	Welcome by ICC Secretariat
11:10 – 12:30	**Opportunities for Efficient Space Cooling Technologies in Emerging India** ➢ Mr. Mayuresh Karmakar, Managing Director, International Copper Association India ➢ Prof. Radhey S. Agarwal, Technical Advisor, Ozone Cell ➢ Dr. Satish Kumar, President and Executive Director, AEEE **Report Launch and Presentation by AEEE – on '5mm Copper Tubing: Enabling Just Transition in the RAC Industry'**
12:30 – 13:30	Lunch
13:30 – 14:30 (20 mins on each theme)	**World Café forum: Enhancing energy efficiency of Room Air Conditioners (RACs)** ***Themes:*** ➢ Strengthening S&L Programme for RAC and Enhancing Check Testing ➢ Advocating for RAC Life Cycle Assessment and Promoting Retrofitting ➢ Achieving Component Level Efficiency Gains ***Moderators:*** 1. Mr. Tarun Garg, Team Lead, Alliance for an Energy Efficient Economy (AEEE) 2. Ms. Shweta Kulkarni, Senior Research Associate, Prayas Energy Group 3. Mr. Avinash Khemka, Chief Manager, International Copper Association India ***World Café Forum Format:*** Breakout Groups of 5-6 ICC members would be created to provide inputs on each theme mentioned above
14:30 – 16:00	**Roundtable Discussion: Priorities for the next year** **1. Moderators' Presentation:** Way forward from World Café Forum **2. ICC Highlights and potential new members** **3. Streamlining the Working of the India Cooling Coalition** • Strengthening information and communication framework • Developing an active community of knowledge exchange, policy support, and joint actions **Closing Remarks**
16:00 Onward	High Tea

Event Proceedings

Panelists

S.No.	Name	Designation & Role	Organization
1	Prof. Radhey S. Agarwal	Technical Advisor	Ozone Cell
2	Mr. Mayuresh Karmakar	Managing Director	International Copper Association India
3	Dr. Satish Kumar	President and Executive Director	Alliance for an Energy Efficient Economy (AEEE)
4	Mr Jayanta Chaudhuri	Director-Marketing, Alliances and Partnerships	AEEE

Moderators

S.No.	Name	Designation & Role	Organization
1	Mr. Tarun Garg	Team Lead	AEEE
2	Ms. Shweta Kulkarni	SeniorResearchAssociate	Prayas Energy Group
3	Mr. Avinash Khemka	Chief Manager	International Copper Association India

Key Highlights

Session Title	Opportunities for Efficient Space Cooling Technologies in Emerging India
Session Timing	11:10 to 12:30 pm
Session Moderator & Speaker(s)	**Moderator** ➢ Mr. Avinash Khemka, Chief Manager, International Copper Association India **Speaker** ➢ Mr. Mayuresh Karmakar, Managing Director, International Copper Association India ➢ Prof. Radhey S. Agarwal, Technical Advisor, Ozone Cell ➢ Dr. Satish Kumar, President and Executive Director, AEEE

Panel Discussion-Key Highlights

Dr. Satish Kumar

- Four key governmental initiatives that have been game changer for the entire cooling industry:
  - The launch of the Standards & Labelling (S&L) Programme that mandated the Minimum Energy performance standards for equipment where Bureau of Indian Standards (BIS) and Bureau of Energy Efficiency (BEE) have done wonderful work and achieved much in a short time frame.
  - The strategic policy interventions through India Cooling Action Plan (ICAP), that made cooling a national priority by highlighting the need for cooling and forecasting the future scenario for 2038. ICAP projects that cooling demand from buildings will be 11 times more than the current cooling demand and will account for 585 TWh of electricity consumption of which 52% would be consumed by Room Air Conditioners (RACs).
  - The Production Linked Incentive Scheme (PLI) Scheme launched by Department for Promotion of Industry and Internal Trade (DPIIT) that renews the focus on domestic manufacturing. The scheme has also been wholeheartedly supported by Refrigeration and Air-conditioning Manufacturers Association (RAMA) and RAC manufacturers as this creates a level playing field for the domestic manufacturers to compete with the international brands.
  - The Global Cooling Prize (GCP) launched by the Department Of Science & Technology (DST) brings a renewed focus on Research & Development (R&D) and showcases that RAC solutions with 5X lower climate impact can be achieved.
- These initiatives would not have been possible without the triple sector leadership shown by the ministries, industry stakeholders, and the civil society organizations.
- Prioritizing climate action can reduce the consequential effects and reduce vulnerabilities of Climate Change and more so now in India address the challenge of Heat Waves.

Mr. Mayuresh Karmarkar

- International Copper Association (ICA) India is a global association formed more than 100 years ago that supports the development of new and advanced technologies in the copper and copper alloy sector.
- The Indian copper industry is more than 14 billion dollars; copper represents 17 to 18% of the overall cost of a RAC; therefore, the value investment of the copper industry is much higher.
- ICA has taken up research that has been done under the domain of cooling; 5mm Inner Grooved Tubes (IGTs) were part of this research work and came out as a viable option to improve the efficiency of the RACs.
- ICA invests a lot in 3 themes of sustainability, i.e. 1) environment, 2) social, and 3) economics.
- India's dependence on China for the compressor imports became a major issue when China stopped the imports to India due to a rise in demand in their domestic market, creating a shortage of compressors in the Indian market; therefore, boosting the domestic manufacturing is the need of the hour.
- India doesn't design heat exchangers; India typically copies the design. While other countries, including China, are doing some groundbreaking work in heat exchanger technology with support from their academia.
- ICA is looking into how copper IGTs (Inner Groove Tubes) can be adopted within the Indian aircon industry. Thereby enabling the aircon industry's transition toward more efficient cooling solutions. The most considerable success of this adoption was seen in the Chinese market.
- The S&L programme has been running since 2006 and has improved appliance efficiency on a 3% annual basis, while other countries' appliance efficiency has been increasing by double digits. The need is to accelerate the S&L programme.
- The Chinese industry has created industry associations that closely work with academia to undertake R&D of super-efficient appliances and make adopting these appliances easier.
- The Chinese government also supports these industrial associations, and there is significant support for the industry dialogue.
- The focus should be on the circular economy and how Covid can become an opportunity instead of a blockade.
- Post Covid, there has been a trend to focus on sustainable investment, which has been highest in the past few years. The need is to work on material and resource efficiency and integrate it with energy efficiency.

- The need is to be self-sufficient and reduce the import of smaller RAC components; the PLI scheme should be utilized to improve domestic component manufacturing.
- The trust in Indian products is absent even at the component level in the international market.
- The Indian testing accredited lab network needs to be upgraded to match the world standards; this will help induce the acceptability of Indian products in the international market.
- Changing Free Trade Agreements (FTAs) overnight is difficult. The focus should be on competitiveness and improving the exports of the component.
- The overall trust at the component level of Indian products can be improved by improving the quality of the RACs, and exports are the only way to improve the quality from the present levels.
- The Indian copper industry has not been developed in the past, but it is now developing at a slow pace.
- The Indian associations should work on the tariff part to boost domestic manufacturing while the government needs to think about what they can do from the industry perspective to boost domestic manufacturing.

Prof. Radhey S. Agarwal:

- In the mid-70s, a cause was identified that is ozone layer depletion. In 1985 Vienna convention was signed, and in 1987 Montreal protocol was set up to phase out the ozone-depleting substances.
- Under the present scenario, the ozone layer has been repaired to its pre-industrialization levels.
- The high Ozone Depletion Potential (ODP) substance also has higher Global Warming Potential (GWP), e.g. Chlorofluorocarbon-11 (CFC-11) & CFC 12, which are one of the ODP substances that have been identified and eliminated, have a GWP of 4700 and 10000, respectively.
- Implementation is not affecting the consumer, but it affects the industry; thereby, the protocol has helped accelerate the phase-out of HFCs (Hydrofluorocarbons).

- At the 19th meeting in 2007-September, the decision was taken to accelerate the phase-out of HFCs, which India is implementing successfully.
- India has completed HPMP 1st phase in 2016 and is presently working on its 2nd phase of HCFC Phase-Out Management Plan (HPMP).
- Ozone cell has taken up a study with The Energy and Resources Institute (TERI) to assess the impact of HPMP, and it has revealed that India has saved close to 770 to 1100 million tons of Carbon dioxide (CO2) emissions since the implementation of HPMP.
- The production of HFCs is growing globally exponentially due to the rise in cooling demand. India has decided to phase down HFCs by 15% to 20% by 2047.
- The need is to map technologies that can cater for the cooling demands: passive cooling interventions, desert cooler, district cooling, and trigeneration are some of the technologies that need to look forward.
- Suggestions are required to facilitate intervention in each of these cooling technologies and help in achieving thermal comfort for all.
- India needs to develop an R&D ecosystem for manufacturing indigenous refrigerants meanwhile work on reducing the cooling requirements and producing more energy-efficient products.
- ICAP states that cooling is a necessity; there are 2 ways of cooling requirements a) at the envelope level, b) responsive use of cooling.
- One of the ICAP goals is to reduce refrigerant and cooling demand; 5mm IGTs can help in increasing the heat transfer with a 15-20% reduction potential in the refrigerant recharge.
- Responsible use of cooling can save up to 25 to 30% on refrigerant demand.
- Six enterprises have converted from R22 to R32 refrigerants, and most of them have moved to 5mm copper tubing, utilizing the advantage these smaller diameter copper tubes own.

Report Launch Presentation

Report Presentation by Mr. Akhil Singhal and Ms. Ishita:

Name of the report: 5mm Copper Tubing: Enabling Just Transition in the CAR Industry Report presentation

The presentation highlighted that:

- The goal of the assessment was:
  - To promote and accelerate the transition to 5mm copper tubes in the Indian RAC Sector.
  - To create enabling mechanisms for mainstreaming domestic production of copper tubes.
- Most of the components are imported; specifically, the copper tube, more specifically the 5mm(millimeter) inner grooved copper tubes, are 100% imported and are not manufactured in India.
- Need to mainstream the usage of 5mm inner grooved copper tube in India as it provides reduced refrigerant recharge as well as reduced energy consumption and various socio-economic benefits across the value chain.
- The transition to 5mm IGTs has begun at a decent pace on the condenser side, while on the evaporator side, it is still in the experimental stages.
- The tubes are majorly imported from the **Association of Southeast Asian Nations (ASEAN)** region under India's FTA.
- The research findings further elaborated on the challenges of limited transition and the absence of domestic manufacturing of 5mm IGTs from the perspective of supply (copper tube manufacturing) and demand-side (heat exchanger or RAC manufacturing) stakeholders.
- The finding then delved into crafting recommendations such as establishing value-added copper clusters and bringing in R&D investments as well as finances through national and international collaborations.
- The authors stress upon the rationalization of import duties on copper tubes, making exclusive incentives under the PLI scheme supported by the skill development ecosystem in the country.

Session Title	World Café forum: Theme #1 Strengthening S&L programme for RAC and enhancing the check testing
Session Timing	13:30 to 14:30 pm
Session Moderator	Ms. Shweta Kulkarni, Senior Research Associate, Prayas

Key Highlights

Key Issues with S&L programme for RACs and Check Testing

- There are only around 4 independent labs in the country for check testing, and it costs around Rs 1-2 crore to set up a new lab. In addition, the cost of testing the air-conditioner is also very high, at approximately Rs 1-1.5 lakh per appliance
- There is limited information about check testing in the public domain - on how many equipments have been rejected in the past or if any manufacturer has been penalized or banned
- It is difficult to determine if BIS and BEE norms are being followed for check testing; currently, it is a manufacturer-driven independent testing process
- Star labeling of appliances does not consider life cycle assessment – performance testing should be done after 6 months

Potential Solutions

- Test labs of Indian railways can be utilized to reduce the shortage of test labs in the country; we can tie up with research universities to build test labs; organizations such as Federation of Indian Chambers of Commerce & Industry (FICCI), Confederation of Indian Industry (CII), and Chamber of Commerce can also take this up
- A favorable business model is needed for check testing labs; also, there should be a mechanism to ensure that every model is tested at least once in its lifecycle
- Star labels can be updated to include more information to attract consumers, including QR codes and IoT for an end to end monitoring

Session Title	World Café forum: Themes #2 Advocating for RAC Life Cycle Assessment an promoting Retrofitting
Session Timing	13:30 to 14:30 pm
Session Moderator	Mr. Tarun Garg, Program Lead, AEEE

Key Highlights

Opportunities

- Lack of information about servicing of a RAC.
- Lack of skilling among technicians.
- Mishandling of old ACs by informal sectors.
- Lack of smart technologies which indicated the condition of a RAC.

Pathways

- Regularization or formalization of the servicing sector.
- partnership with the service providers by key manufacturers.
- Increase in advertisement on the role of components and the need for their servicing.
- Mechanisms to track old RACs and their disposal policy.
- Availability of incentives for opting for higher efficient ACs and availability of green loans.

Outcomes/Solutions

- Refrigeration standardization and disposal policy.
- Visualization devices/dashboards for tracking building and appliance performance.
- Mandate the life of a RAC lifecycle cap like vehicles.
- Implementation of business models such as 1) servitization, 2) cooling as a service, 3) buy-back models with product disposal policy between Discoms, manufacturers and end-users.

Session Title	World Café forum: Theme 3 Achieving component level efficiency gain
Session Timing	13:30 to 14:30 pm
Session Moderator	Mr. Avinash Khemka, Chief Manager, International Copper Association India

Key Highlights

Key Issues in "Achieving component level efficiency gain"

- According to ICAP, there will be 8 times more refrigerant demand and 6 times more energy demand in the coming years for cooling.
- The role of Original Equipment Manufacturer (OEM) is to look into production cost, refrigeration & efficiency norms and produce an economical and affordable product.
- The Indian market is price-sensitive, and RAC is still considered a luxury even though it is a necessity.
- The need is to build a strong business case for the component manufacturing in the country.
- The aircon industry is not glamourized enough, and there is a lack of communication between smaller players and larger players.
- PLI scheme has negligible reach to the Small and Medium-Sized Enterprises (SMEs) ; the players. registered under PLI are larger OEMs (somewhere in the range of 4600 crores) and not the component manufacturers.
- The skill to develop the aircon industry, especially in R&D, is not adequate.
- The govt. do have the intent, but the on-ground implementation is not happening.
- Faster adoption of technologies that are energy-efficient and provide adoption of green refrigerants.

Potential Solutions

- There are various ways to reduce the cost and improve the efficiency for OEMs; One such way is the application of the small diameter copper tube in the heat exchanger of both the Indoor Unit (IDU) and Outdoor Unit (ODU) of a RAC.
- The association, e.g. Refrigeration & Air-Conditioning Trades Association Ltd. (RATA), RAMA and Indian Cooling Coalition (ICC), actually brings all the stakeholders together to develop a roadmap to understand where the industry wants to go and present the joint case with the government to tell them what support they require from govt. to build an ecosystem in the country, making India self-dependent and promoting the idea of make in India.
- To build the business case a collaborative effort is required among the industry players where bigger players can come together and help in technology sharing and providing orders to the component manufacturers to compete with international players.
- PLI-2 can be developed to provide benefits to the smaller component manufacturers.
- Develop a center of excellence and institute to design modern heat exchangers and carry out a skill enhancement programme.
- The govt. policies need modification to improve the on-ground implementation and provide the benefit of creating the conducive environment.

Session Title	Priorities for the next year & Closing Remarks
Session Timing	14:30 to 16:00 pm
Session Speaker	Mr Jayanta Chaudhuri, Director- Marketing, Alliances and Partnerships, AEEE

Key Highlights

- Highlighted the work done under India Cooling Coalition in the last year, shared vision and provided the outlook for next years:
  - 2016-17: AEEE with Shakti foundation organized ICC and received representation from non-profits, academics, research institutions and industry associations.
  - ICC organized various events in the past related to cooling, including the recently closed group roundtable discussion conducted during Forum for Energy Efficiency and Decarbonisation (FEED), regional National Cooling Action Plan (NCAP) capacity building workshop, webinars and other collaborative discussions.
- The shared vision is to provide access to affordable and sustainable cooling in India.
- Three major things to be addressed under ICC are:
  1) ENDORSE: Advocate cooling as a critical area of focus and lend support to the prioritization of the cooling agenda in the Indian policy framework.
  2) ACT: Build synergies between government, industries, think tanks, research, and academia to design and implement necessary interventions.
  3) KNOWLEDGE SHARING: Provide market data, information, and technical expertise for white papers and publications.
- The idea is to move from incremental to transformational change through partnerships to bring environmental sustainability.
- Need a world that targets progress towards more resilient supply chains, greener investments, smart cities, smart grids, and the refrigeration servicing sector while ensuring affordable and sustainable cooling for all.
- Also mentioned that next year's outreach and information dissemination plan will be shared with the ICC teams and other non-members in a couple of months.
- Request both members and non-members to support making ICC a go-to place for awareness and knowledge sharing.


INDIA COOLING COALITION