

that, in a warming world, access to sustainable cooling is a necessity.

Global Warming is Creating Increased Demand for Cooling

Global energy demand for air conditioning in buildings more than tripled between 1990 and 2016, from about 600 to 2000 TWh (terawatt hours). As per International Energy Agency (IEA), the projected growth in residential and commercial space cooling capacity from 11,670 GW in 2016 to over 36,500 GW in 2050 will leave substantial cooling needs unmet. Air conditioner ownership, in particular, is rising very rapidly with income in countries with hot and humid climates, where cooling is essential for people to live and work in comfort. Statistically, cooling demand globally is being met through refrigerant-based cooling across sectors, such as buildings, cold chain, refrigeration, and transport.

As far as India's air conditioning is concerned, the production of room air conditioners has been growing at 13% per year since 2010 and the demand for air conditioners is expected to grow by 11–15% per year over the 2017–27 period. Consequently, India's aggregate cooling related energy demand is expected to soar from 90 TWh in 2015 to 1350 TWh by 2050, signifying a 15-fold increase. India, along with China and Indonesia, is expected to extract a lion's share in energy for space cooling by 2050, contributing to half of global cooling energy demand growth. Also, the country's peak electricity load for space cooling is projected to jump from 10% now to 45% in 2050. This poses adverse environmental and societal impacts – significant additional power generation capacity, peak load impacts, and an enormous GHG footprint.

ICAP – An Action Plan for Reducing the Environmental Footprint of Cooling in India

The growing demand for cooling will increase global warming – from emissions of hydrofluorocarbons (HFCs) used in cooling equipment as well as CO₂ and black carbon emissions from mostly fossil fuel-based energy currently powering cooling. A transition to climate-friendly and energy-efficient cooling, however, would avoid these emissions and allow an increase in cooling access that would contribute substantially to the Sustainable Development Goals (SDGs).

Keeping this in view, the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India has developed the India Cooling Action Plan (ICAP). The ICAP presents a 20-year outlook on how the cooling demand in India will evolve across priority demand sectors and outlines strategies and actions to promote sustainable and smart cooling practices across the nation while mitigating adverse impacts.

This landmark policy document demonstrates unprecedented inter-ministerial and cross-sectoral collaboration in laying out actionable pathways and identified ambitious goals. ICAP underscores the environmental and socio-economic benefits of sustainable cooling through five ambitious goals, including recognition of 'cooling and related areas' as a thrust area of research under the National Science and Technology Programme to support the development of technological solutions and encourage innovation challenges. The action plan seeks to reduce cooling demand by 20–25% and refrigerant demand by 25–30% across sectors by 2037–38. Other goals include reduction of cooling energy requirements by 25–40% by 2037–38 and training and certification of 100,000 servicing sector





technicians in synergy with the Skill India Mission by 2022–23. As meaningful as these goals are to proactively and effectively manage India's future cooling needs, what makes the ICAP even more important are the significant co-benefits – above the energy and emissions reduction – that are inherent in the pathways recommended for the cooling sectors.

Cross-Sectoral Alignment in the Sector Necessitates Effective Communications

Cooling is essentially cross-sectoral in nature, involving residential and

commercial buildings, transport, cold storage, and industries, each with differing demands and priorities. Implementation of ICAP thus becomes a challenging task for the government as well as industry players, with the cross-sectoral nature of cooling raising key aspects that need to be addressed, including aligning priorities and regulatory and institutional contradictions.

To effectively implement SMART (specific, measurable, achievable, realistic, and time bound) levers to achieve sustainable cooling, it is imperative to understand perceptions and attitudes of key stakeholders. It is necessary to gauge priorities and challenges and identify opportunities

so that any policy decision is effectively translated into desired outcomes.

The behaviour of different stakeholder groups and their perception towards issues and challenges in the sector become very critical while designing policies and communication strategies and assessing capacity building needs. Activities can be complementary, thus reinforcing each other and achieving better results with optimal efforts. To bring about a desired change through behavioural change, some elements that are required to be kept in mind include time taken to devise action plans, seeking strategies through collaborations between various stakeholders, identifying effective previous work done in comparable

fields, involving appropriate expertise, and highlighting the importance of specific behavioural targets and time frames.

TERI's Research to Gauge Stakeholder Perceptions and Behaviour

The lack of perceptions and behaviour research in the cooling sector has till now been a key gap in the overall understanding of the sector. To better understand key issues and challenges, TERI is conducting a national level perception study with respondents across key stakeholder groups, including policymakers at the central and state levels, industry, consumers, and servicing technicians. The survey has revealed interesting insights into perceptions, behaviour, and expectations of key stakeholders.

For consumers, energy efficiency is seen to be a major factor in selecting home ACs and refrigerators. Almost 9 of 10 consumer respondents cited the star rating of an appliance as the most important aspect in choosing a cooling appliance. Energy efficiency and ozone-friendly coolants are seen by consumers to be major innovations in the sector. Consumers in urban India are also seen to be relying increasingly on information available online to make their decisions.

One of the key consumer behavioural aspects investigated was related to maintenance of ACs. Consumers have a clear preference for company trained servicing personnel – an overwhelming 75% of consumer respondents preferred company personnel. The reason is trust. About 84% of consumers surveyed said that they trust the servicing personnel to do the right thing, fill the correct coolant, and so on, with a perceived trust factor in the technical competence of company technicians or company authorized technicians.

Servicing personnel were another major focus of the survey. For a clear opportunity here is to bring more

servicing technicians into the formal workforce – almost a third of technicians surveyed did not have formal training. Any such move is also likely to be welcomed by the servicing workforce, as a majority indicated that training and refresher courses directly and positively impact competence and job prospects. With an increasing need for servicing personnel, given the massive growth projected in the sector, this provides an excellent opportunity to both skill people and provide jobs, while also improving the maintenance life cycle of cooling equipment.

Manufacturers in the cooling industry believe that transition should not leave consumers unsatisfied in terms of costs as consumers tend to be very price conscious. They are of the view that the newer environment-friendly refrigerants can be more flammable and to avoid casualties, safer installation practices must be followed. Increasing training centres for servicing personnel and ensuring job security can be beneficial for the overall sector. From a policy perspective, manufacturers have sought clarity on the roadmap for ratings, signalling that a clear expression of intent from policymakers can potentially increase appetite to invest in technology.

Policymakers engaged with this survey acknowledged the possibility of gaps between policies and levels of awareness about the policies even among manufacturers. A feedback loop was sought so that policies are not made in a vacuum but take into account ground realities. Policymakers indicated that there is a need for more platforms for consultation and collaboration, especially in research.

An initial analysis of these perceptions points to some clear pathways:

1. *Collaboration:* There should be formal and informal consultations and collaborations between industry, between industry and government, perhaps also between different ministries and departments

of the government so that there is alignment at all levels.

2. *Cost rationalization:* Cost is always likely to be an issue for both consumers and manufacturers. Collaborations, especially on R&D, may spread risk and reduce the cost of development. Innovative market models, such as demand aggregation, may also be explored to further reduce cost to consumers.
3. *Training:* There is a clear need for more training. Conventional training can perhaps be supplemented by leveraging digital and social platforms for micro-skilling and knowledge transfer.
4. *Awareness:* It is imperative to spread awareness among all stakeholder groups. Feedback loops to inform policy, awareness about policy among manufacturers, and awareness about technology and the benefits of ratings among consumers can drive a holistic intervention to achieve a faster transition to efficient cooling.
5. *Effective communication:* This underlies all the above activities. Only when stakeholders know can they participate effectively. Only then can decisions be better informed and only then will consumers also buy into this transformative process. Effective communication at all levels will be vital to the success of any initiative in the sector.

This study will effectively identify the levers to synergies in relation to policy, awareness, and capacity building to facilitate the implementation of the ICAP and to push and pull the correct levers for the targeted stakeholder groups. More importantly, the study provides a valuable baseline assessment that can be used to measure transformation and identify areas that may require more focused analysis in the future to fine-tune future policy interventions. **EF**

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