ISHRAE Position Document

on

Managing Heat Stress & Enhancing Thermal Comfort

(2026-TG_C001)

May 2026

ISHRAE

Indian Society of Heating, Refrigerating and Air Conditioning Engineers

COVER 2

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Disclaimer: This book is a compilation of data from various open sources.

First Edition – May 2026

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Published by:
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Design, layout and artwork by:
Fezisons Quality Printers
Rahimtoola House, 7 Homji Street,
Fort, Mumbai - 400 001, India.

Foreword

India's battle against escalating heat stress is no longer a distant concern — it is an urgent, present-day challenge that demands informed action from every stakeholder in the built environment. As temperatures rise and extreme heat events grow more frequent, ISHRAE reaffirms its commitment to placing science-backed knowledge at the service of society.

This Positiion Document on Managing Heat Stress and Enhancing Thermal Comfort represents the collective expertise of ISHRAE's Technical Group on Thermal Comfort and Passive Cooling, and reflects our responsibility as a professional body to guide individuals, building owners, and policymakers with actionable, evidence-based recommendations. From personal behaviour and building design to indoor environment management, the paper addresses heat stress across all scales of intervention relevant to Indian conditions and climate zones.

I commend the dedicated work of Dr. Jyotirmay Mathur, Ar. Gaurav Shorey, and the entire ISHRAE Technical Group for producing this timely and comprehensive guidance document.

I urge all stakeholders — professionals, administrators, and citizens alike — to study, adopt, and share these recommendations widely, for the health, comfort, and resilience of our communities depend on it.

Prof R Saravanan
Society President ISHRAE (2026-27)

Preamble

India's built environment confronts an intensifying heat stress challenge. Rising temperatures, urban heat island effects, and the increasing frequency of extreme heat events place lives, livelihoods, and public health at risk. ISHRAE — the Indian Society of Heating, Refrigerating and Air Conditioning Engineers — convened a Technical Group on Combating Heat Stress in the Built Environment to develop science-backed, practical guidance for individuals, building owners and managers, and policymakers.

This Positiion Document synthesises evidence-based measures across three scales of intervention: individual behaviour, building design and management, and indoor environment control. Each recommendation is grounded in peer-reviewed research and authoritative national advisories.

Document Type	Positiion Document
Subject	Managing Heat Stress and Enhancing Thermal Comfort During Extreme Hot Season
Prepared by	ISHRAE Technical Groups on Healthcare, Thermal Comfort, Passive Cooling, Evaporative Cooling and Safety.
Date	May 2026
Applicability	India — all climate zones; broadly relevant to other heatwave-affected regions with local adaptation.

Please note:
Numerical ranges provided in this document are indicative and may vary depending on climate zone, humidity, building type, exposure, ventilation, occupancy and operating conditions.

ISHRAE Position Document on Managing Heat Stress & Enhancing Thermal Comfort

1. Measures to be taken by Individuals

Personal behaviour is the first and most immediate line of defence against heat stress. The measures below are drawn from NDMA and NCDC heat-wave advisories and supported by thermal physiology research.

1.1 Avoid Walking in Unshaded Places

Direct sun exposure significantly intensifies heat stress because the body absorbs both hot air and solar radiation simultaneously. Government heat-wave advisories recommend avoiding direct sun exposure during peak heat hours, especially 12 noon to 3 p.m. Shade from trees, arcades, umbrellas, or temporary canopies substantially reduces radiant heat exposure.

WHY IT MATTERS

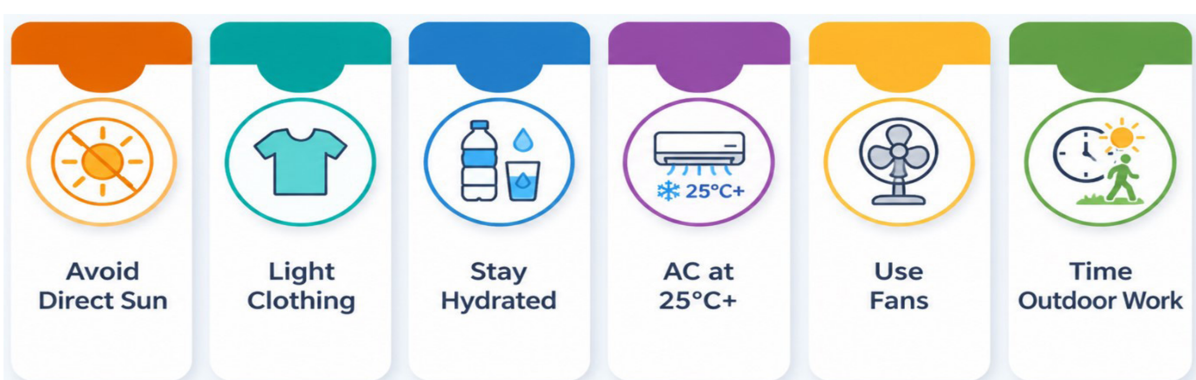
Direct solar radiation can increase the body's heat gain by more than 150–250 W/m^2 and raise the perceived temperature by 8–15°C compared to shaded areas.

1.2 Cover the Body with Loose, Light-Coloured Clothing

Loose, thin, light-coloured cotton clothing promotes air circulation, facilitates sweat evaporation, and reduces solar heat absorption.

WHY IT MATTERS

Light-coloured fabrics can reduce direct solar heat absorption by 20–40% compared to dark, tight-fitting synthetic clothing, while also lowering dehydration and sunburn risk.



Priority Individual Measures During Extreme Heat

1.3 Use a Wet Towel for Evaporative Cooling

Wet cloth cooling works through the principle of evaporation. In dry and composite climates, wiping exposed skin with a wet towel can provide immediate local cooling — particularly useful for outdoor workers, drivers, street vendors, and security staff in unshaded public areas.

WHY IT MATTERS

Evaporative cooling from wet cloth can reduce skin temperature by 2–5°C, especially in dry climates.

1.4 Drink Water Regularly — Before Feeling Thirsty

Thirst is not always a reliable early indicator of dehydration. Advisories recommend drinking water frequently, carrying water when travelling, and consuming ORS, lemon water, or buttermilk when sweating heavily

WHY IT MATTERS

During peak summer, adults may lose 0.5–1.5 litres of sweat per hour outdoors. Even 1–2% dehydration can reduce physical and cognitive performance and increase heat stress risk.

1.5 Prefer Local, Seasonal Foods and Traditional Cooling Drinks

India's culinary traditions offer time-tested climate-responsive food practices. Seasonal fruits, watery vegetables, chaas/buttermilk, lassi, kanji, lemon water, coconut water, aam-panna, and similar regional drinks support hydration and comfort during hot weather. ICMR-NIN dietary guidance recommends these in hot weather. Alcohol, carbonated soft drinks, and very sugary drinks should be avoided during heat waves as they can worsen dehydration.

WHY IT MATTERS

Traditional summer foods and drinks often combine water, electrolytes, light calories and digestibility. Buttermilk, lemon water, coconut water, kanji, aam-panna and seasonal fruits support hydration better than alcohol, carbonated drinks or very sugary beverages, which can worsen dehydration during heat waves.

1.6 Operate Air Conditioners at 25°C or Higher

Research and policy guidance for Indian conditions recommends AC setpoints in the 24–26°C range depending on climate, clothing, air movement, and occupant adaptation. Raising the setpoint by even 1°C reduces outdoor heat rejection and electricity use meaningfully.

WHY IT MATTERS

Every 1°C increase in AC setpoint can reduce cooling electricity consumption by approximately 6–10%.

1.7 Use Ceiling Fans Together with ACs

Air movement improves comfort by increasing convective and evaporative heat loss from the body. ISO 7730, ASHRAE Standard 55, the National Building Code and the ISHRAE IEQ Standard all recognise elevated air speed as a valid comfort strategy.

WHY IT MATTERS

Air speeds around 0.8–1.2 m/s can make occupants comfortable at temperatures 2–3°C warmer than still-air conditions, allowing AC setpoints to be raised without loss of comfort.

1.8 Schedule Outdoor Work Before Noon or in the Evening

Peak heat stress occurs during the afternoon. NDMA and NCDC advisories recommend avoiding strenuous outdoor activity from 12 noon to 3 p.m. — many extend this caution to 4 p.m. on severe heat days.

> **WHY IT MATTERS**
>
> *Outdoor surface temperatures in Indian cities can exceed ambient air temperatures by 15–25°C between 12 PM and 4 PM. Heat stroke risk rises sharply during this period.*

2. Measures to be taken by Building Owners, Managers & Institutions

Building design and management decisions have lasting impacts on the thermal environment experienced by occupants and the wider community. The recommendations below address both passive design strategies and active management during heat events.

2.1 Plant Trees Around Buildings

Trees reduce heat through shade and evapotranspiration. Priority planting locations include the west and south-west sides of buildings, parking areas, pedestrian paths, guard posts, waiting areas, school yards, and factory entry points.

> **WHY IT MATTERS**
>
> *Air temperatures in tree-shaded areas can be 2–8°C lower than ambient, and shaded surfaces can remain 10–25°C cooler than sun-exposed surfaces.*

2.2 Install Creepers and Shaded Green Walls

Vegetation on or near walls reduces direct solar exposure and can lower wall surface temperature by 5–15°C, reducing indoor heat gain correspondingly. Green walls should be designed using local species with appropriate structural support, drainage, and maintenance access. Low-cost creepers or green screens offer similar benefits where formal vertical gardens are not feasible.

> **WHY IT MATTERS**
>
> *Vegetated façades reduce heat through two linked mechanisms: shading and evapotranspiration. Shading reduces direct solar gain on the wall, while evapotranspiration uses absorbed heat to evaporate water from plant surfaces and soil. Together, these effects can reduce external wall surface temperatures by approximately 5–15°C, lowering indoor heat gain and improving the outdoor microclimate.*

2.3 Apply Reflective Paint or Cool-Roof Coating on Terraces

Cool roofs reflect more sunlight and absorb less heat than conventional roofs. Indian cool-roof studies report indoor temperature reductions of approximately 2–5°C depending on roof construction, ventilation, and climate. This measure is especially impactful for

- Plant trees on west & SW sides
- Install green walls / creepers
- Apply cool-roof / reflective coating
- Provide shaded outdoor waiting zones
- Use light-coloured exterior surfaces
- Ensure wind paths are unobstructed
- Reduce glass on east & west facades
- Use evaporative coolers (hot-dry climate)
- Provide external shading (fins, jaalis)
- Avoid highly reflective glass on streets

Priority Building Measures Against Heat Stress top-floor rooms, informal settlements, schools, guard rooms, and low-rise buildings.

WHY IT MATTERS

Cool roofs can reduce roof surface temperatures by 6–15°C and indoor temperatures by 2–5°C depending on construction type and insulation levels.

2.4 Avoid Highly Reflective Glass Where It Creates Glare for Others

Reflective glass can redirect glare and solar radiation toward pedestrians, outdoor workers, neighbouring buildings, and streets — worsening outdoor discomfort during heat waves. External shading is generally a more effective and neighbourly first response than increasing glass reflectance.

WHY IT MATTERS

Highly reflective façades can redirect intense solar radiation toward streets, neighbouring buildings and pedestrian zones. International examples such as London's "Walkie Talkie" building show that reflected solar concentration can create severe glare and localised heat discomfort. The issue is not only the building's own cooling load, but the thermal burden shifted to others.

2.5 Provide External Shading on Existing Glass

External shading blocks solar radiation before it reaches the glass. Overhangs, fins, bamboo screens, fabric shades, pergolas, jaalis, temporary curtains, or vegetation can reduce window solar gains substantially. Internal curtains are far less effective because much of the solar radiation has already entered the room.

WHY IT MATTERS

External shading can block 50–90% of solar heat gain before it enters the building. Internal curtains are significantly less effective.

2.6 Prefer Light-Coloured Exterior Surfaces and Reduce East/West Glass

Light-coloured walls and roofs absorb less solar radiation, reducing surface temperature, heat conducted indoors, and heat re-radiated to surrounding spaces. Unshaded glass on east and west facades admits high solar heat gain during morning and afternoon sun — reducing unnecessary glass area substantially reduces overheating, cooling demand, and glare.

WHY IT MATTERS

Light-coloured surfaces can reduce wall surface temperatures by around 5–10°C compared to darker finishes. Unshaded glass can admit solar heat gains of 500–700 W/m² during peak sun, especially on east and west façades.

2.7 Provide Shaded Outdoor Waiting and Recovery Zones

Heat relief should not depend solely on air-conditioned interiors. Shaded seating, drinking water, fans, and first-aid access should be provided in areas used by guards, delivery staff, drivers, street vendors, visitors, maintenance workers, and construction workers.

WHY IT MATTERS

Shade can reduce perceived heat stress by 8–15°C compared to direct sun exposure. For workers who spend several hours outdoors, even short shaded recovery breaks with water access can significantly reduce heat strain.

2.8 Ensure Wind Movement Is Not Blocked

Air movement helps remove accumulated heat from streets, courtyards, and service areas. Solid compound walls, poorly placed cabins, storage, parked vehicles, and dense service equipment can obstruct natural ventilation paths.

WHY IT MATTERS

Even low air speeds of 0.5–1.0 m/s noticeably improve outdoor thermal comfort.

2.9 Use Evaporative Coolers in Hot-Dry and Composite Climates

Direct evaporative coolers can reduce supply air temperatures significantly in hot-dry climates, commonly by 5–12°C, and sometimes more under very dry conditions while consuming 70–90% less electricity than conventional air conditioners. Coolers must draw outdoor air and allow exhaust air to leave — closed rooms significantly reduce performance. Misting systems can further improve outdoor comfort in dry climates when combined with shade, but must be occupancy-sensor controlled and designed to avoid water waste and slippery surfaces.

WHY IT MATTERS

An evaporative cooler consumes approximately 16–100 litres of water per day depending on size and type. Misting and evaporative cooling should be deployed judiciously only where water is reliably available.

2.10 Use Evaporative Cooling and Ventilation for Factories and Workshops

Factories without adequate ventilation can become severe heat-stress zones near machinery, furnaces, kitchens, laundries, and production lines. Properly designed evaporative cooling, ducting, exhaust ventilation, and local air movement reduce worker heat exposure and improve productivity.

WHY IT MATTERS

Factories, kitchens, laundries and workshops can accumulate heat from machines, furnaces, people and poor ventilation. Each worker adds roughly 70–300 W of body heat depending on activity level, while machinery can add several kilowatts of heat. Local air movement and exhaust can reduce heat stress at the worker level even when the whole factory cannot be air-conditioned.

3. Measures Inside Buildings

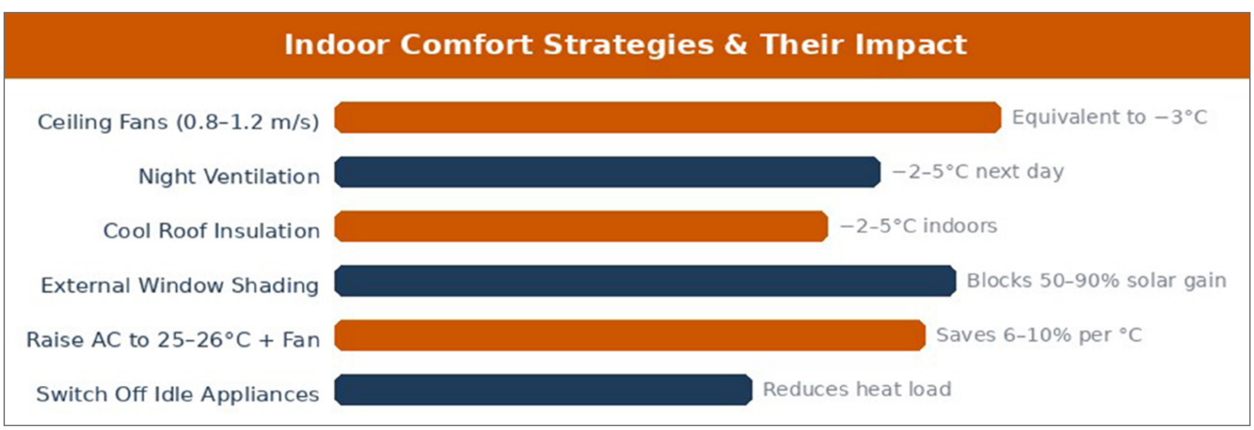
The indoor environment can be managed through a combination of passive strategies, occupant behaviour, and building services operation. The following measures are presented in order of decreasing impact and immediacy.

3.1 Increase Indoor Air Movement

Ceiling fans, pedestal fans, wall fans, or HVLS fans at air speeds of 0.8–1.2 m/s can significantly improve comfort at higher temperatures. Studies confirm that combining ceiling fans with ACs can maintain comfort at 26–28°C, allowing thermostat setpoints to be raised.

WHY IT MATTERS

Indoor air speeds of 0.5–1.5 m/s can improve perceived thermal comfort equivalent to reducing room temperature by 2–4°C.



Indoor Strategies and Their Estimated Thermal Impact

3.2 Use Night Ventilation Where Outdoor Air Is Cooler and Safe

In hot-dry and composite climates, flushing the building with cooler night air reduces heat stored in walls, floors, and furniture.

> **WHY IT MATTERS**
>
> *In locations with large 'diurnal swings*', night ventilation can reduce next-day indoor temperatures by 2–5°C where security, air pollution, and dust conditions permit.*
>
> **large differences between daytime and nighttime temperatures.*

3.3 Reduce Internal Heat Gains

Almost all electricity used indoors eventually becomes heat. Switching off unnecessary lights, appliances, chargers, printers, display screens, and idle equipment is especially important in small rooms, top-floor spaces, and rooms without AC.

> **WHY IT MATTERS**
>
> *Almost all electricity used indoors eventually becomes heat within the space — through light, motors, electronics, chargers, displays or appliance operation. Some of this heat is released directly as radiant heat and some as convective heat to the room air. Reducing unnecessary plug loads directly reduces indoor heat gain.*

3.4 Prefer LED Lighting

LEDs provide the same useful lighting with much lower electricity consumption than incandescent or halogen lamps. This reduces both electricity use and indoor heat gain — a double benefit during hot weather.

> **WHY IT MATTERS**
>
> *Incandescent lamps release nearly 90% of their energy as heat. Replacing inefficient lamps with LEDs reduces both electricity use and indoor heat gain, especially in small rooms, top-floor spaces and non-air-conditioned areas.*

3.5 Control Afternoon Sun on West-Facing Rooms

West-facing rooms often overheat in Indian summers due to strong afternoon solar radiation when outdoor temperatures are already at their peak. External shutters or shades should be closed before the room heats up, not after it has already become uncomfortable.

> **WHY IT MATTERS**
>
> *West-facing walls and windows receive intense afternoon sun when outdoor air temperature is already near its daily peak. Unshaded west glass can admit 500–700 W/m^2 of solar heat, quickly overheating rooms before evening occupancy.*

3.6 Keep Indoor Relative Humidity Under Control

High humidity reduces the body's ability to cool itself through sweat evaporation. Where ACs are used, avoid oversized systems that cool rapidly without adequate dehumidification. Where evaporative coolers are used, ensure adequate exhaust air paths so indoor humidity does not build up excessively.

> **WHY IT MATTERS**
>
> *High humidity reduces sweat evaporation, which is the body's main cooling mechanism. Where mechanical cooling or dehumidification is available, indoor RH around 40–60% is generally more comfortable. In naturally ventilated spaces, maintaining air movement becomes especially important when RH is high.*

3.7 Insulate Roofs and Top-Floor Ceilings

Top-floor rooms receive high heat gain through the roof. Roof insulation, ventilated false ceilings, cool-roof coatings, and shaded terraces can reduce indoor overheating by 2–5°C depending on conditions.

WHY IT MATTERS

Roofs receive the highest solar exposure in low-rise buildings. Roof insulation, cool roofs, shaded terraces or ventilated false ceilings can reduce top-floor indoor temperatures by approximately 2–5°C, improving comfort even without air conditioning.

3.8 Avoid Overcrowding in Poorly Ventilated Rooms

Crowded rooms heat up quickly when ventilation is inadequate. Cross-ventilation, fans, staggered occupancy, or access to cooler shared spaces help manage this.

WHY IT MATTERS

Each seated adult releases approximately 70–120 W of heat at rest or light activity, and more during physical work.

3.9 Create Common Cooling Rooms During Severe Heat Days

Residential societies, schools, offices, factories, and community buildings should identify at least one shaded, ventilated or cooled room for vulnerable occupants. Priority users include elderly persons, infants, pregnant women, people with chronic illnesses, outdoor workers, security guards, and maintenance staff.

WHY IT MATTERS

Vulnerable people — elderly persons, infants, pregnant women, outdoor workers and people with chronic illnesses — are at higher risk during heat waves. A common cooled or shaded room can act as a low-cost "heat refuge" during peak hours or power-stress periods.

3.10 Prepare for Power Cuts

During heat waves, power cuts can quickly make enclosed rooms unsafe. Keep drinking water, ORS, battery fans, charged lights, shaded resting spaces, and cross-ventilation options readily available. Closed rooms that depend entirely on mechanical cooling must have emergency protocols.

WHY IT MATTERS

If air movement stops during a power cut, the comfort benefit of fans — often equivalent to 2–4°C of cooling — is immediately lost. Closed rooms can heat up rapidly from roof gain, occupants and appliances unless emergency ventilation is available.

4. Summary of Key Recommendations

Category	Key Measure	Expected Impact
Individual	Avoid peak sun 12–3 PM; light clothing; stay hydrated	*Reduces heat stress risk significantly*
Individual	AC at 25°C+ with ceiling fan	*Saves 6–10% per °C; same comfort*
Building — External	Plant trees on west & SW facades	*−2–8°C in shaded zones*
Building — External	Cool-roof or reflective coating	*Roof surface −6–15°C; indoor −2–5°C*
Building — External	External shading on windows	*Blocks 50–90% solar heat gain*
Building — External	Light-coloured exterior surfaces	*Wall surface −5–10°C*
Indoor	Ceiling fans with AC	*Comfort at 26–28°C; lowers cooling load*
Indoor	Night ventilation (hot-dry/composite)	*Indoor temp −2–5°C next day*
Indoor	Switch off idle appliances & use LEDs	*Reduces indoor heat load directly*
Indoor	Common cooling room for vulnerable users	*Critical safety measure*

5. References and Further Reading

The following authoritative sources underpin the recommendations in this Positiion Document:

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COVER 3

About ISHRAE

The Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE) was founded in 1981 at New Delhi by a distinguished group of HVAC&R professionals. Today, ISHRAE represents a strong network of over 25,000 members, including student members, and functions through 57 chapters and sub-chapters across the globe, with its headquarters located in New Delhi. It is led by a team of elected officers who are members of the Society working on a voluntary basis, collectively called the Board of Governors. In pursuance of its objectives, ISHRAE works in the areas of Research, Standards, Education and Training, and Publication of Technical Books and a Journal. It also organizes world-class annual exhibitions ACREX and REFCOLD, besides hosting technical seminars and conferences. ISHRAE is a responsible and socially-conscious Technical Society.

Purpose

- Nurturing the built environment

Vision

- Enabling climate positive built environment

Mission

- Global leadership & trusted knowledge partner for planet centric HVAC&R solutions, unifying professionals across industry, academia & government by setting standards, enabling policy, creating capacity and building resilience

Activities

Knowledge Dissemination: ISHRAE conducts conferences, seminars, exhibitions, workshops, panel discussions and product presentations throughout the country with both national and international participants to discuss, promote and display the state-of-the-art technologies, systems, products and services.

Books and Publications: ISHRAE publications help its members and the industry to keep up with technical developments, latest trends and sunrise technologies. ISHRAE publishes Standards, books on fundamentals of various topics, HVAC&R Handbooks and the extremely popular and informative ISHRAE Journal. The latest publication is on Insulation

Exhibitions cum Conferences: ISHRAE organises ACREX India, the largest international exposition in South Asia on the Air Conditioning, Refrigeration, Ventilation and Building Services industry. Held annually, ACREX showcases the latest technologies and innovations, and provides a platform for buyer-seller meets for technical and commercial personnel in the HVAC&R field. To serve the interests of the Refrigeration and Cold-chain sector, ISHRAE organises REFCOLD annually. ISHRAE is a member and active supporter of the National Centre for Cold-chain Development (NCCD).

Education: ISHRAE is actively engaged in Education and Training, and offers several courses for technical professionals, some with post-examination certification. This helps to bring trained manpower into the HVACR industry.

Research: ISHRAE promotes research in the field of HVAC&R technologies. It offers financial support to graduate and post-graduate students to carry out innovative R&D work in technology, systems and processes. ISHRAE partners with the industry, academia and the government to carry out scientific research at Institutes of Excellence associated with ISHRAE.

Standards: ISHRAE works in the national interest with various government ministries and departments; for example, in the development of Standards and drafting of the National Building Code for the Bureau of Indian Standards, working on Energy Conservation Building Code with the Bureau of Energy Efficiency, and with the Ozone Cell of the Ministry of Environment, Forest and Climate Change on refrigerant gases. ISHRAE has also developed a pioneering Standard on Indoor Environmental Quality.

Student Activities: ISHRAE student chapters in more than 150 engineering colleges encourage students to opt for careers in the HVAC&R industry with industry exposure including factory visits. The K-12 initiative of ISHRAE reaches out to young school children to make them aware of subjects like energy conservation and environmental concerns through drawing competitions, poster designs, quizzes and more, with emphasis on STEM education to inculcate scientific fervour and help them to grow up as responsible citizens.

Global Reach: ISHRAE works in close co-operation with other similar societies and organisations, both at national and international levels, for the promotion and development of concepts like health and safety, sustainability, Green buildings, energy efficiency and environmental responsibility, often interacting with UN bodies like UNDP and UNEP.

ISHRAE is indeed looked upon as a repository of technical knowledge in the HVAC&R and Building Services Industry globally by peer organizations and the Government.