Turn down the heat – Coping with energy demand and thermal comfort

Several solutions are already within reach but focused planning by governments will ensure that housing and infrastructure schemes and efficient appliance penetration plans converge on thermal comfort considerations.

Thermal comfort is a fundamental need and should not be the privilege of the well-off. The recent string of heatwaves around the world, including in India, have unquestionably been intensified by climate change. Staying 'thermally comfortable', especially during these events, is vital for avoiding the health impacts of extreme heat.

Air-conditioning (AC) is fast becoming the mainstay for thermal comfort in India among those who can afford it, while those who cannot are simply forced to cope. However, AC usage comes with a massive climate cost – both in terms of electricity demand and the hydrofluorocarbons (HFCs) used in their refrigerants. Despite a temporary slump in AC demand due to the pandemic, in the next 30 years, India could have over a billion ACs (25% of global ACs).

How can India cope with soaring heat and stay thermally comfortable while minimising the energy and emissions impacts of AC usage?

Building design for passive cooling and thermal comfort

Eliminating the need for ACs altogether would be ideal, but is unlikely. However, reducing the use of ACs is possible if 'passive' design measures are adopted. This calls for coordinated efforts at the building design and construction stages to ensure spatial layouts and material choices that promote natural ventilation and lessen heat absorption. Further, alternative construction materials could both directly and indirectly reduce the lifetime carbon footprint of buildings, as recent research shows. Using materials with good thermal properties, such as aerated cement blocks (AAC), instead of conventional burnt clay bricks, can cut active cooling demand by over 30%. Materials such as AAC are a segment of small unorganised industries in India; their use needs to be increased significantly but they have high upfront costs. There is also growing innovation in other material alternatives that reuse waste from industries (fly ash, paper and cotton industry waste, even rice husk, for instance).

We need a strong regulatory push to scale these up enough to lower per unit construction costs and increase accessibility to all housing segments. Public procurement initiatives (as with LED procurement in the past) could help with this. Including green recovery plans under government housing schemes could further promote alternative materials. They may also help drive down costs by ensuring demand certainty for suppliers. Although thermal comfort

features in the 2018 Energy Conservation Building Code for Residential Buildings and the 2019 India Cooling Action Plan (which emphasises thermal comfort considerations in affordable housing projects), it must be made mandatory for all public and private infrastructure projects. Passive design of affordable housing is especially important, to ensure that already vulnerable, economically disadvantaged households are protected from additional heat stress.

Appliance efficiency and consumer behaviour

To reduce energy demand from 'active' cooling, we need to target appliance efficiency (how much energy does the appliance use to function?) and usage efficiency (how optimally are we using the appliance?). Appliance efficiency measures require both AC performance improvements (which the Bureau of Energy Efficiency, under the Ministry of Power, ensures by setting annual minimum AC performance standards) and incentives to increase the penetration of efficient ACs. The latter is largely guided by cost, even among environmentally conscious individuals. Five-star ACs use a quarter less energy but cost a fifth more than three-star ACs.

Only 8% of Indian households own ACs now; most of India's ACs are going to be purchased sometime within the next few years. Most consumers appear to look at upfront costs rather than long-term returns on investment. But consumer behaviour in this growing market is not yet fully understood. Making a handy long-term cost-benefit analysis easily available could be one way to help consumers better understand the benefits of efficient ACs. Rebates on upfront purchases or zero-interest EMIs for 5-star rated appliances could also act as incentives.

Targeting consumer behaviour to influence cooling needs and usage patterns is an important aspect of usage efficiency. Improving awareness on the link between thermostat temperature and utility bills (there is a 6% lower energy consumption for every degree increase in AC temperature) and introducing time-of-day pricing could ensure further monetary incentives for efficiency considerations.

In summary, a majority of the buildings that will exist in India by 2050 are yet to be designed and constructed, and the majority of India's ACs in 2050 are yet to be purchased. Herein lies an opportunity to consciously improve thermal comfort for all. Thermal comfort is as much a justice and equity issue as it is a climate issue. As is often the case, those hardest hit by extreme heat events and the most vulnerable to climate change are also those facing economic and energy poverty. Several solutions are already within reach, as discussed here, but focussed planning by governments will ensure that housing and infrastructure schemes and efficient appliance penetration plans converge on thermal comfort

considerations.

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