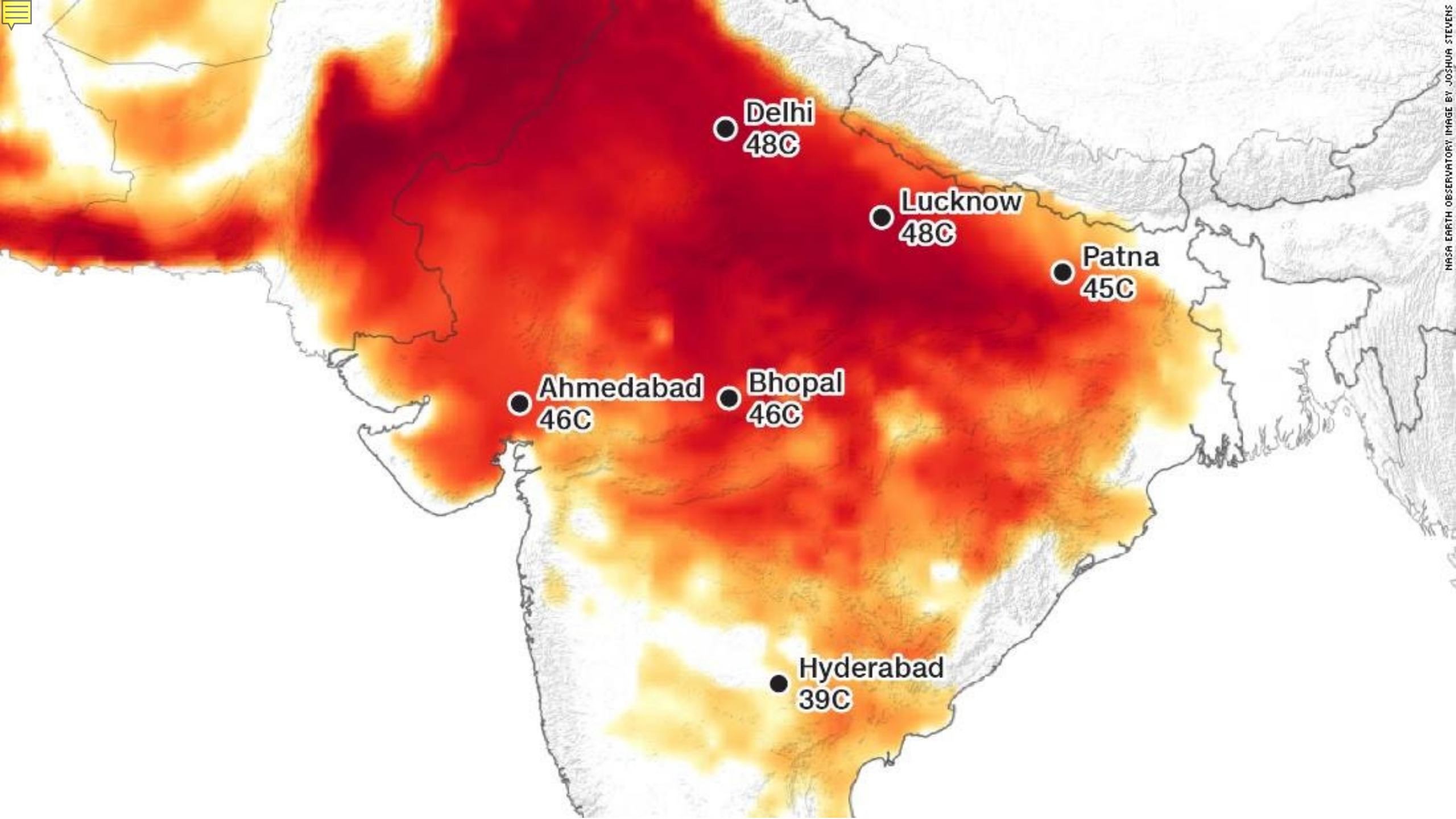
Advancing Deployment of Cool Roofs in India

Charlotte Steiner, Natural Resources Defense Council

NRDC
NATURAL RESOURCES
DEFENSE COUNCIL


Delhi
48C
Lucknow
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Patna
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Ahmedabad
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Bhopal
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Hyderabad
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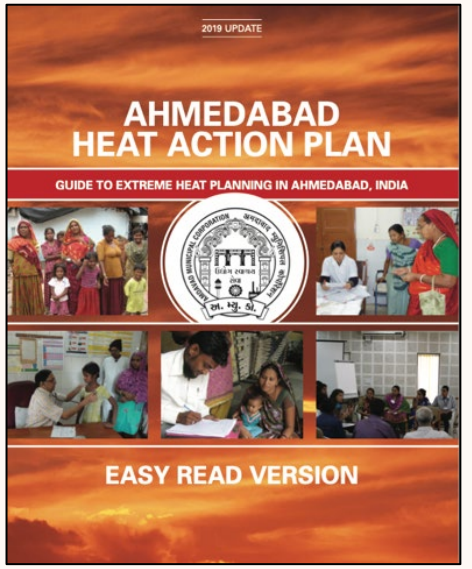
NASA EARTH OBSERVATORY IMAGE BY JOSHUA STEVENS

People Oriented Solutions at Local Level Heat Action Plan

Poster on Extreme Heat in Ahmedabad



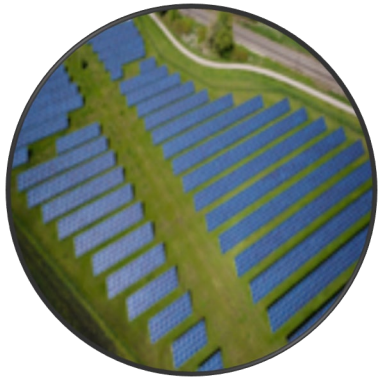
Ahmedabad Heat Action Plan

Partners

INDIAN INSTITUTE OF PUBLIC HEALTH GANDHINAGAR

NATIONAL DISASTER MANAGEMENT AUTHORITY

India Work Areas



RENEWABLE ENERGY GROWTH AND ACCESS

COOLING AND ENERGY EFFICIENCY

CLIMATE RESILIENCE AND HEALTH

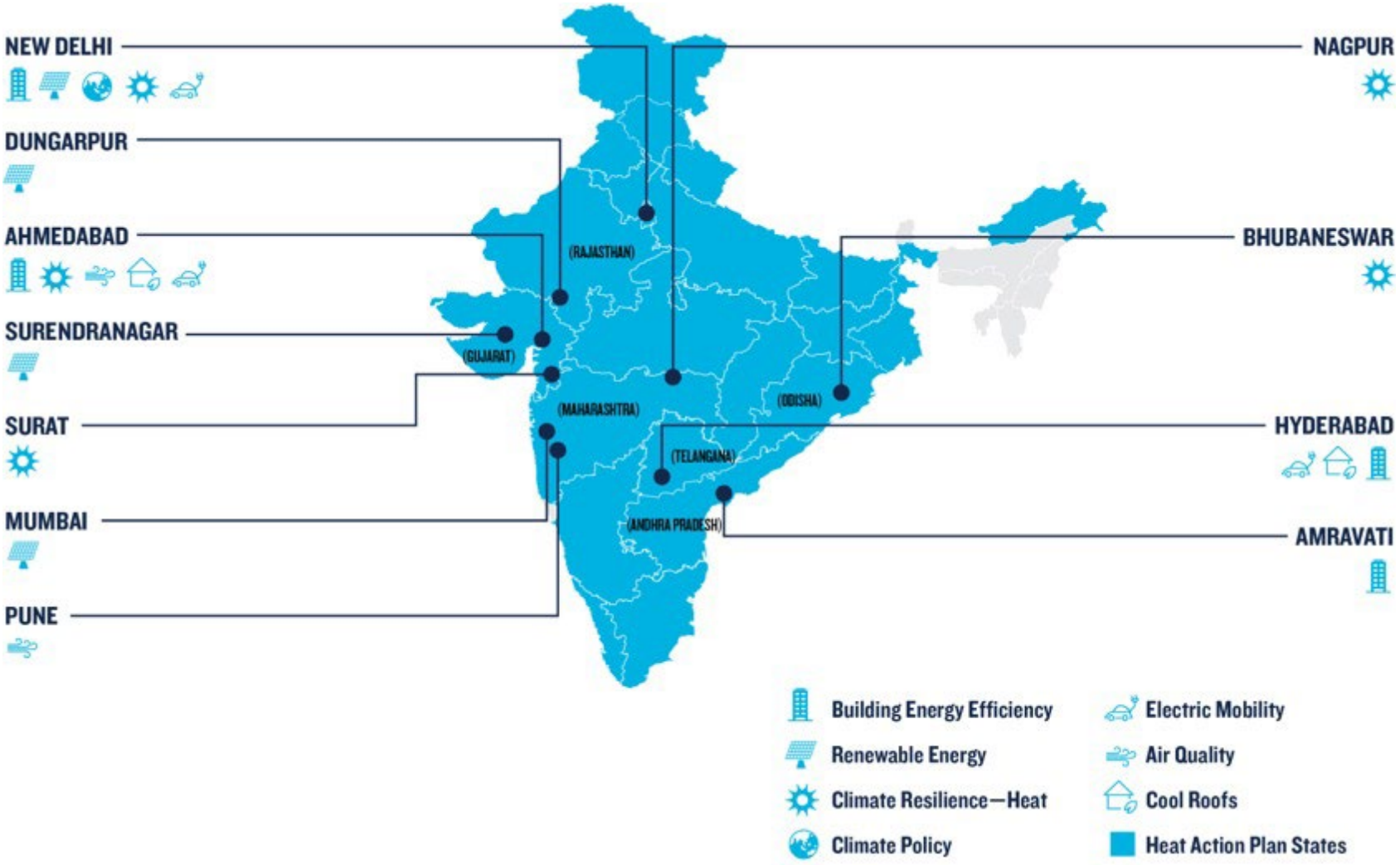
CLEAN TRANSPORTATION

CLIMATE GOALS AND GLOBAL ENGAGEMENT

NRDC India

NRDC India seeks to advance national and global climate goals through community-based solutions that prioritize public health and equity, create jobs, and boost resiliency.

Where We Work

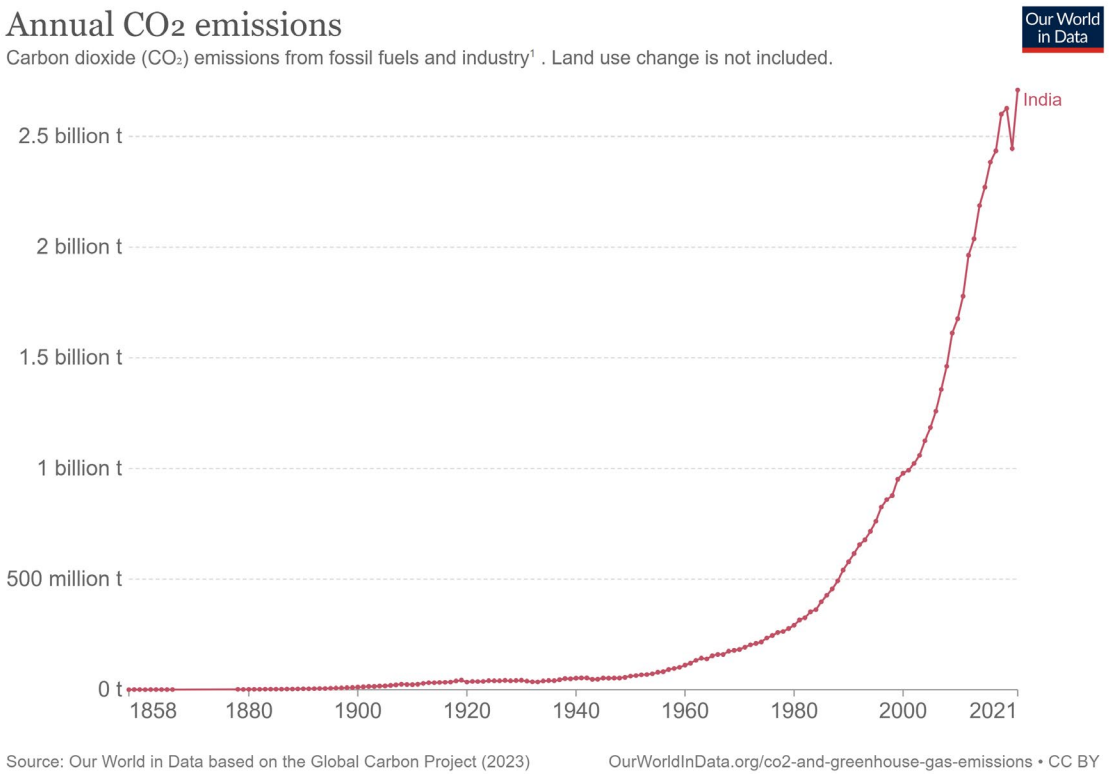


The Way We Work

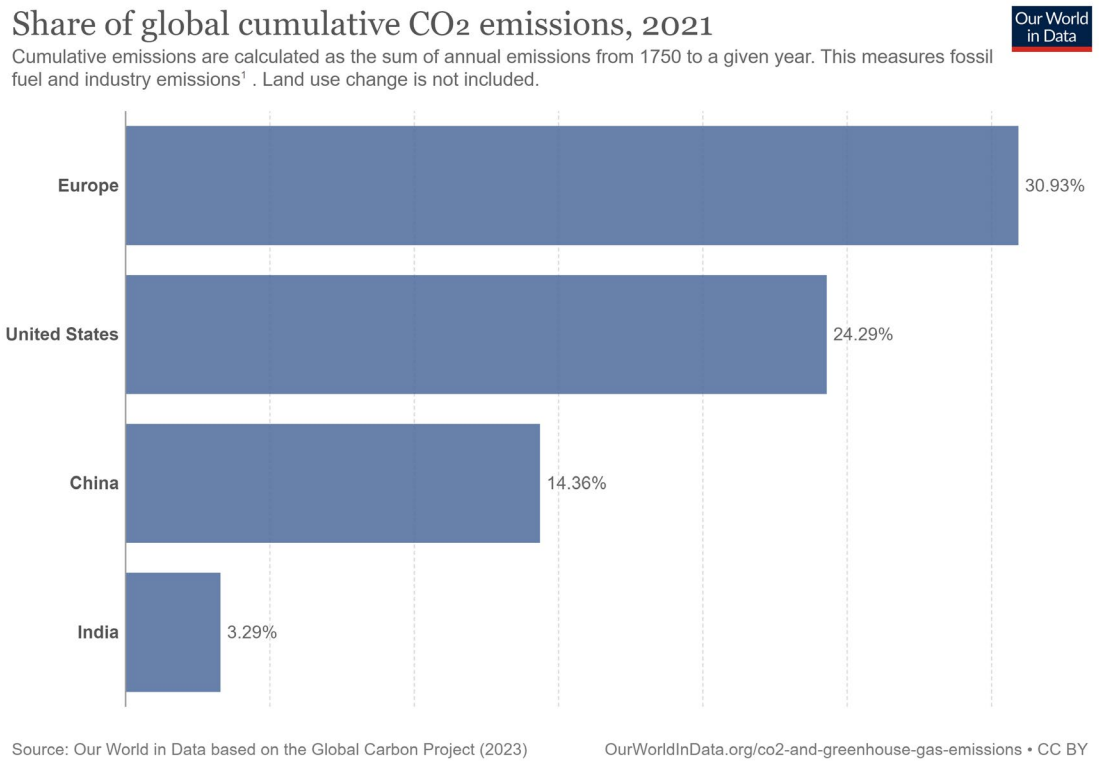
- Bring local-evidence based solutions to inform and implement national policy
- Bring together stakeholders
- Act as strategic knowledge partner, international climate leader
- Amplify messages through persistence and outreach


Why India?

India's CO_2 Emissions



1. Fossil emissions: Fossil emissions measure the quantity of carbon dioxide (CO_2) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO_2 includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.



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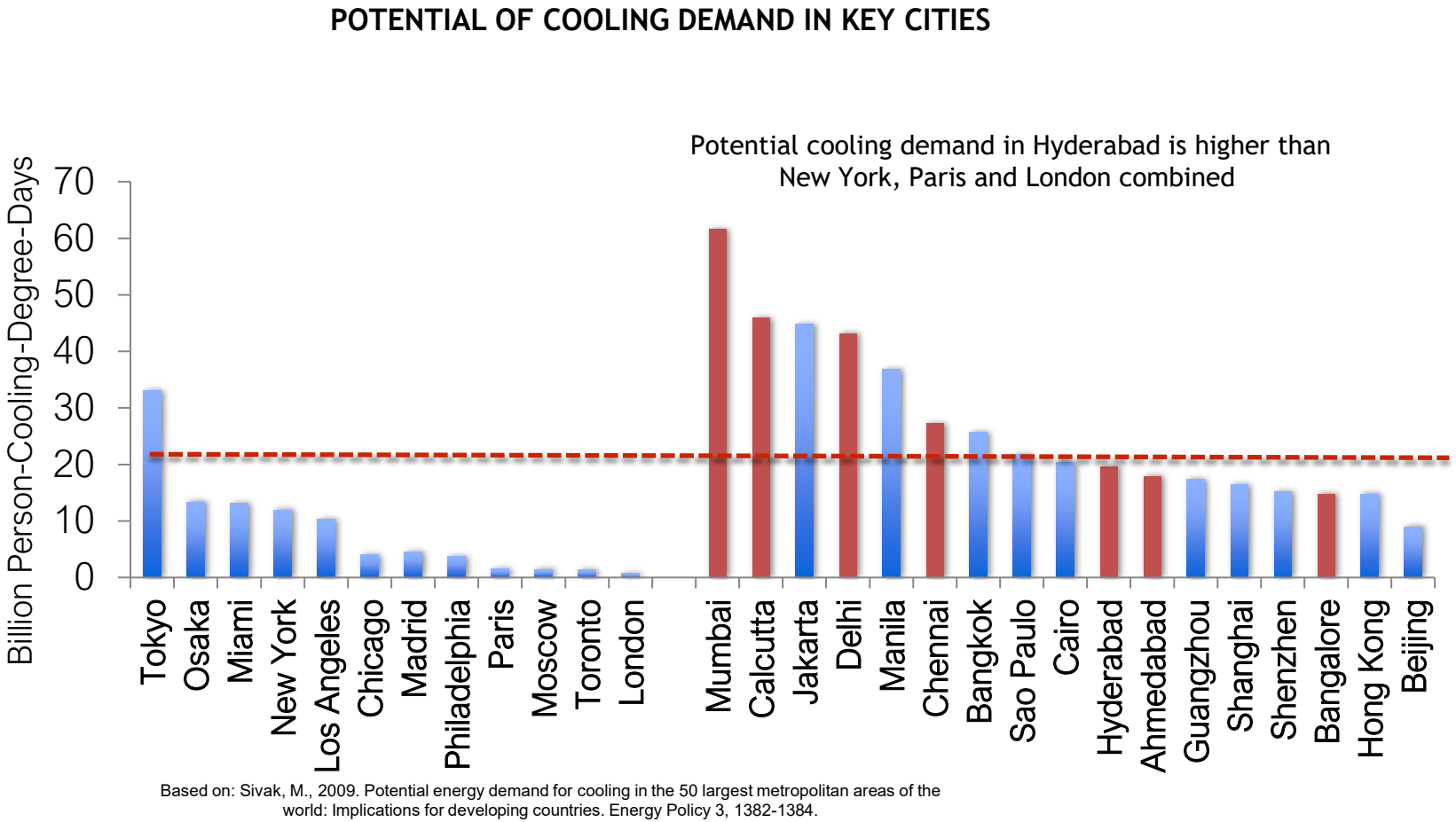
Cooling Demand in India

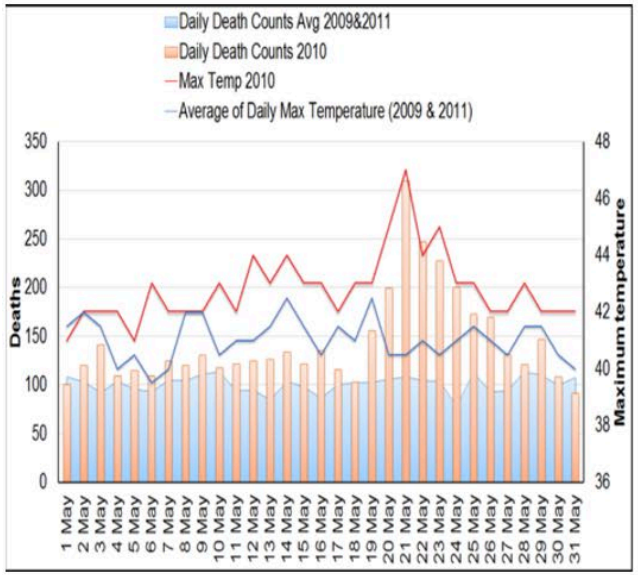


Based on: Sivak, M., 2009. Potential energy demand for cooling in the 50 largest metropolitan areas of the world: Implications for developing countries. Energy Policy 3, 1382-1384.

With rising temperatures, increasing consumer power, and rapid urbanization, the demand for cooling is growing in Indian cities. Extreme heat waves lead to loss of lives every year.

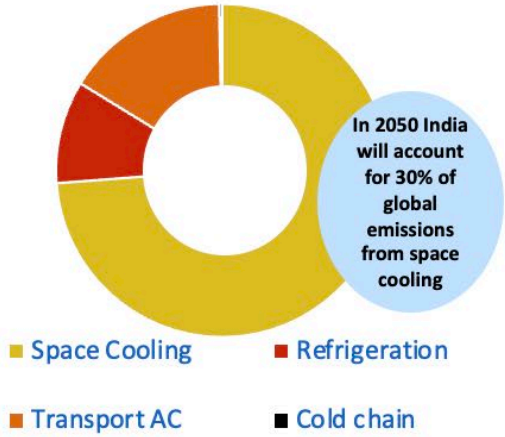
Cooling Matters: Triple Threat to Climate

Rising Temperatures Deadly Threat



Protecting vulnerable communities from extreme heat

Skyrocketing cooling demand To grow 8 times by 2038



Source: *IEA Future of Cooling, 2018* (some values indicative only); *Velders et al. Future Atmospheric Abundances. 2015; India Cooling Action Plan 2019*

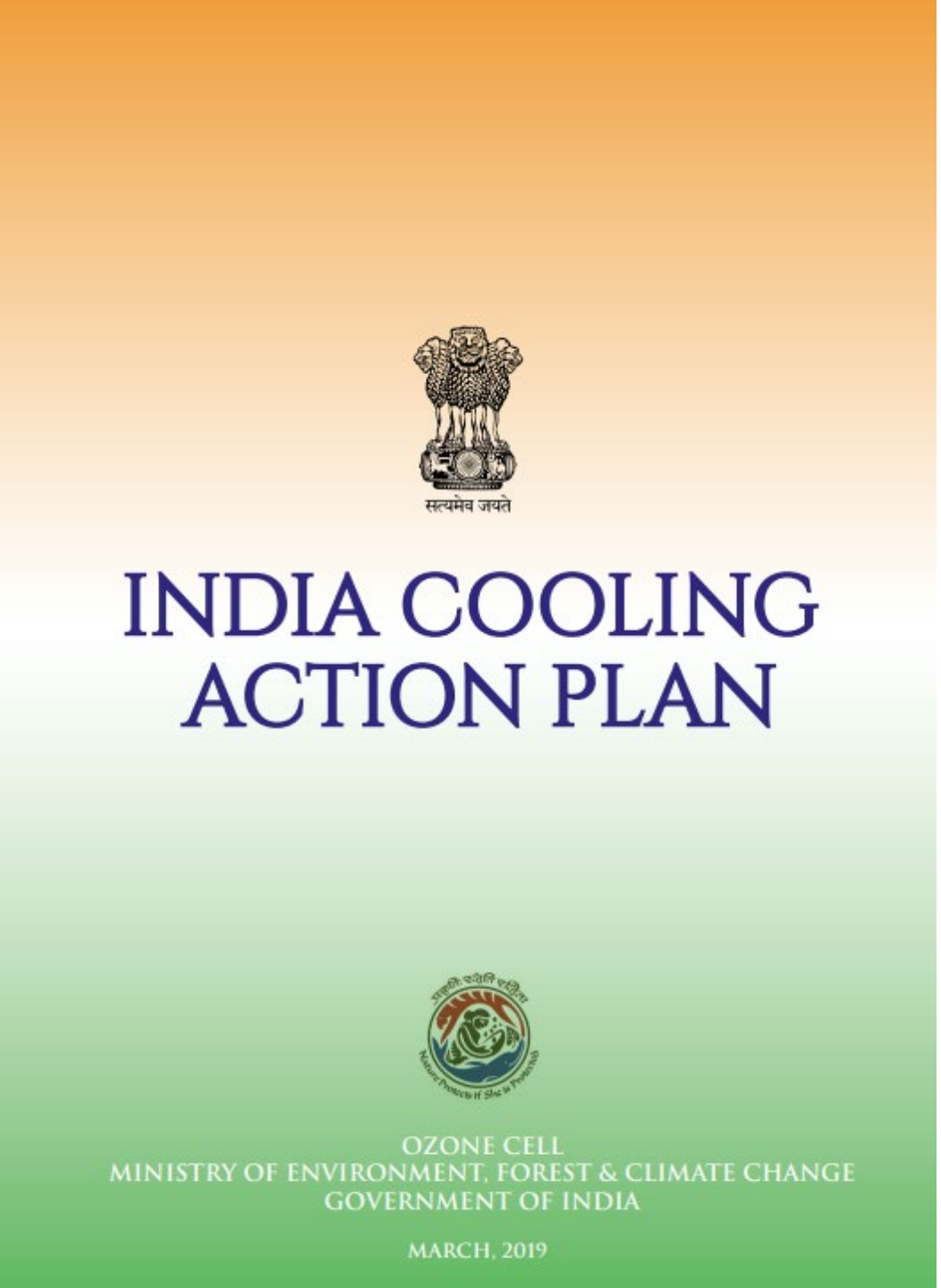
Cooling with less warming

Emerging Economy, Rapid Urban Development

50 %

OF THE BUILDINGS THAT WILL EXIST IN INDIA BY 2030 HAVE YET TO BE BUILT

Constructing change, building smart from the start



Goals:

1) Reduce cooling demand across sectors by 20% to 25% by 2037-38

2) reduce refrigerant demand by 25% to 30% by 2037-38

3) Reduce cooling energy requirements by 25% to 40% by 2037-38

4) recognize “cooling and related areas” (area of research under National Science and Technology Programme)

5) Training and Certification of 100,000 servicing sector technicians by 2022-23

City Level Cool Roof Programs

- In 2017 and 2018, the cities of Ahmedabad and Hyderabad initiated pilot cool roof programs.

- In Telangana, MAUD and GHMC piloted the cool roofs program focused on 25 low-income households.

Impacts of Cool Roofs

Source: LBNL, SPM Thermoshield (USA and India), Satyam, IIIT Hyderabad

Conditioned building: Satyam Learning Centre –Hyderabad, Telangana

Black to white:

reflectance of the roof was increased (0.10 to 0.70, an increase of 0.60)

- Annual savings 20-22 kWh/$m^{2,}$
- Percentage savings from 14-26%

Concrete to white:

(0.30 to 0.70, an increase of 0.40)

- Annual savings 13-14 kWh/m^2,
- Percentage savings: 10-19%

Ahmedabad Cool Roof Pilot

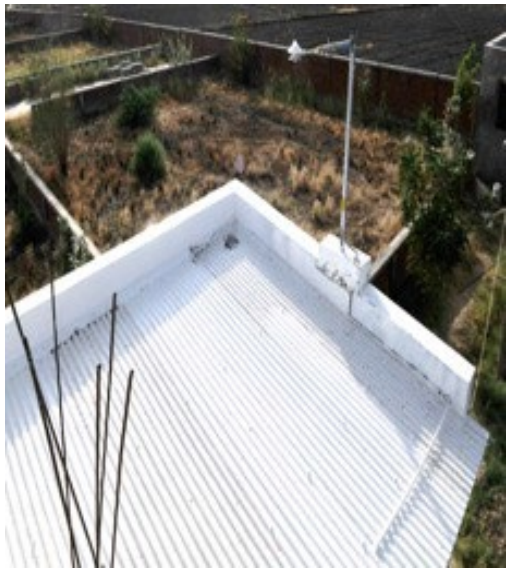
In 2017, AMC unveiled a cool roofs initiative as a part of the updated Ahmedabad Heat Action Plan 2017

Outreach and Awareness measures

Impacts of Cool Roofs

Grey galvanized roof

Galvanized Roof with cool coat



Source: Cool Roof for Low Income Group Housing: Master's Thesis, Saumya Ranjan Sahoo

Low Income Housings- Ahmedabad

Reduction in mean radiant temperature of over 3°C in peak summers

Project on Cool Roofs Implementation

- NRDC and Mahila Housing Trust (MHT) painted roofs of selected vulnerable community households with solar reflective paint, as demonstration projects, in four cities-- Ahmedabad, Bhopal, Jodhpur and Surat

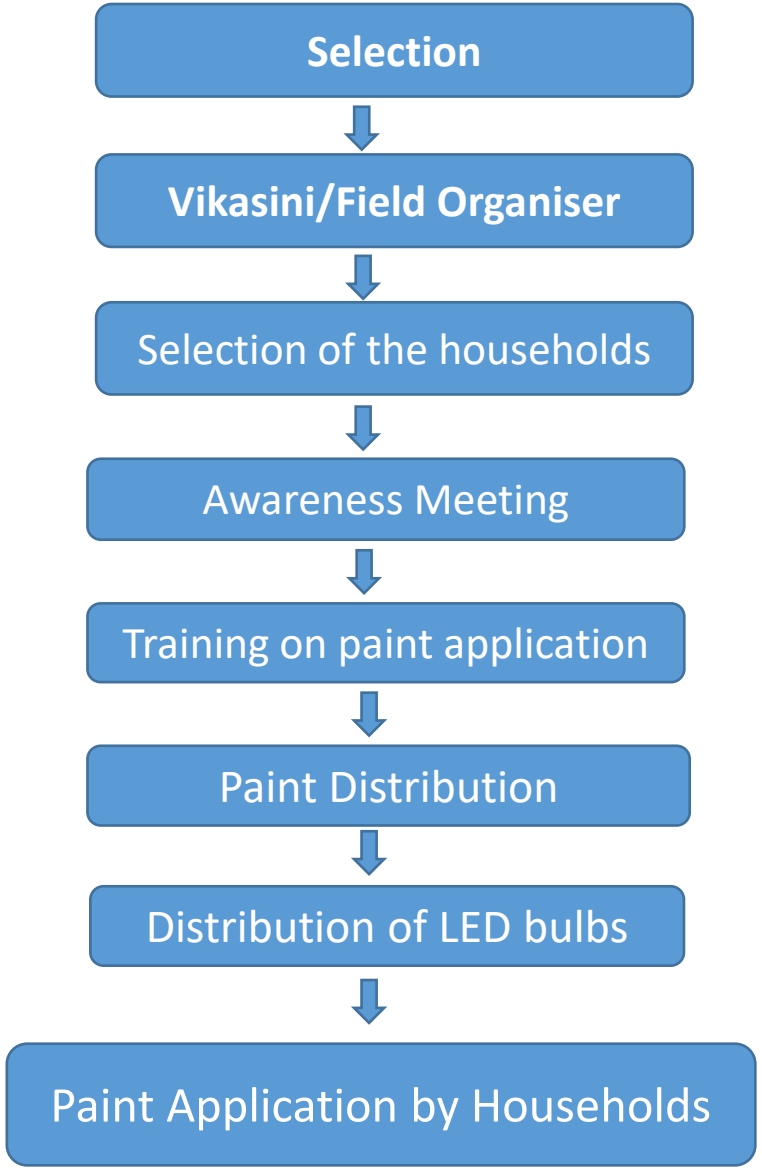
Project on Cool Roofs Implementation in Cities of Ahmedabad, Bhopal, Jodhpur and Surat

Reducing heat stress

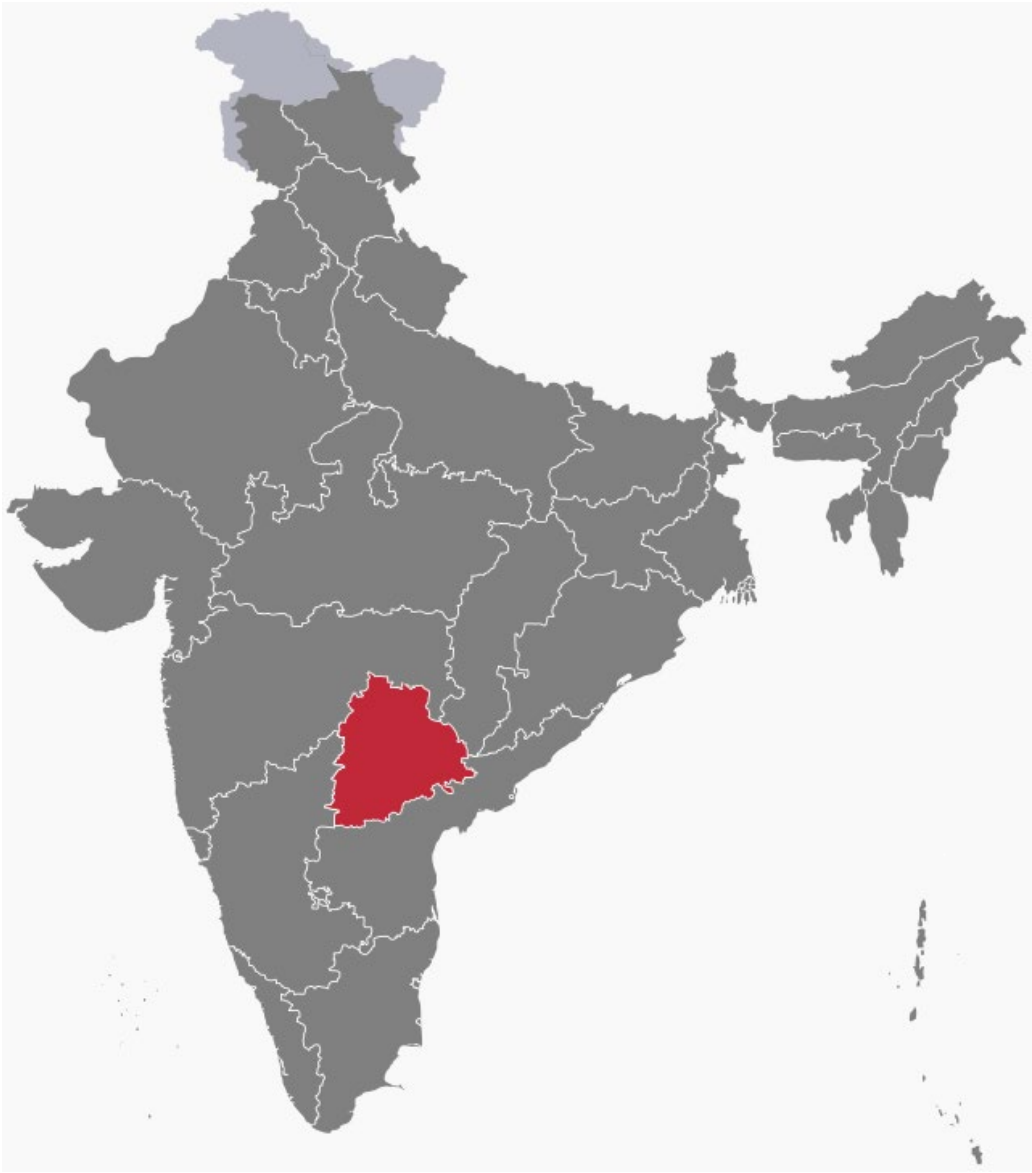
Outreach on cool roofs as heat mitigation technology

Skill development of households

Implementation Steps



Telangana



Telangana Statewide Cool Roofs Policy Objectives

Drive rapid state-wide adoption of cool roofs to save energy, strengthen heat resilience and increase thermal comfort.

Create a robust institutional framework to implement the city-wide cool roof application.

Identify financing frameworks and undertake outreach to spread awareness of building tools for implementing cool roofs.

Support workforce development and training programs for cool roof installation.

Implementation Strategy

Mandatory:

Government, Non-Residential & Commercial Buildings: Mandatory cool roofing for all the Government, Government-owned, Non- Residential and Commercial buildings irrespective of site area / built-up area.

Residential: Mandatory cool roof application for all the residential buildings that have plot area of 600 sq. yds and above. Optional / voluntary for the buildings that have plot area of less than 600 sq. yds.

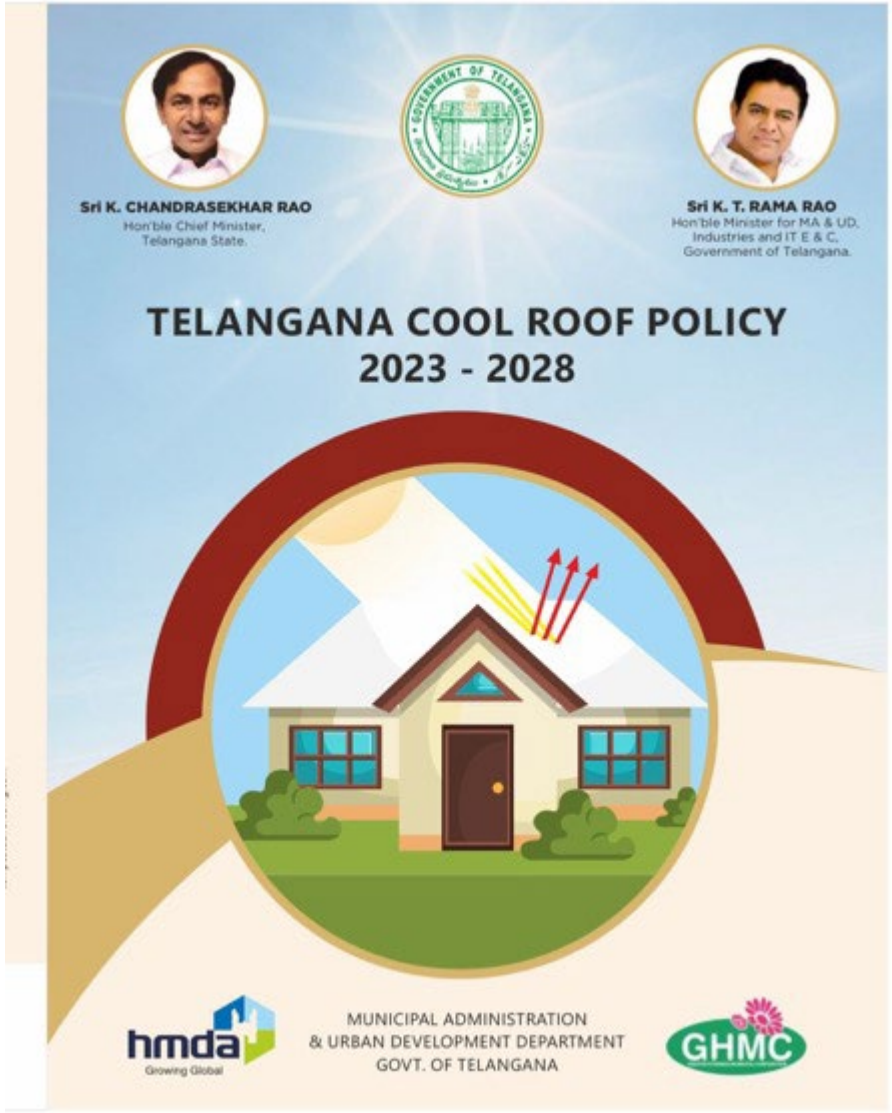
Government assisted Housing Scheme: Cool roofing for all Government low-income housing constructions.

Telangana Cool Roof Policy

Year	Hyderabad Cool roof area (sq. kms) targets for respective years	Rest of Telangana Cool roof area (sq. kms) targets for respective years
2023-24	5	2.5
2024-25	20	10
2025-26	40	20
2026-27	60	30
2027-28	75	37.5
Total Aggregated Area by 2028-2029	200	100

Telangana after implementing the cool roof policy can

- Save approximately **600 Million Units (GWh)** of electricity per year after 5 years.
- Offset **carbon emission of 30 million tonnes** in 5 years.



Development of the Telangana Cool Roof Program

1. Creation of evidence base
2. Research analysis
3. Demonstration projects with city government
4. Extensive Stakeholder Consultations (government departments, building developers, manufacturers etc)
5. Market survey of available materials
6. Mapping of different departments and stakeholders roles in implementation of city cool roof programs
7. Development of the draft components of the cool roof program in close consultation with the city government
8. Draft open for public commenting
9. Release of cool roof program by the state/city government
10. **Next steps:**
    - **Issue of government orders for implementation**
    - **Outreach and awareness program**
    - **Vendor listing, creation of cool roof council, etc**.

Creating an ecosystem for implementation

- Mechanisms for quality assurance
- Training and Capacity Building
- State level monitoring
- Types of cool roof materials
- Studies on impact

Resources

- www.nrdc.org
- www.nrdcindia.org
- Frequently Asked Questions: Cool Roofs (Fact Sheet)
- Climate change and 2030 cooling demand in Ahmedabad, India: opportunities for expansion of renewable energy and cool roofs (Paper)
- Telangana Cool Roof Policy

THANK YOU

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NRDC INDIA PROGRAM