Green building in a post Covid-19 India

SHAKTI
SUSTAINABLE ENERGY
FOUNDATION

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ABOUT SHAKTI FOUNDATION

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SHAKTI SUSTAINABLE ENERGY FOUNDATION

- OUR VISION | A clean and secure energy future

- OUR MISSION | Facilitating a sustainable energy future for India by promoting policies that encourage renewable energy, energy efficiency, sustainable urban transport and sustainable finance

- THE POLICY FOCUS| We believe that effective energy policy frameworks are necessary for large-scale, transformative change.

- OUR WORK | We work with policy makers, civil society, research institutions , think tanks and the private sector to develop policy solutions for energy and climate challenges

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WHY SHAKTI

- Ability to create positive policy momentum
- Investments focus on large scale change.
- Strong relationships with over 100 partners
- Established and tested grant management and compliance processes
- Credibility with Policy Makers at the Central, State and City level

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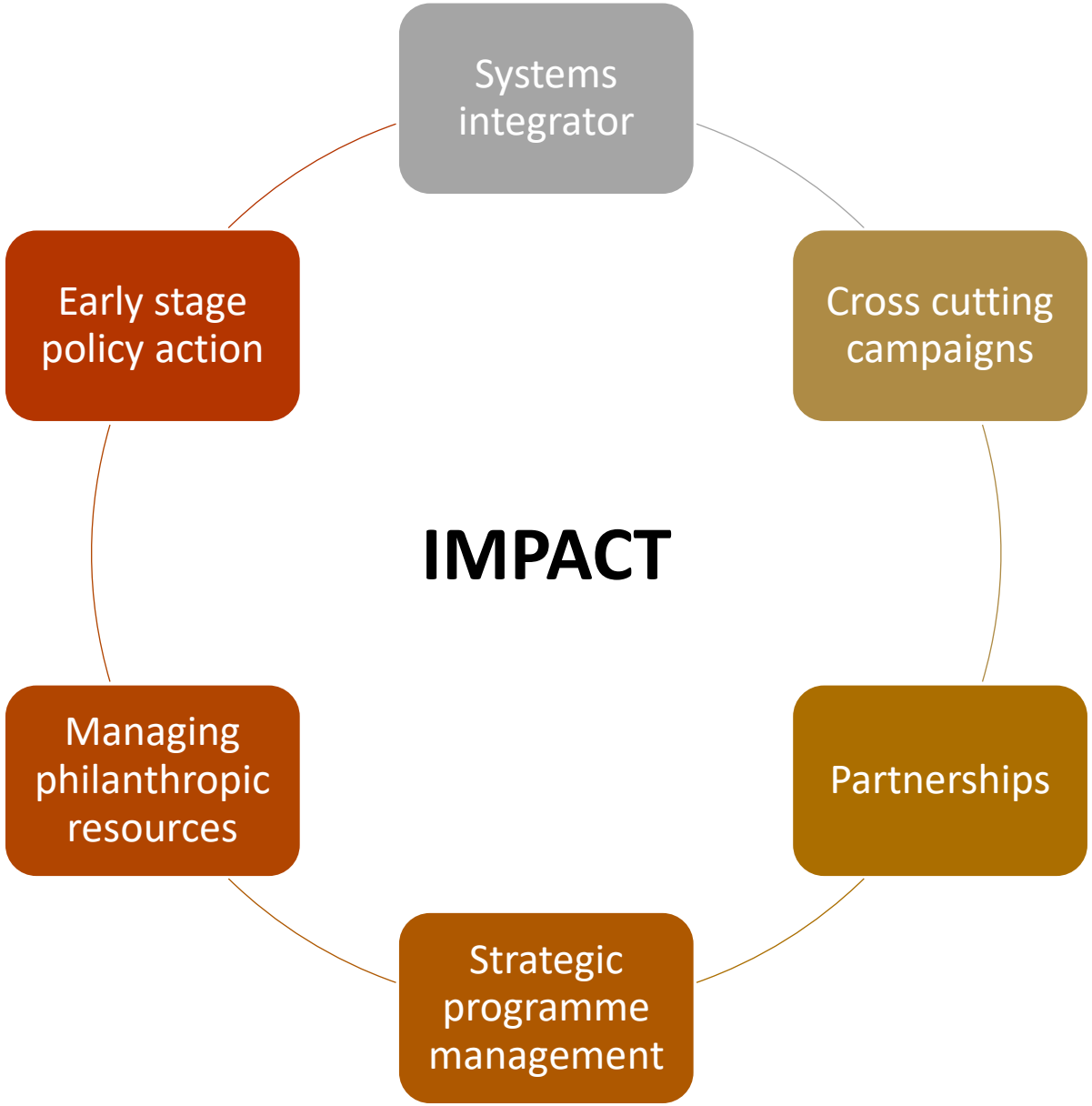
OUR APPROACH



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KEY FOCUS AREA

Energy Efficiency

Energy Efficient and Climate Friendly Cooling

Buildings & Appliances

Industry

Climate Policy

Low Carbon Development

Air Quality Management

Clean Power

Electric Utilities

Energy Access

Renewable Energy

Sustainable Finance

Financial Market Regulations

Financial Products and Instruments

Sustainable Transportation

Systems & Planning

Vehicles & Fuels

Electric Vehicles

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KEY OUTCOME

Shakti-supported efforts have greatly informed the development of the India Cooling Action Plan (ICAP), a comprehensive roadmap to address the country's burgeoning cooling requirements over the next 20 years. Shakti helped to form a civil society coalition on cooling – India Cooling Coalition. Members of the coalition led four of the thematic working groups working on the ICAP and had representation across all six working groups. Shakti also supported its grantee partners over the last two years to create a fact-base on clean cooling through research and analysis, which fed into the preparation of the ICAP.

KEY OUTCOME

Shakti's support has led to the inclusion of building sector (Hotels) as designated consumers during the 4th cycle of Perform Achieve and Trade (PAT). PAT is a mandatory market-based mechanism to enhance energy efficiency in energy intensive sectors by making efficiency a tradable commodity.

KEY OUTCOME

The wholesale price of the highly energy efficient 9W LED bulbs dropped to less than INR 75 – making it affordable for consumers and unlocking considerable energy savings for India. Shakti worked with multiple partners to pave the way for the large-scale adoption of LED bulbs.

Now, under the national program for LED-based Home and Street Lighting launched by Govt. of India over 360 million LED bulbs have been distributed and a further 200 million LED bulbs have been sold by the private sector.

WHY BUILDINGS

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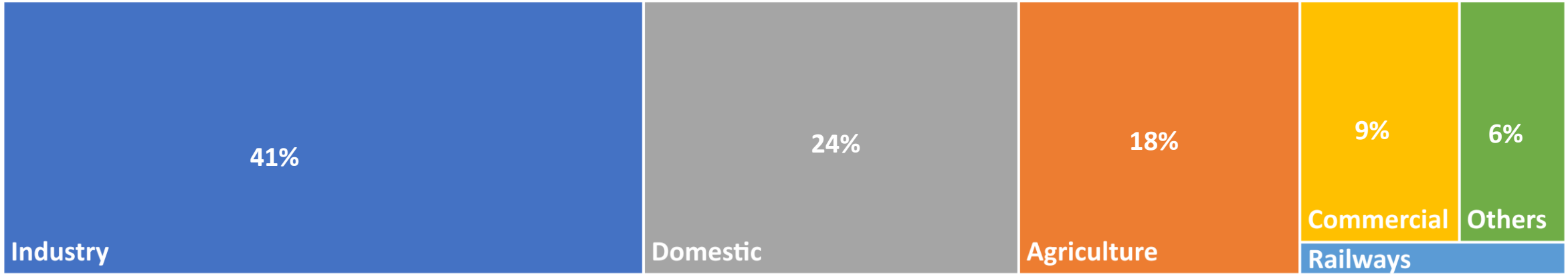
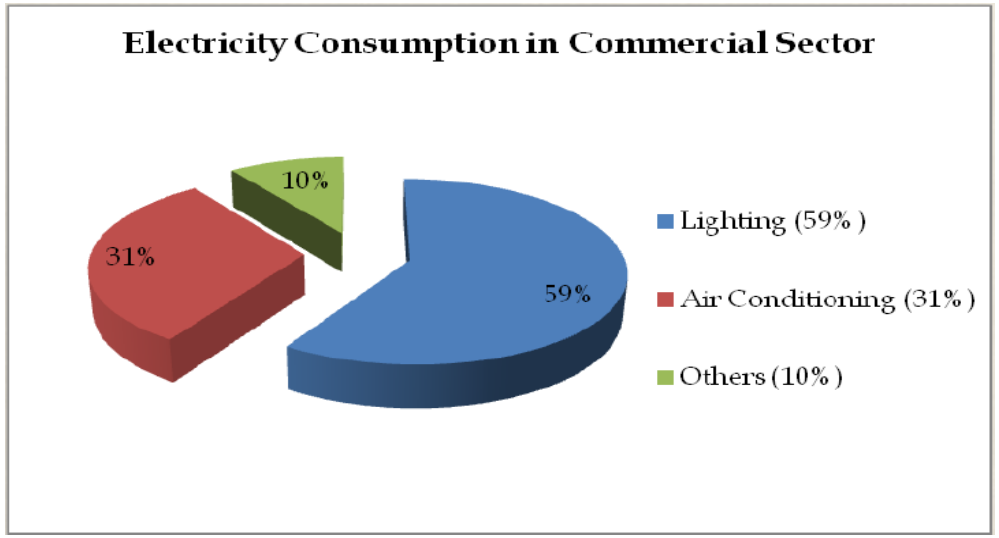
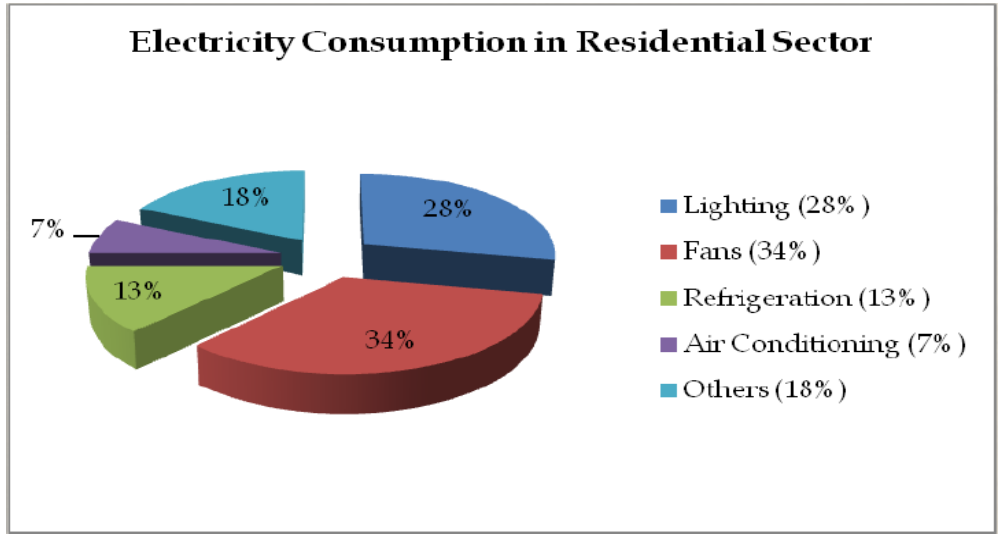
WHY BUILDINGS

CONSUMPTION OF ELECTRICITY BY SECTORS IN INDIA (2017-18)



Source: MOSPI Energy Statistics 2019 ; INDIA Second Biennial Update Report





Source: Bureau of Energy Efficiency

- Lighting, cooling (AC & fans) and refrigeration are the major load

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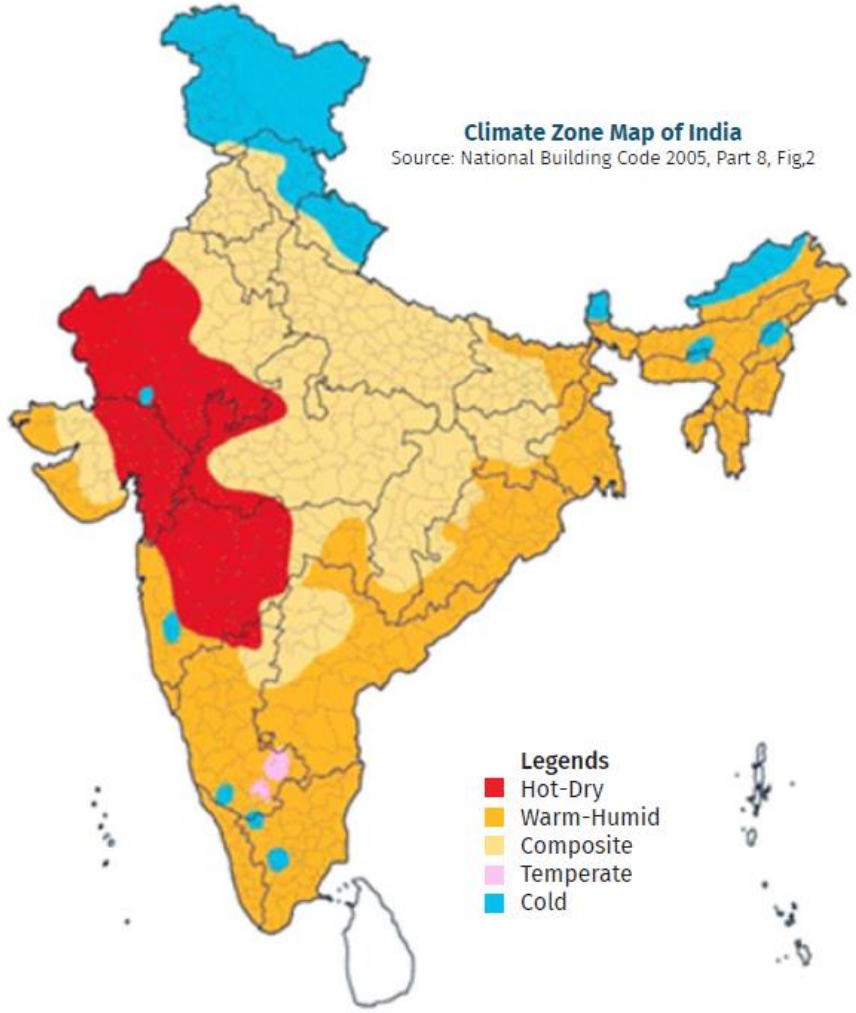
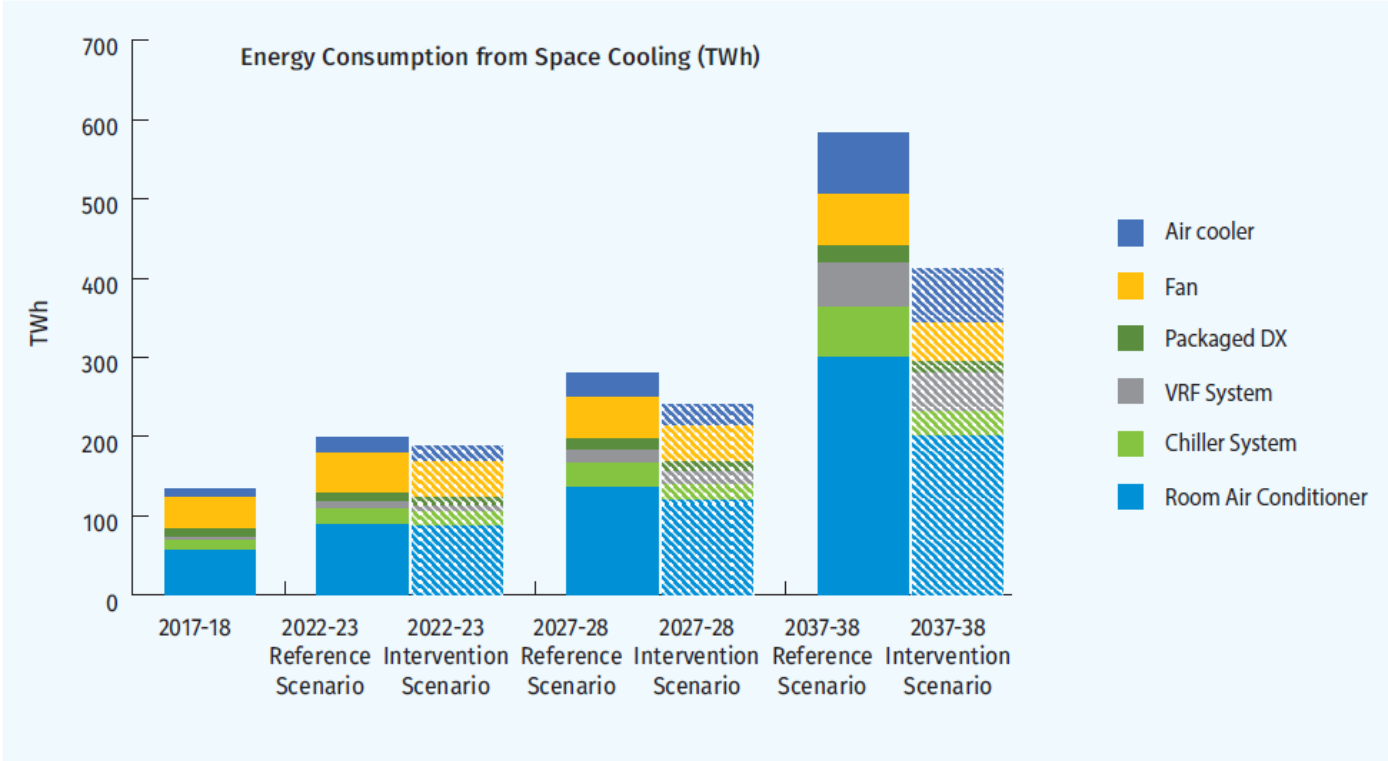
IDENTIFY LARGE CONTRIBUTORS

- Penetration of AC in India is expected to increase from the current level of 6-8% to around 50% in next 25-30 years. Hence, making cooling load substantially higher then others.





Annual Energy Consumption from Space Cooling in Buildings

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IMPACT OF COVID-19

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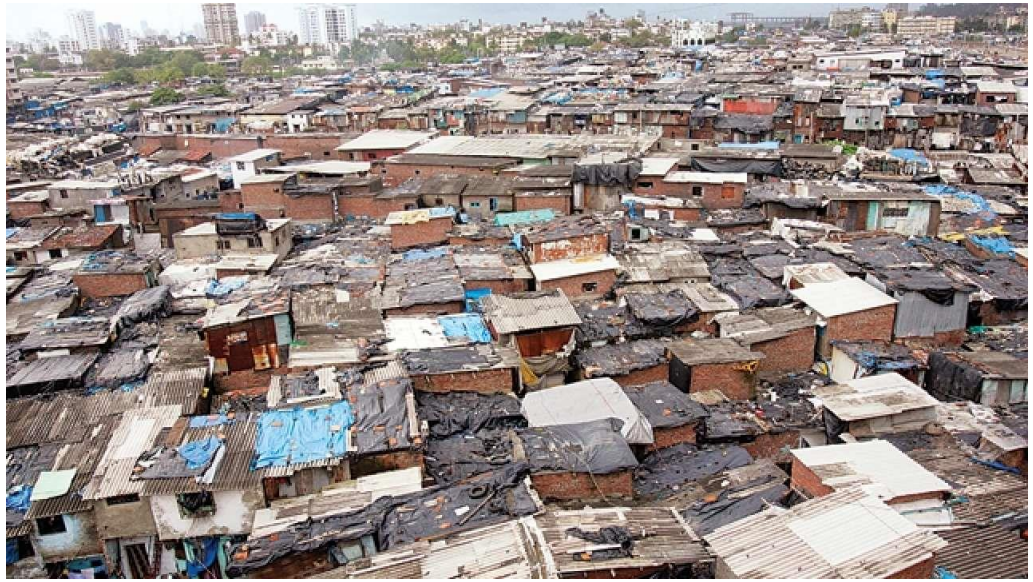
PANDEMIC AND HOUSING

- In majority of Indian cities which are worst effected by the current pandemic; the urban slums, unauthorized colonies and densely populated areas with poor building designs became the hot bed for Covid-19 infection.

- Unavailability of safe, healthy and affordable houses in cities was one of the principle reason for reverse migration of migrant workers in India.

- The spread of Covid-19 infection in India indicates that during a pandemic where self isolation is required, the design and quality of a home and neighbourhood is a key contributor to the health and wellbeing of the people who live there.

Covid19 hotspot Jahangirpuri, Delhi (Photograph: AajTak)



Covid19 hotspot Dharavi, Mumbai (Photograph: DNA)

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STIMULUS PACKAGES: OPPORTUNITY TO ACT

Real estate sector finds an important place holder within the INR 20,000 Billion stimulus package announced by Government of India. Few examples:

PMAY subsidy scheme extension

The Indian Finance Minister, Nirmala Sitharaman on May 14 announce the extension of Pradhan Mantri Awas Yojana (PMAY) subsidy scheme to FY 21. This will facilitate investment of INR 70,000 crore in housing projects for the mid-income group.

Credit for real estate

INR 300 Billion special liquidity scheme for Non-Banking Finance Companies (NBFCs) and Home Finance Companies (HFCs) and Micro Finance Institutions (MFIs).

Affordable rental housing scheme

An affordable rental housing scheme (ARHC) through a Public – Private Partnership (PPP) mode will be launched to provide rental accommodation to migrant workers, students and the urban poor providing them with a healthy living condition. Industries, manufacturing units and institutions will also be incentivised to develop AHRC on their land that is unutilised under PPP mode. This housings may deter migrants to reverse migrate when faced with calamity or pandemic such as COVID-19.

These stimulus packages provides us with an excellent opportunity to advise policy makers to introduce building energy conservation principles (focusing on thermal and visual comfort) in the design and construction of millions of new homes and prevent long-term lock-ins into fossil-fuels based technologies.

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KEY FOCUS

	Embodied Energy	Thermal Comfort	Operational Energy
Direct impact	India is yet to build about 75% of the buildings expected to exist in India in 2030. Around 1.2 million new urban homes will be built under PMAY by 2022. India offers a huge opportunity to avoid carbon lock-in associated with new buildings.	Indoor thermal comfort is a function of building design and building materials used. Poor indoor thermal comfort creates higher demand of energy for indoor air conditioning	Energy efficient appliance to reduce building electricity demand Rooftop solar to reduce dependence on fossil fuel based grid supply
Indirect impact	Real estate sector is a major consumer of products manufactured by harder to abate sectors like steel, cement and brick	Impacts productivity, health and wellbeing of the occupants. Critical for future calamities or pandemics like Covid19	Reduce green house gas emission and air pollution from diesel / thermal power generation

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ENABLER

The National Building Code of India (NBC) 2016, is a National Instrument providing guidelines for regulating the building construction activities across the country. It contains administrative regulations, development control rules and general building requirements; fire safety requirements; stipulations regarding materials, structural design and construction (including safety); building and plumbing services; **approach to sustainability**; and asset and facility management.

The ECBC 2017 provides current as well as futuristic advancements in building technology to further reduce building energy consumption and promote low-carbon growth. The code aims to optimise energy savings with the comfort levels for occupants and prefers life-cycle cost effectiveness to achieve energy neutrality in commercial buildings.

ECO Niwas Samhita 2018, an Energy Conservation Building Code for Residential Buildings (ECBC-R), aims to benefit the occupants and the environment by promoting energy efficiency in design and construction of homes, apartments and townships.

The India Cooling Action Plan (ICAP) 2019 provides a 20-year perspective (2017-18 to 2037-38) and recommendations, to address the cooling requirements across sectors and ways and means to provide access to sustainable cooling.

India focused Green Building Codes are available for both commercial and residential buildings e.g. Indian Green Building Code, GRIHA etc.

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GO LEAN, MEAN & GREEN
- FOR SUSTAINABLE BUILD ENVIRONMENT

What should be our growth model?

NEED based or WANT based?

GDP based or HDI based?

URBAN centric or Holistic

LEAN	Optimize demand
MEAN	Efficiently manage available resources
GREEN	Use low carbon or carbon neutral resources.

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LEAN

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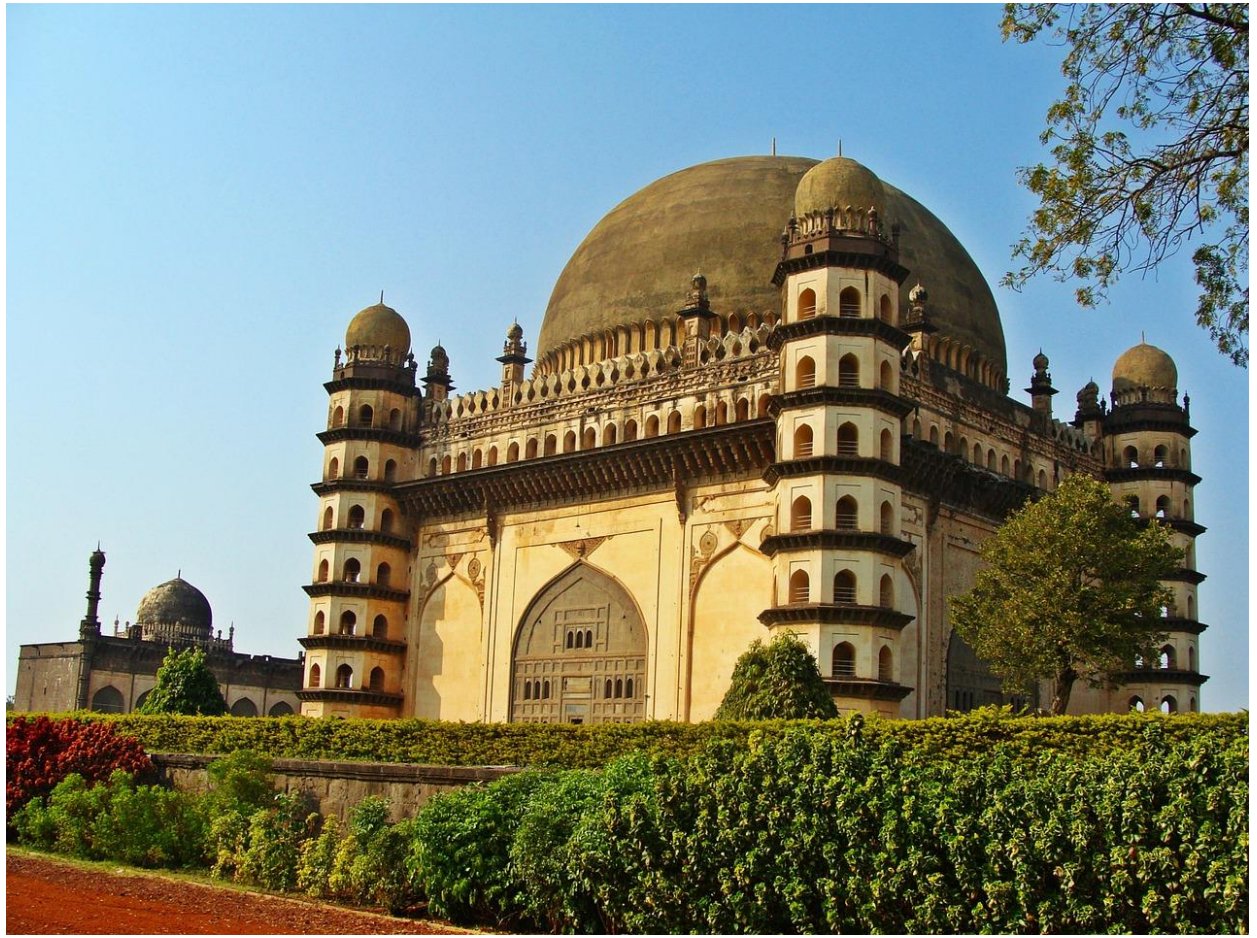
REDEFINING HISTORY OF ART AND ARCHITECTURE

Can we do a green rating for old buildings? Is an EPI (energy performance index) of the Gol Gumbaz possible?



- How would these buildings fare if the ECBC were to be enforced on them?
- User experiences documented in comparative structures
- Recent research on energy efficiency in historical buildings, is shifting more towards Life Cycle Assessments compared the approach of operational energy studies.

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REDEFINING HISTORY OF ART AND ARCHITECTURE

Integrating old techniques in new buildings and technologies

Use of Jallis / fenestrations

Pearl Academy of Fashion
http://www.treehugger.com/

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REDEFINING HISTORY OF ART AND ARCHITECTURE

SECMOL campus, Ladakh: Combination of traditional knowledge and modern architecture.

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ARCHITECTURE & URBAN DESIGN

Tradition vs Modern

This is NOT meant to be a battle between traditional and modern forms of architecture.

Every district has its own traditions and, by trial and error, over thousands of years, people have learned how to use, and to cope with, all the many factors which are involved in Architecture. – The Site, the Topography and Geology.

It is foolish, therefore, to abandon the tested findings of centuries of “Science & Technology.”

- Laurie Baker

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MEAN

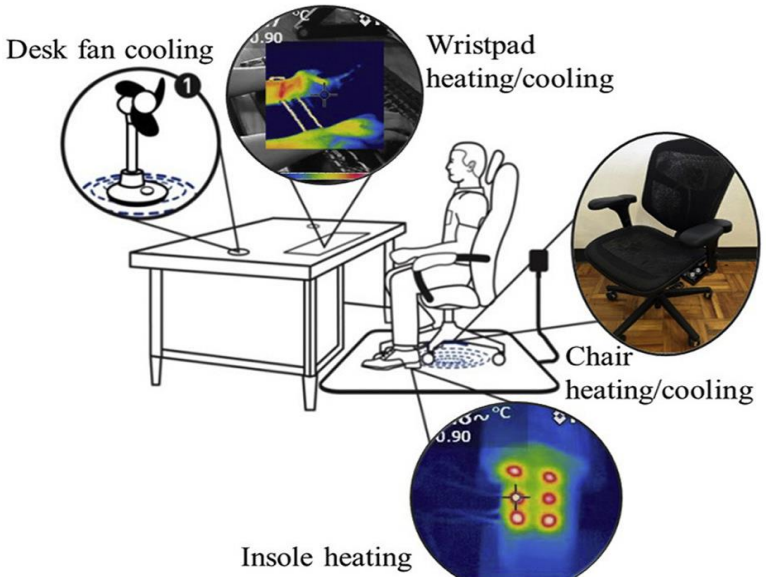
PROMISING COOLING TECHNOLOGIES

Building Level

- Radiant cooling (slab/chilled beams)
- Individual RAC with centralized water-cooled condensers system
- Building level assisted ventilation systems

Personal Systems

- Wearable – Cooling Technology
- Personal Thermal Comfort Systems



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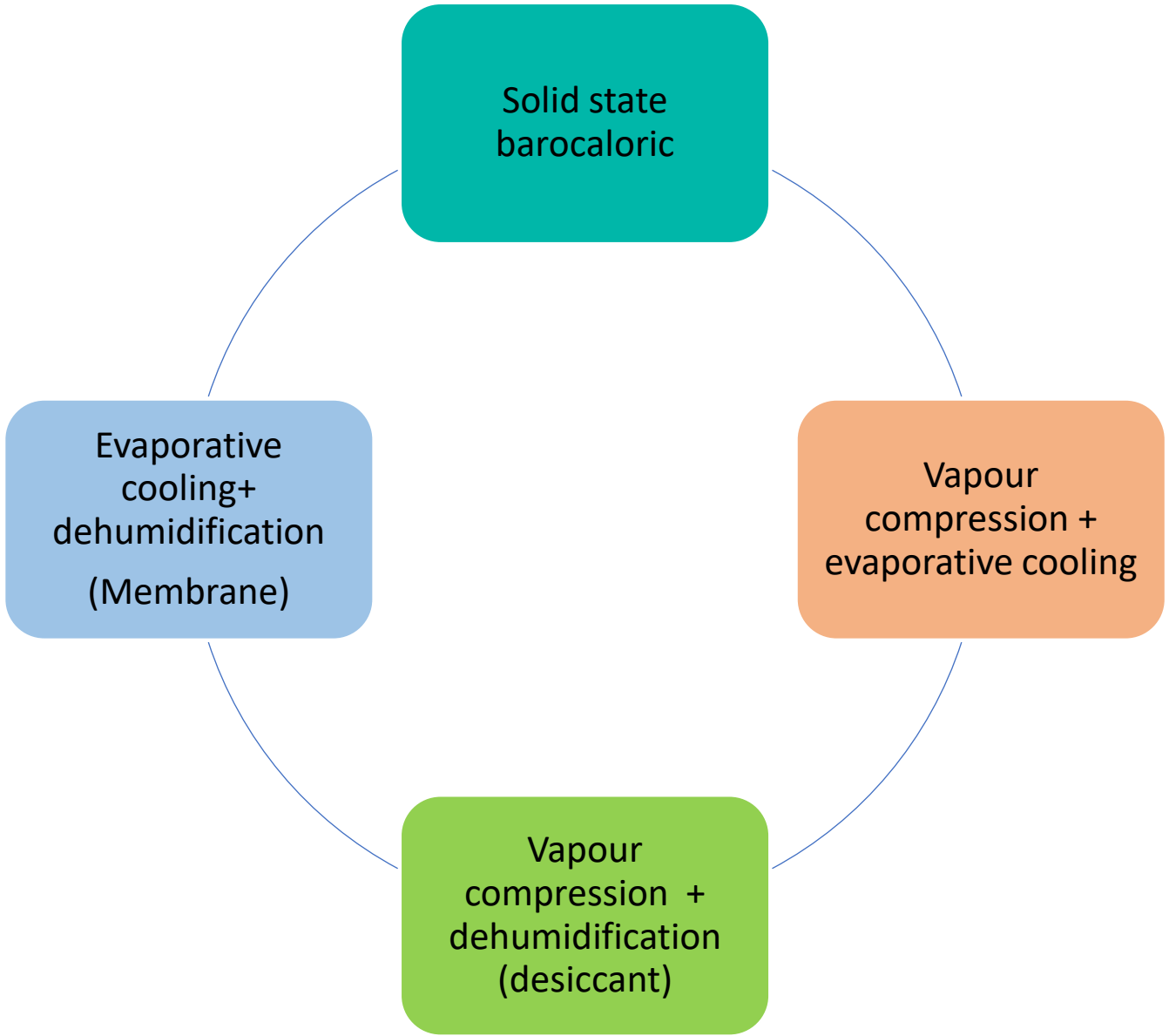
PROMISING FUTURE TECHNOLOGIES (RAC): GLOBAL COOLING PRIZE EIGHT FINALISTS



Global Cooling Prize

Room Air Conditioners (RAC) solutions

- 80% lower climate impacts
- 60% reduction in maximum power drawn

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RADIANT COOLING AND SLAB TEMPERING SYSTEMS

Option 1: Considerable first cost but provides high degree of thermal comfort

Roof Level, Living & Learning Design Center, Kutch

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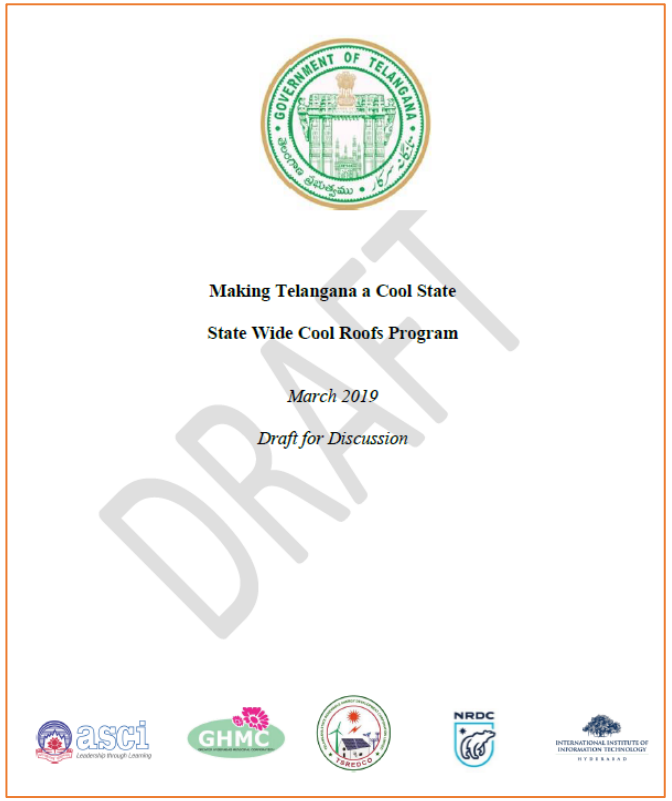
COOL ROOFS

Option 2: Affordable and provides thermal comfort

Cool Roof, Hyderabad
(Photograph: Deccan Chronicle)



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GREEN

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RENEWABLE ENERGY INTEGRATION IN BUILDING

Rooftop solar photovoltaic plant

Rooftop solar water heater

Wind Towers

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NATURAL REFRIGERANTS: TYPES

Natural Refrigerants can be divided into :

- Hydrocarbons – Propane (R290), Propylene (R1270), R600a
- Ammonia
- Carbondioxide
- Isobutene

QUESTIONS

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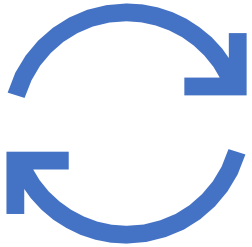

Thank you

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