

*f*AIR CONDITIONING

Climate Justice & the Built Space

Why air conditioning India is not enough and why we must 'Fair' condition it.



Climate



Justice



Airconditioning



Justice

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the Head – *Environment, Economy, Education, Profession*

the Head - Economy

Figure 2. Building Energy Consumption in India

ENERGY
CONSUMPTION



Commercial and residential buildings
Everything else

ELECTRICITY
CONSUMPTION



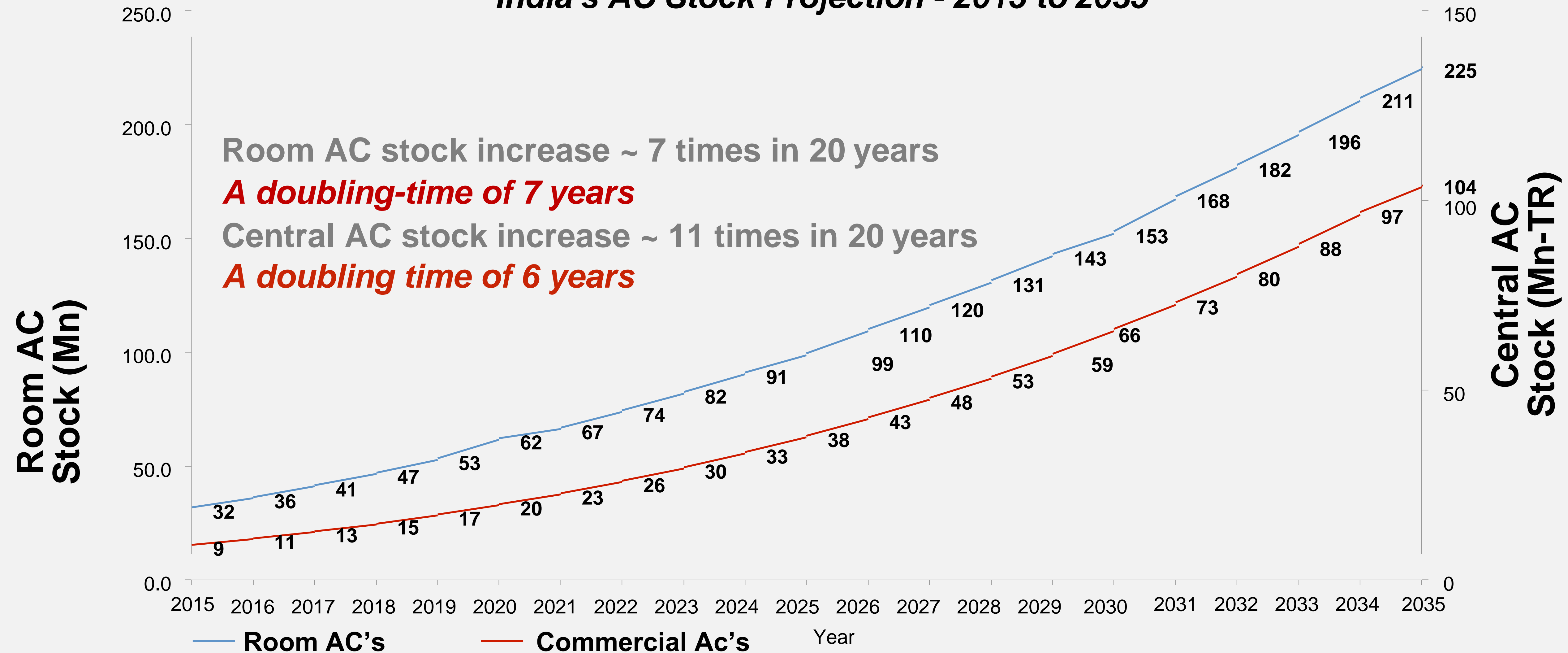
70%

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

Source: Energy Conservation and Commercialization (ECO-III), 2010.

the Head - Economy

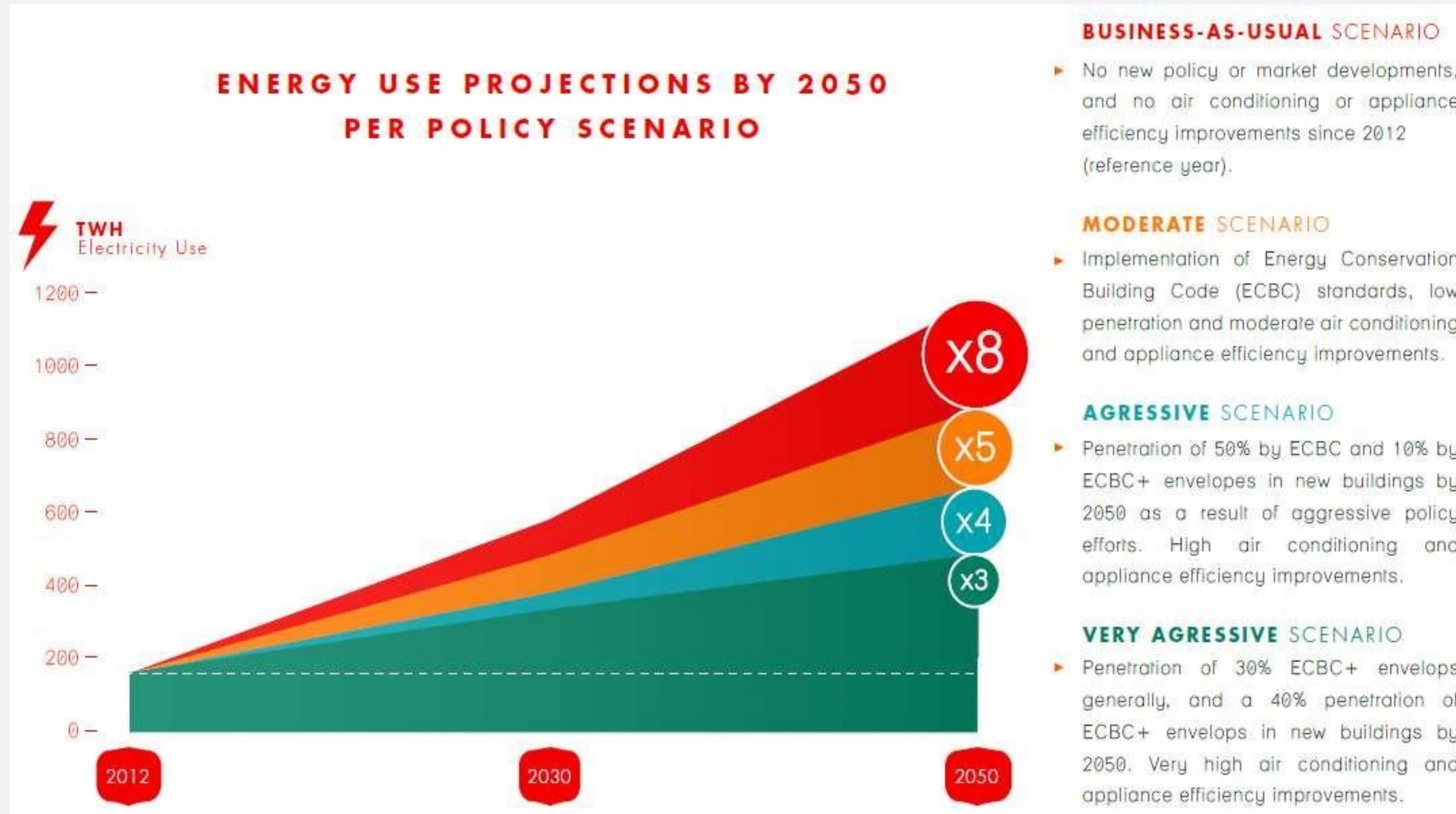
India's AC Stock Projection - 2015 to 2035



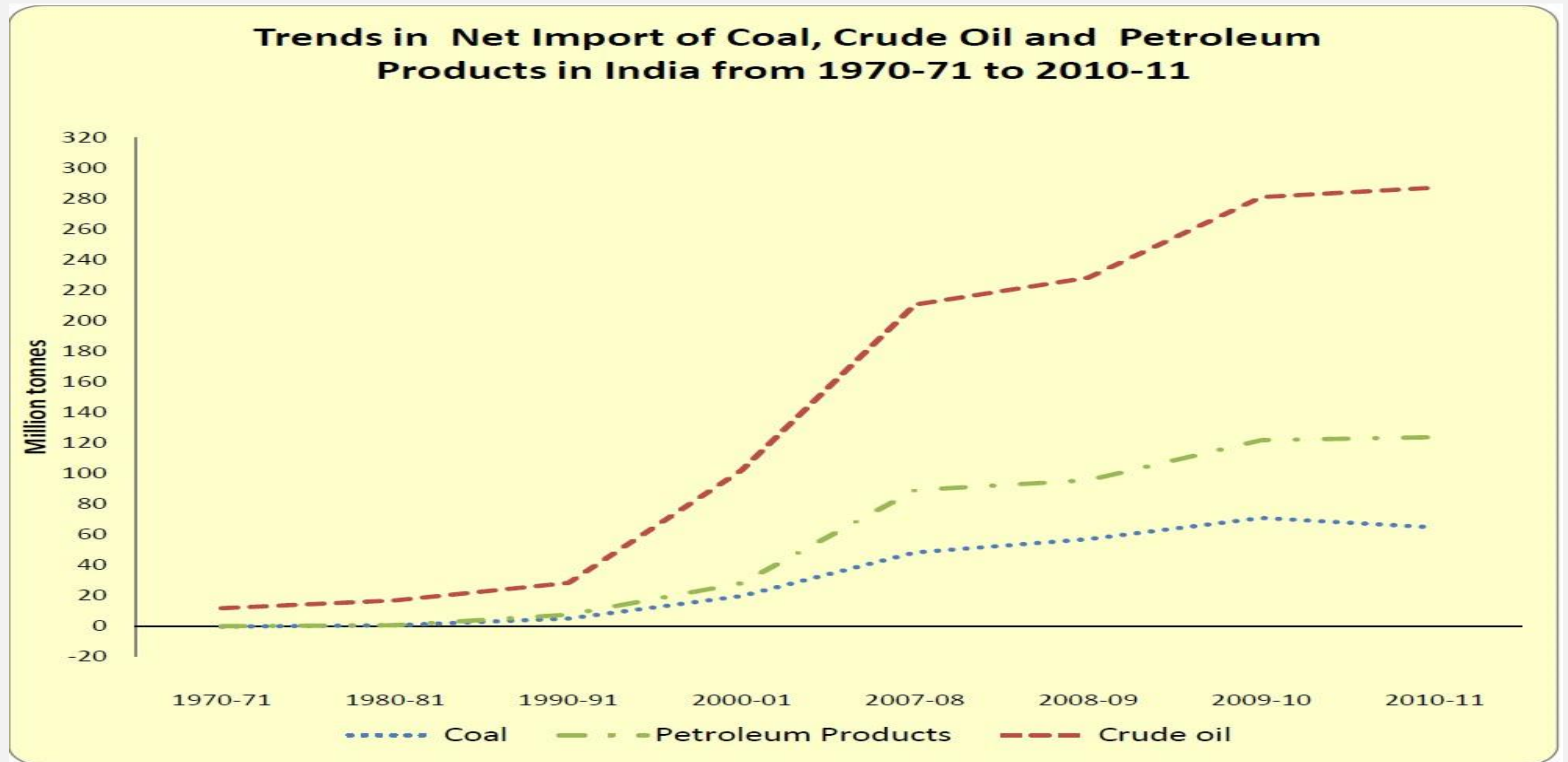
Source: Fairconditioning & Chaturvedi V, Sharma M, Chattopadhyay S, and Purohit P. HFC emission scenarios for India. CEEW report

the Head - Economy

- In a Business-As-Usual Scenario, energy use from Indian buildings ~ 5 fold increase between 2012 and 2030
- Residential building energy consumption ~ 8 fold increase

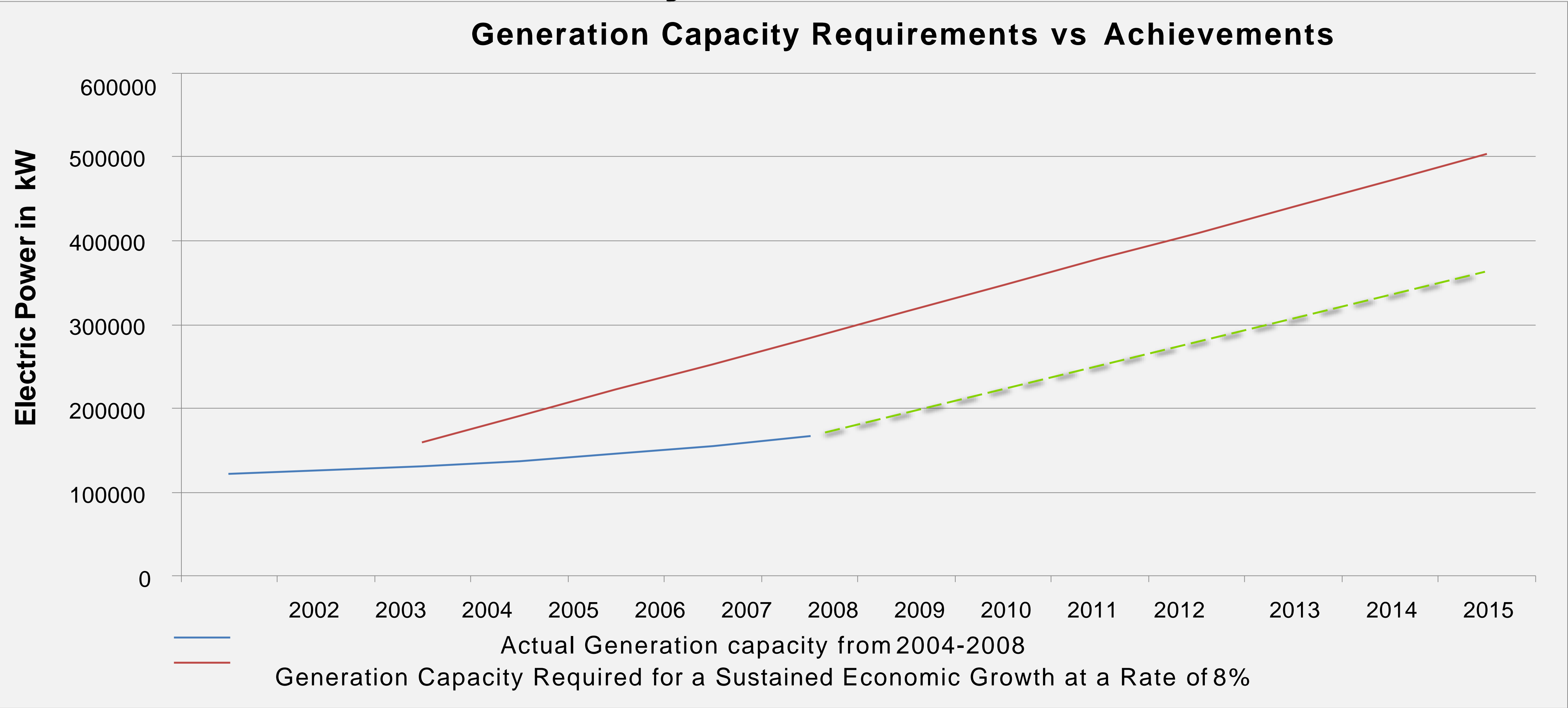


the Head - Economy



Source: Energy Statistics 2012 Central Statistics Office, Ministry Of Statistics And Programme Implementation , Govt. of India

Electricity Scenario in India



Source: Central Electricity Authority General Review 2006 & 2009 and Planning Commission's Integrated Energy Policy Report 2006

the Head - Economy

Energy Demand in India by 2030

The requirement

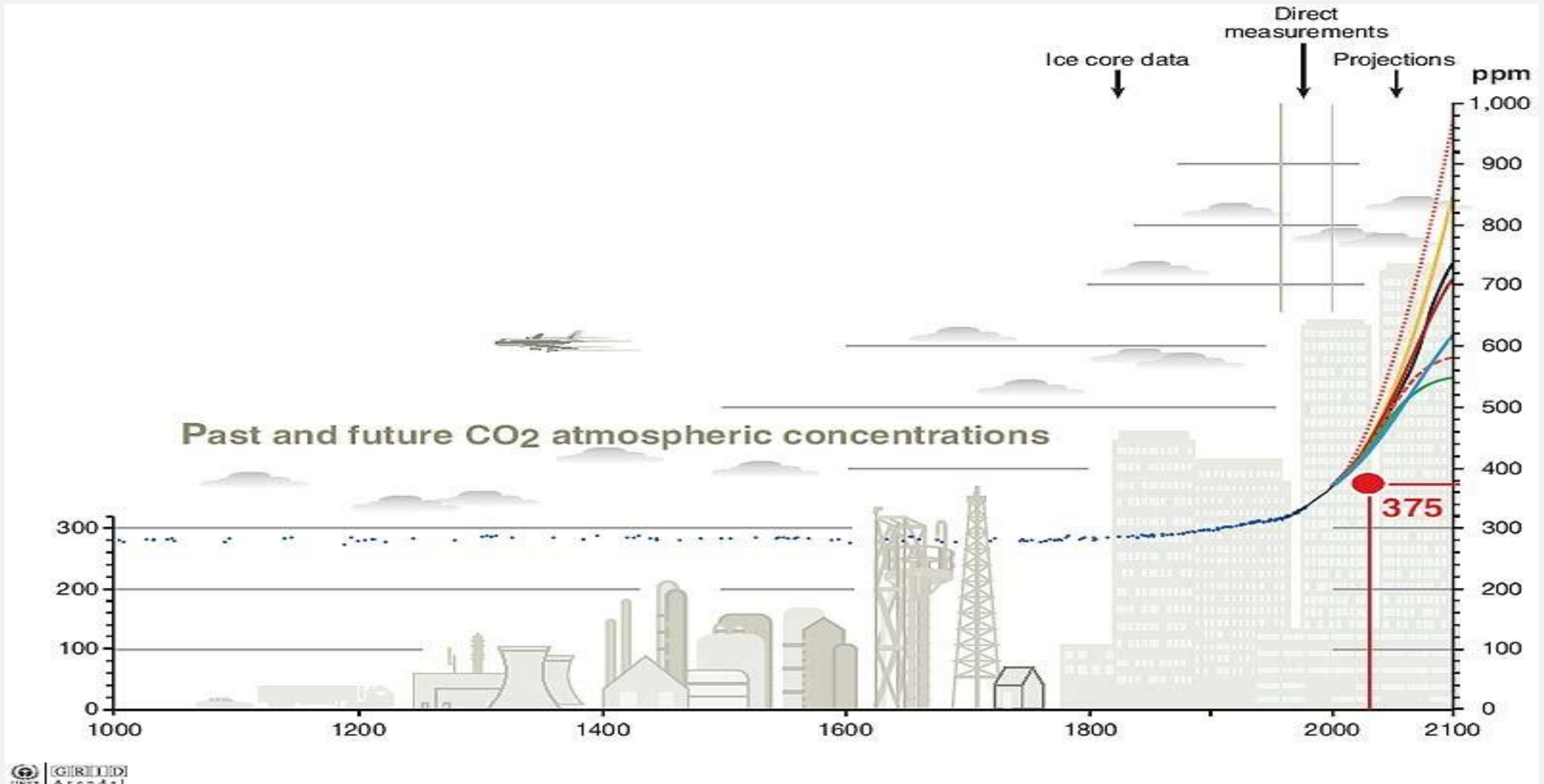
× 4

The availability

?

Source: Schneider Electric:Energy Efficiency

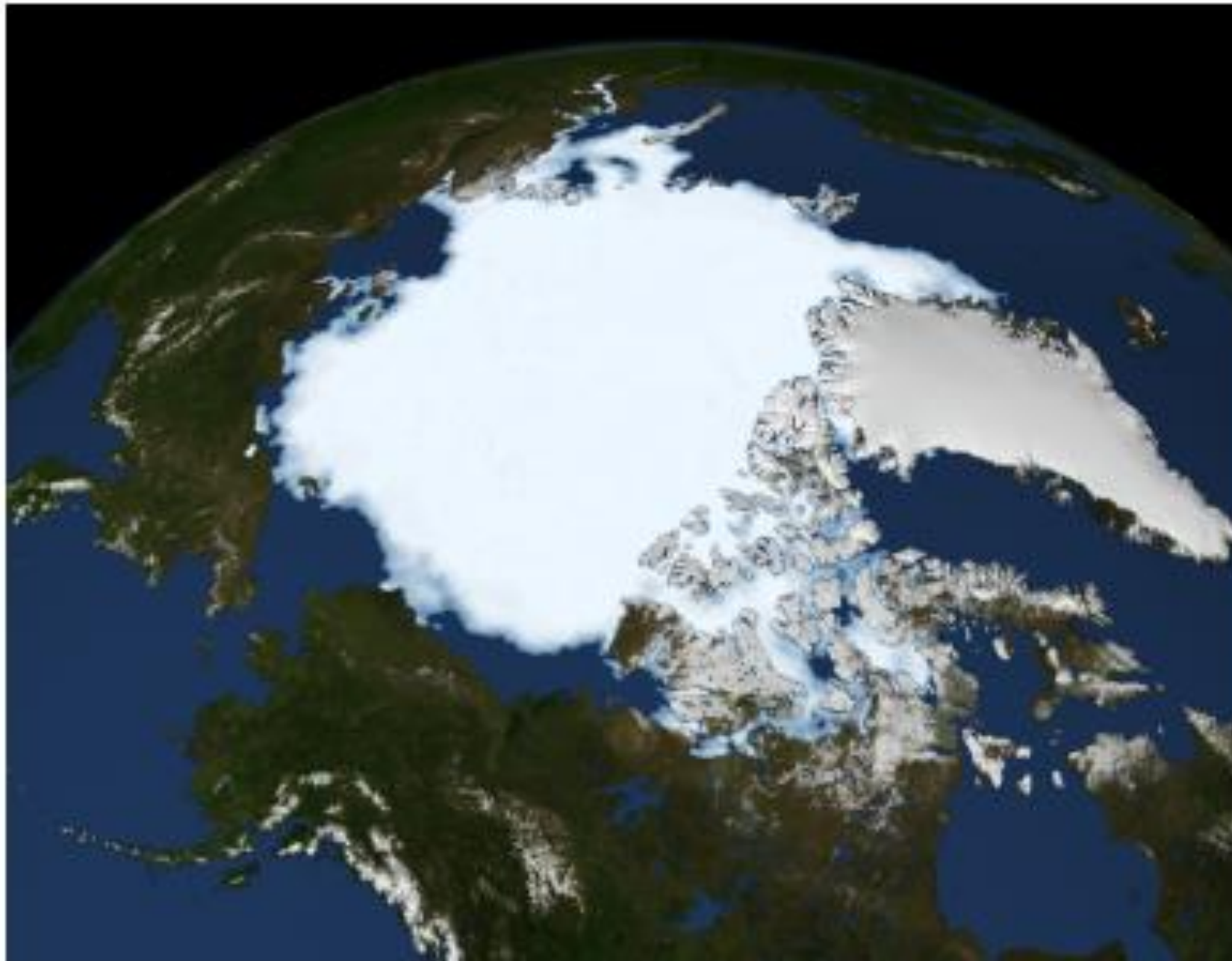
the Head - Environment



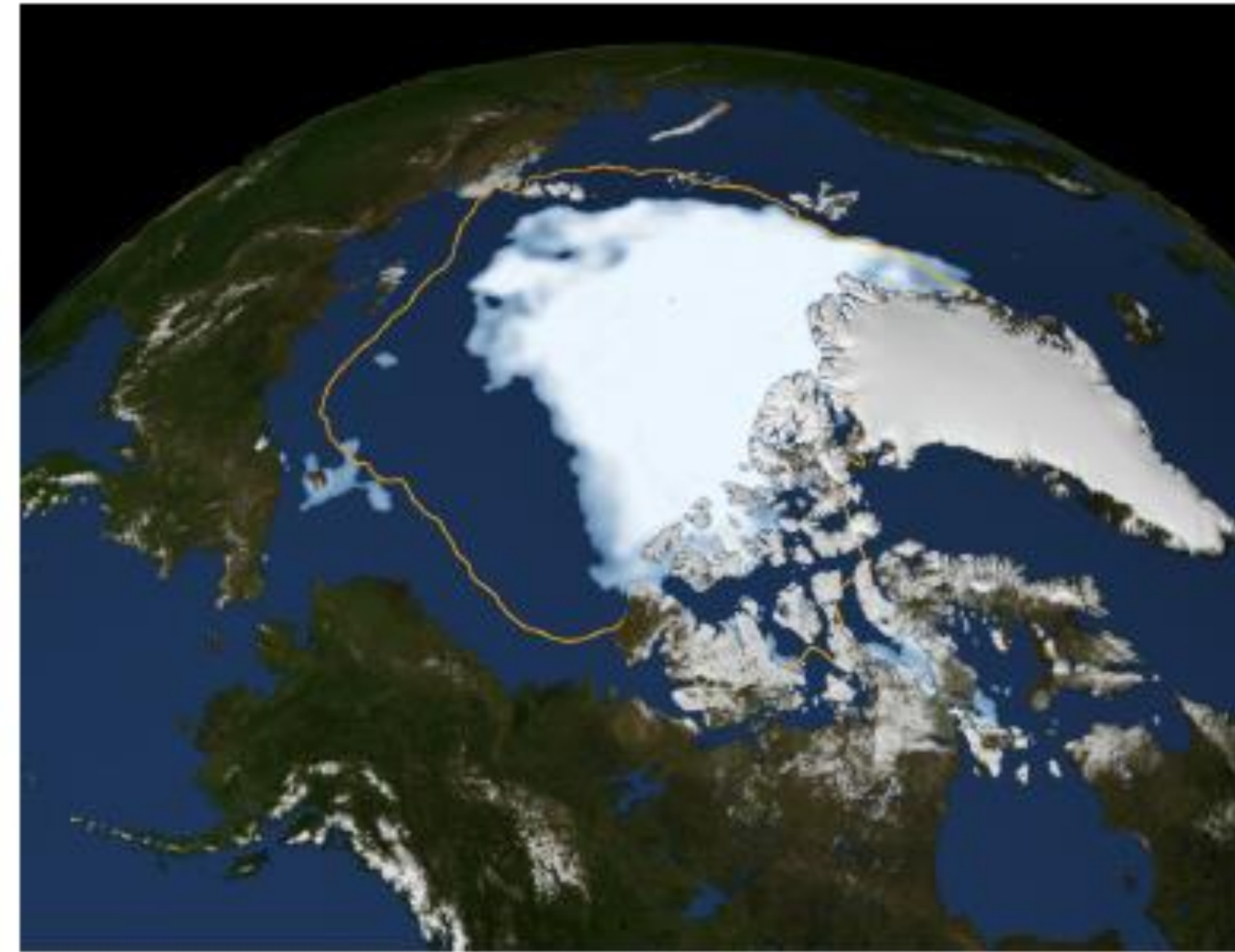
Source: Vital Climate Graphics based on the IPCC's Third Assessment Report (TAR) Copyright © 2005: UNEP, UNEP/GRID-Arendal

the Head - Environment

1980

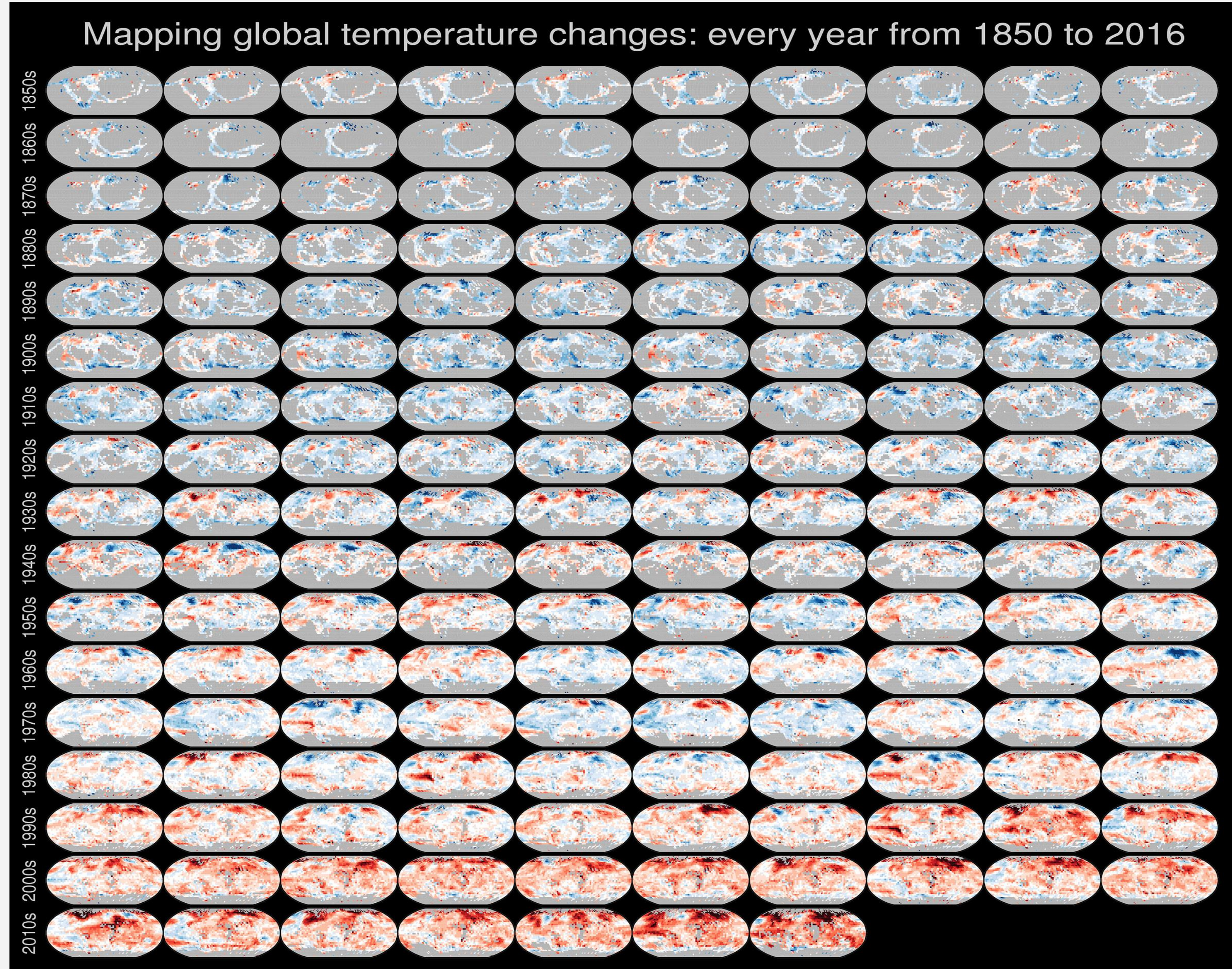


2012



Source: NASA, 2013

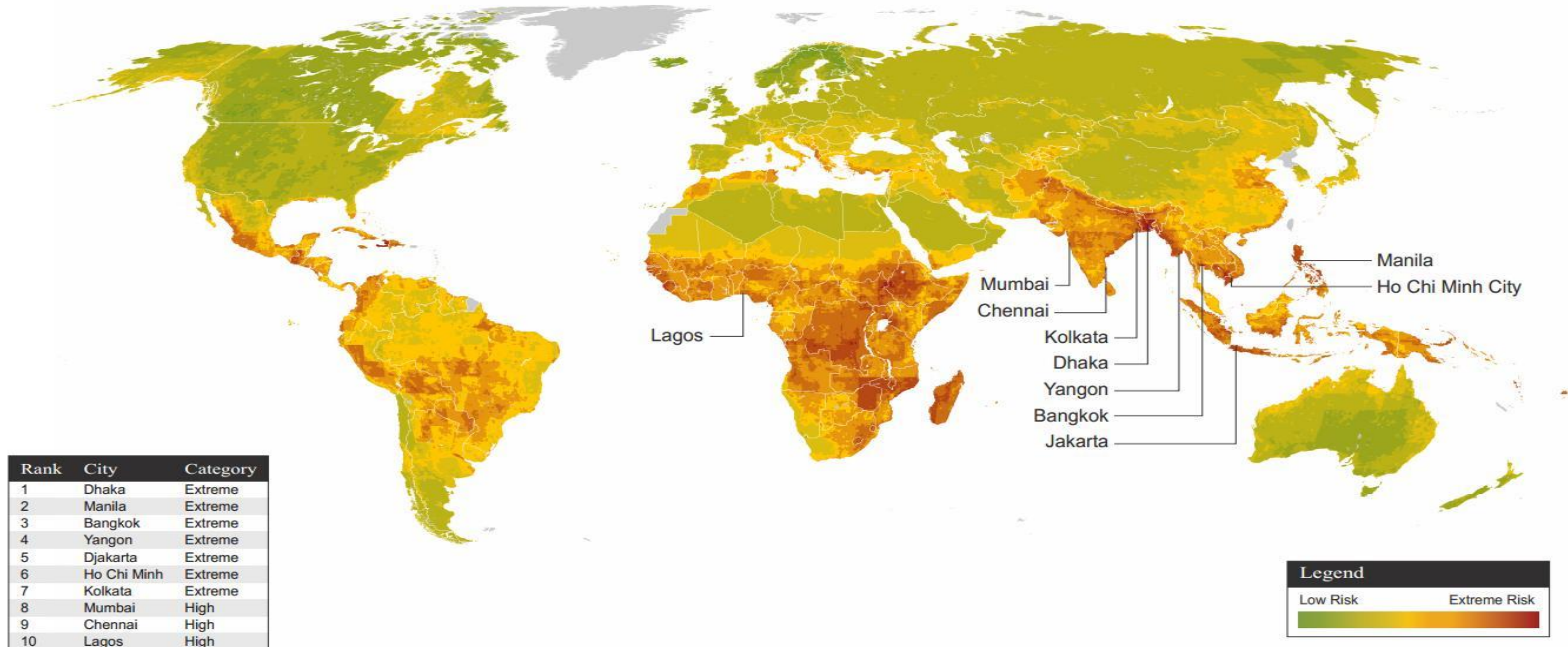
the Head - Environment



Source: HadCRUT4.4 dataset, Ed Hawkins Climate scientist
in the National Centre for Atmospheric Science (NCAS),
University of Reading

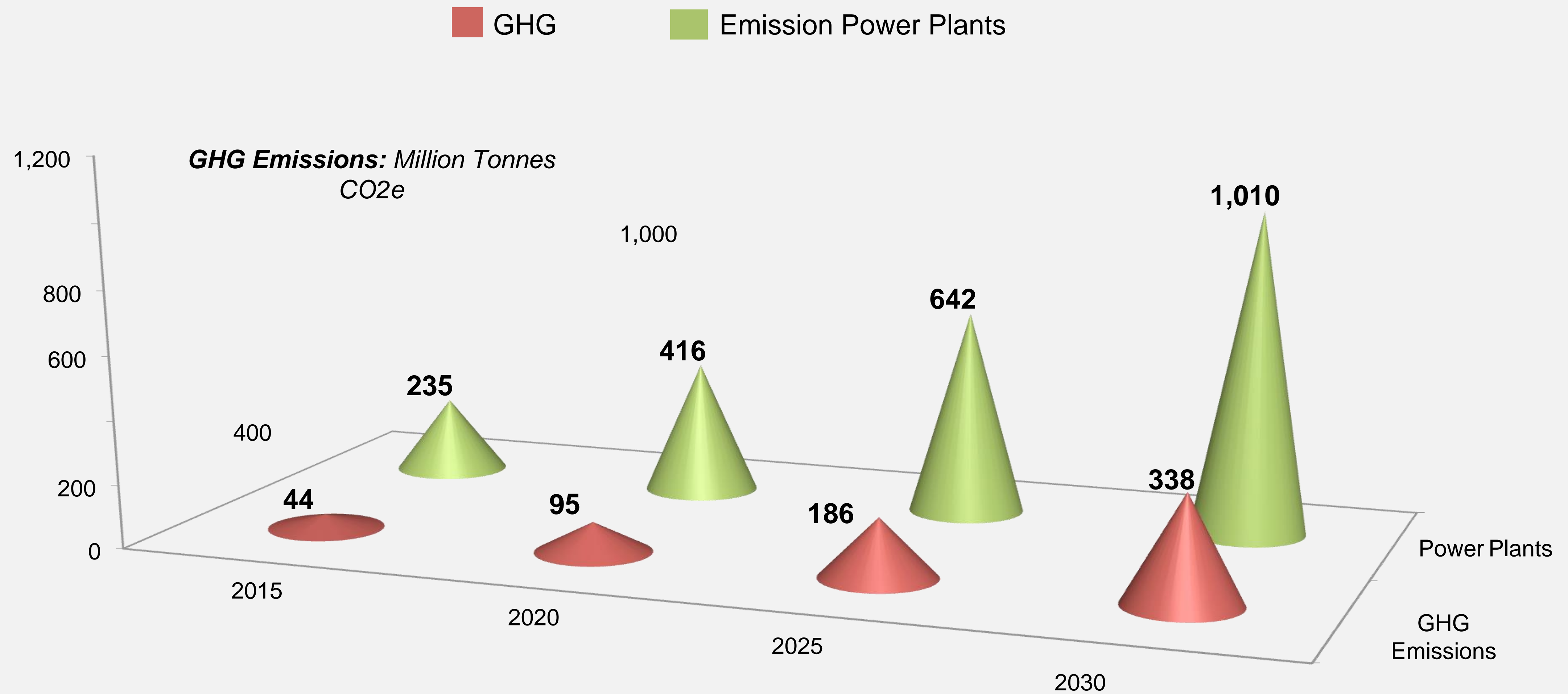
the Head - Environment

Climate Change Vulnerability Index 2013 – Most at risk cities



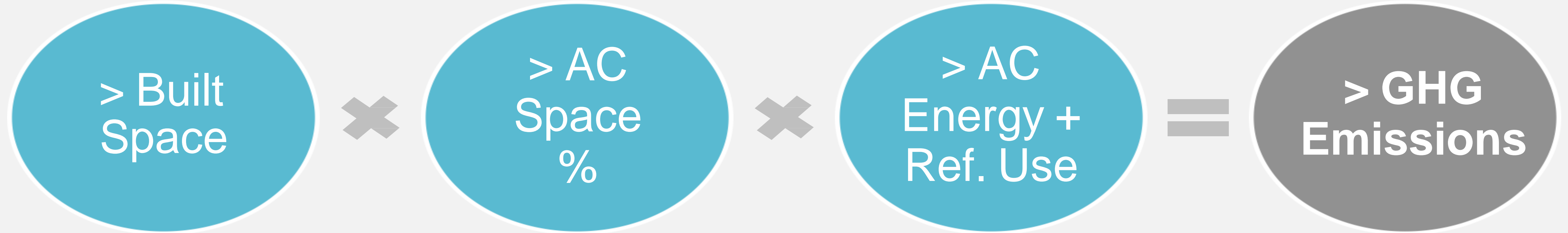
the Head - Environment & Economy

Power Plants & GHG Emissions from ACs - 2015 to 2030



Source: Fairconditioning

the Head - Environment & Economy



the Head - Profession

Analysis by the Centre of Science and Environment (CSE) has revealed that several green rated buildings across the country are underperforming and guzzling more energy¹

A promising idea when spawned, 'Green Building Certification' is now routinely described as a largely 'paper-work' exercise by Green Building consultants²

It is our view that energy-efficiency / sustainability in buildings cannot effectively be wrought with a top-down approach because of:

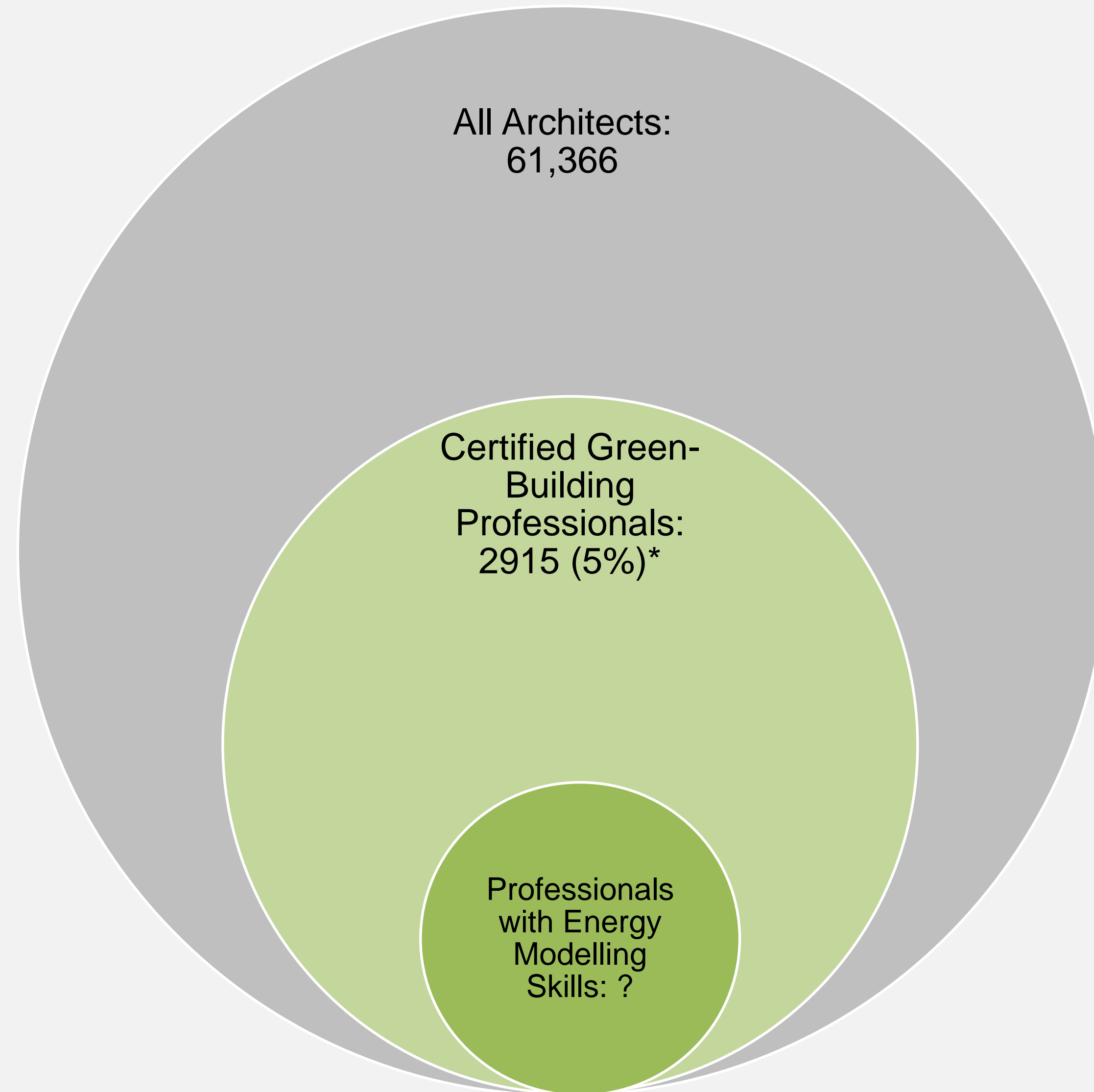
- affliction of poor oversight and monitoring by administrative bodies in India, and;
- tendency and ability of the built-space supply chain to circumvent rules imposed without rigorous debate and popular patronage

Hence the imperative need to build capacity, and create motivation among the front-line – architects, HVAC engineers, to internalize energy-efficiency and sustainability as a 'default', a non-negotiable value rather than a 'value imposition' or even a 'value addition'

1. [CSE warns against green rating of buildings becoming 'green wash' with no real benefits](#), Pune, Nov. 2015

2. qualitative surveys of green building consultants conducted during workshops by Fairconditioning

the Head - Profession



the Head

In 2017

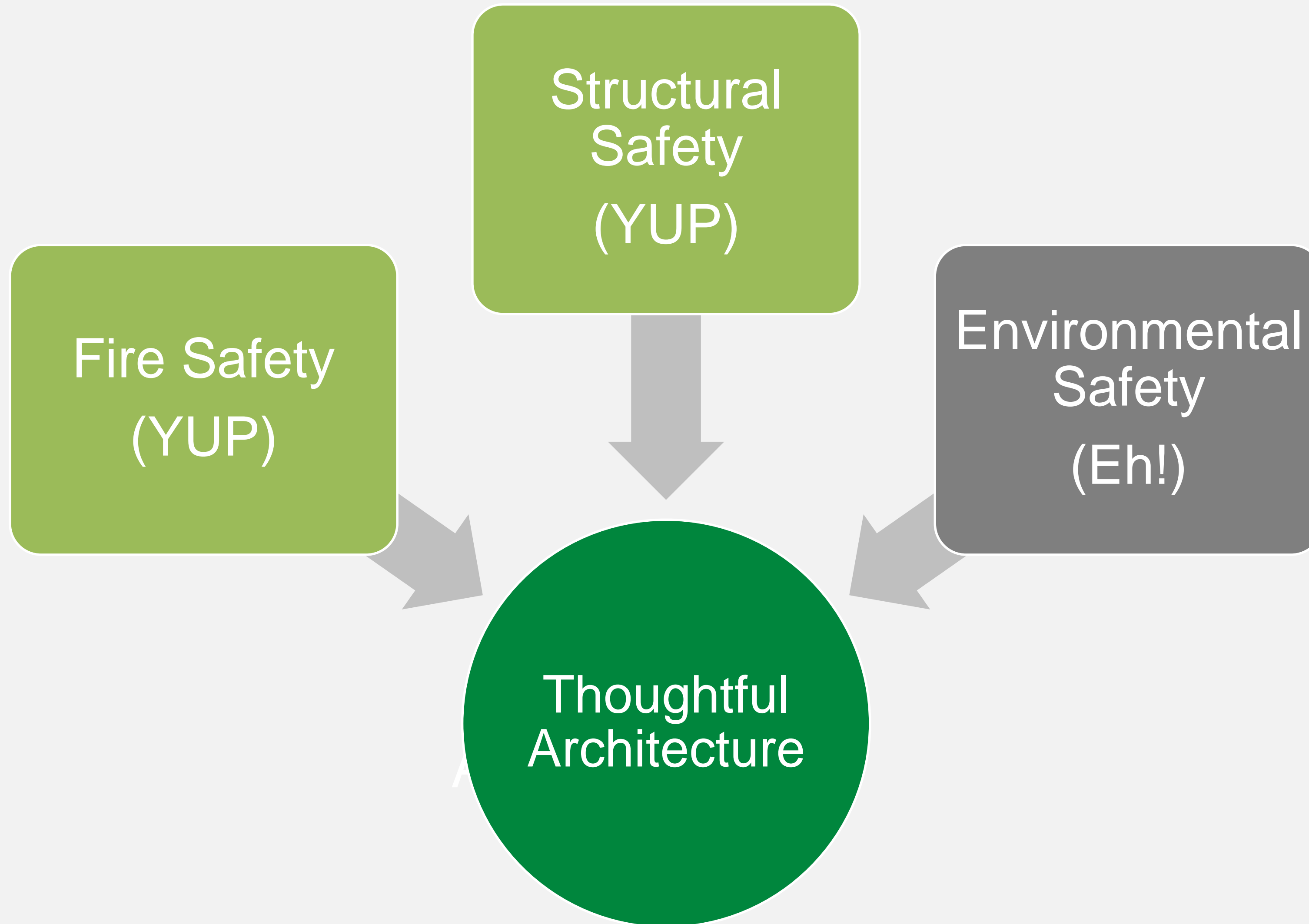
Of India's 61,366 Architects, only **5% (2,915)** are **certified green building professionals**, and even fewer possess sophisticated analytical skills to designing environmentally responsible buildings

In 2030

AC GHG Emissions from India ~ 338 Million Tonnes CO₂e per year
~ **1.35 Billion Trees** required per year

the Heart – *Responsibility, Justice, and Ethics*

the Heart - Responsibility



the Heart - Ethics

A promising idea when spawned, 'Green Building Certification' is now routinely described as a largely 'paper-work' exercise by Green Building consultants*.

A typical Split-Unit AC* in India ~ 25 ceiling fans

41 million AC users cause power cuts depriving 25-fold the number of persons of power to operate fans during India's harsh summers

Source: qualitative surveys of green building consultants conducted during workshops by Fairconditioning



Reality Check:

It's a **humanitarian** issue,
not '*just*' an **environmental** issue.

the Heart -Justice

Vulnerable Region	Migrant Levels in 2100
West Bengal	~10 million
Coastal Maharashtra (around Mumbai)	~10-12 million
Coastal Tamil Nadu	~10 million
Coastal Andhra Pradesh	~6 million
Gujarat	~5.5 million
Coastal Orissa	~4 million
Western Rajasthan	~1.4 million
Northern Karnataka	~1.3 million
Madhya Pradesh	~1.2 million
Interior Maharashtra	~1 million
Northern Andhra Pradesh	~1 million
Southern Bihar	~1 million

TABLE 3.
REGIONS IN INDIA THAT WILL LIKELY EXPERIENCE THE HIGHEST LEVELS OF OUT-MIGRATION DUE TO SEA LEVEL RISE AND DROUGHT/GLOBALIZATION.

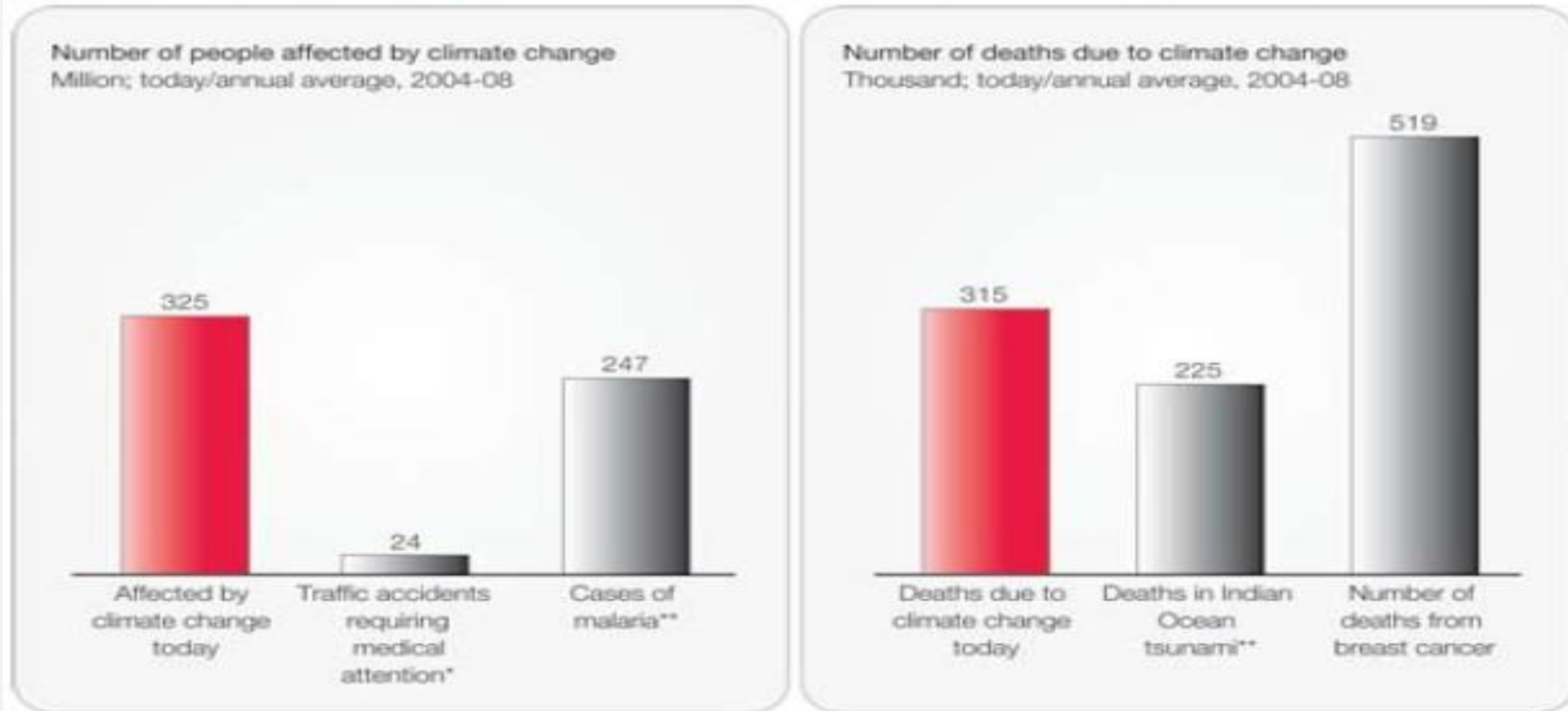


**CLIMATE MIGRANTS IN SOUTH ASIA:
ESTIMATES AND SOLUTIONS**

Department of Humanities and Social Sciences,
Indian Institute of Technology Madras.

the Heart - Justice

Figure 1 — Comparing human impact of climate change today with other global challenges

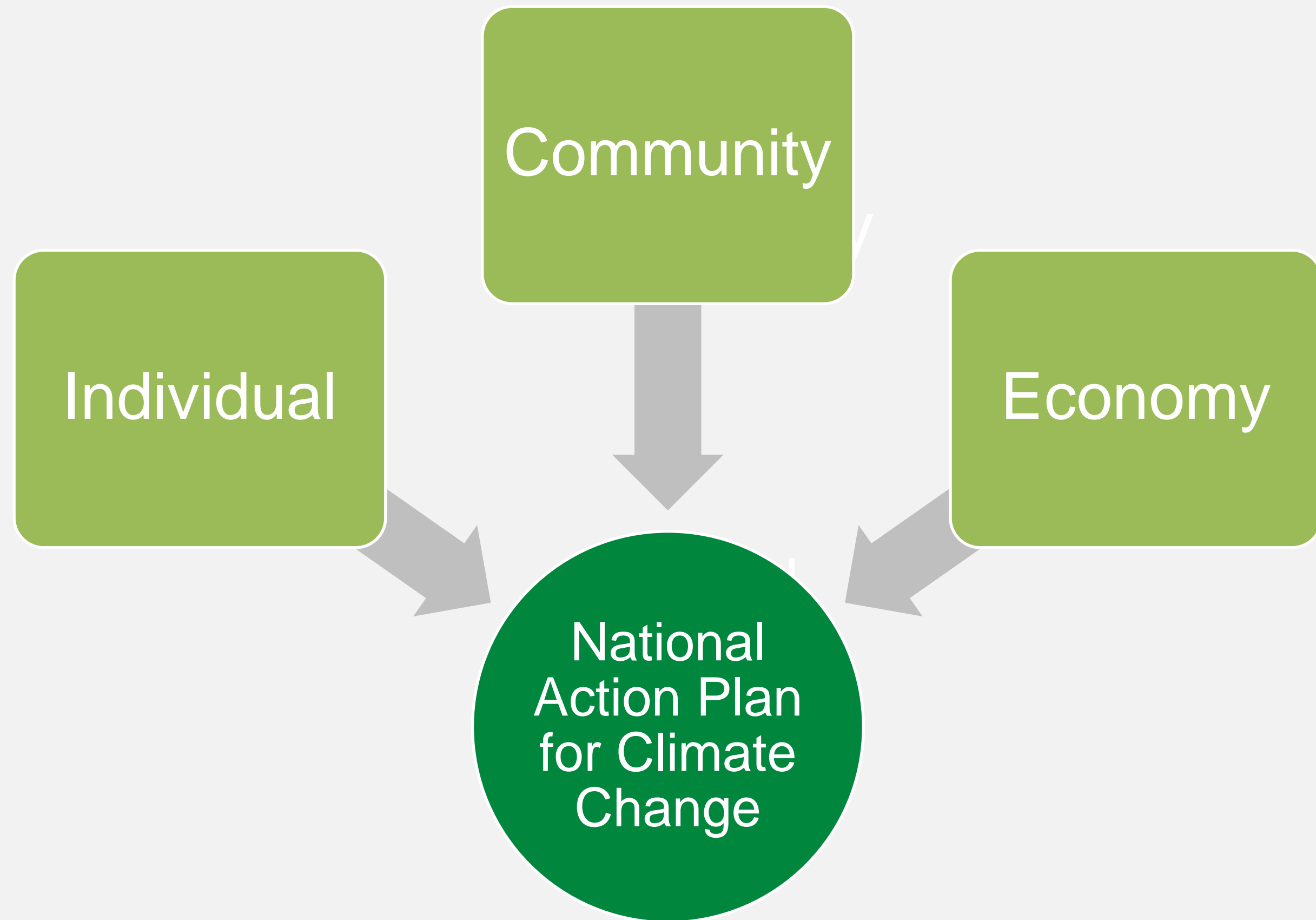


* 2004 **2006

Source: WHO World Malaria Report, 2008; WHO. (2004): "The global burden of disease: 2004 update."; McMichael, A.J., et al (2004): "Chapter 20: Global Climate Change" in Comparative Quantification of Health Risks. WHO; Munich Re; CRED database; Dalberg analysis

the Hands – *Targets & Solutions*

the Hands -Targets



Global GHG Mitigation GOAL

- **50% reduction by 2050** to restrict temperature rise to 2 deg C
- 15 billion tonnes of CO₂e reduction per year

Indian Commitment to UNFCCC @ COP21

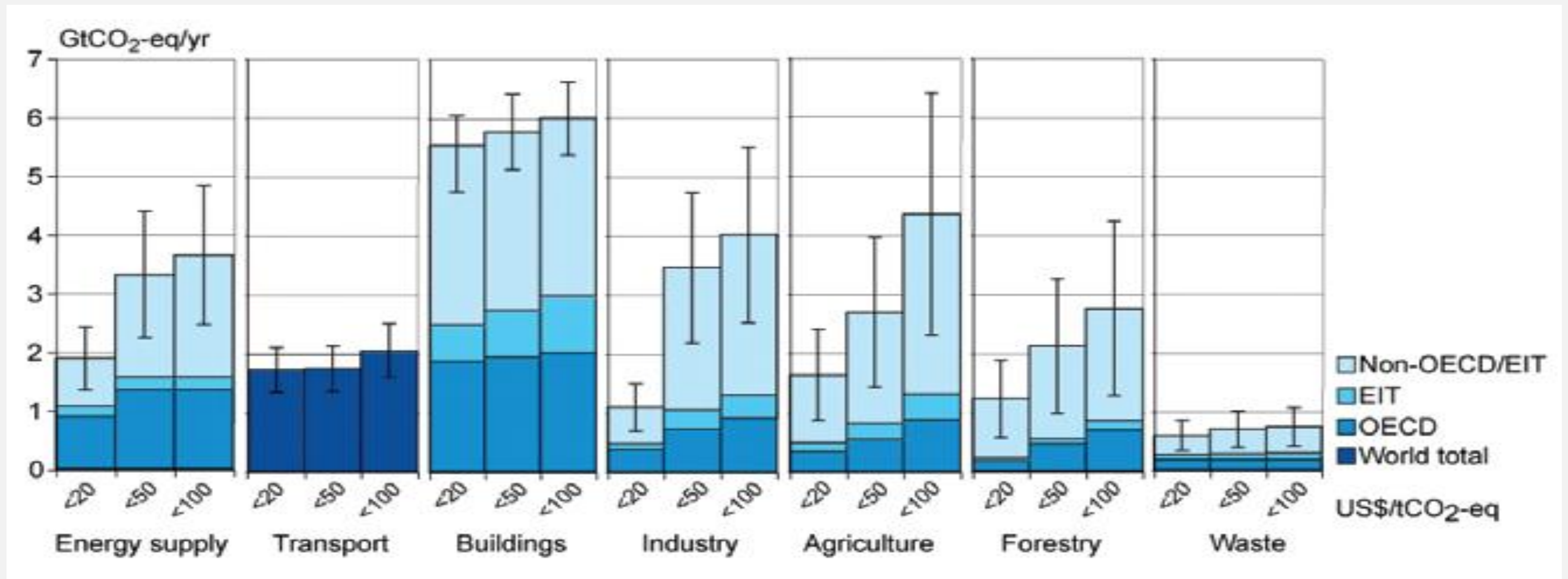
- **33-35% reduction in GHG emissions** relative to GDP from 2005 levels by 2030

Indian Commitment to Montreal Protocol @ Kigali

- **Freeze HFC consumption by 2028**
- **Emission Cuts Timeline (2024-26 baseline):**
 - 2032 – 10%
 - 2037 – 20%
 - 2042 – 30%
 - 2047 – 85% (plateau)

the Hands - Solutions

The 4th IPCC assessment states that the greatest potential for reducing GHG emissions are from the building sector and the highest potential and cheapest method was to do so in developing countries.



the Hands - Solutions

Be Lean

- reducing building cooling loads
- adaptive thermal comfort
- **passive cooling**
- building code
- **affordable thermal comfort in low-income housing**

Be Mean

- energy efficient/star-labelled HVAC
- district cooling
- **sustainable cooling technologies**
- smart HVAC controls
- demand reduction programmes

Be Green

- **natural/low-GWP refrigerants**
- **solar air-conditioning**
- trigeneration

the Hands - Solutions

- Energy Consumption of efficient buildings **50%** < than conventional buildings
- Workers in green certified buildings score 26.4% higher on cognitive function test and have 30% fewer sick building symptoms than those in non-certified buildings*¹
- Doubling the ventilation rate from ASHRAE minimum cost \$40 per person per year but improved the performance by 8%; \$6500 increase in employee productivity each year*²

^{*1} Source: MacNaughton P, Satish U, Laurent JGC, Flanigan S, Vallarino J, Coull B, Spengler JD, Allen JG, *The impact of working in a green certified building on cognitive function and health, Building and Environment* (2016), doi: 10.1016/j.buildenv.2016.11.041

^{*2} *Economic, Environmental and Health Implications of Enhanced Ventilation in Office Buildings* Piers MacNaughton, James Pegues, Usha Satish, Suresh Santanam, John Spengler and Joseph Allen, *Int. J. Environ. Res. Public Health* 2015, 12, 14709-14722; doi:10.3390/ijerph121114709

the Hands - Solutions

Potential

Average office building

- 250 kWh/m².year
- 14 Rs/ft².month
- 1400 Rs/employee/month

Best-in-class office building

- 60 kWh/m².year
- 3.25 Rs/ft².month
- 325 Rs/employee/month

Even just 25% of the Energy Efficiency opportunity is worth:

- ✓ 2.5 Rs/ft².month
- ✓ 250 Rs/employee/month

the Hands - Solutions

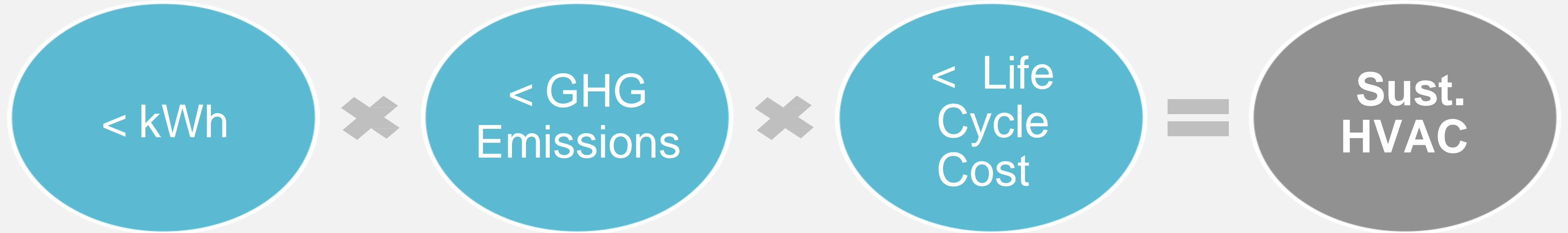
Potential

Infosys Pocharam SDB 1 and 2:

- Orientation, shading
- Daylighting, high performance glazing, high efficiency lighting
- Radiant Cooling
- 1 conventionally air-conditioned wing, 1 radiant cooled wing
- Radiant cooled wing operating at 80 kWh/m²/year (business as usual – 250-300 kWh/m²/year)
- No added construction cost



the Hands - Potential



the Hands - *Intervention*

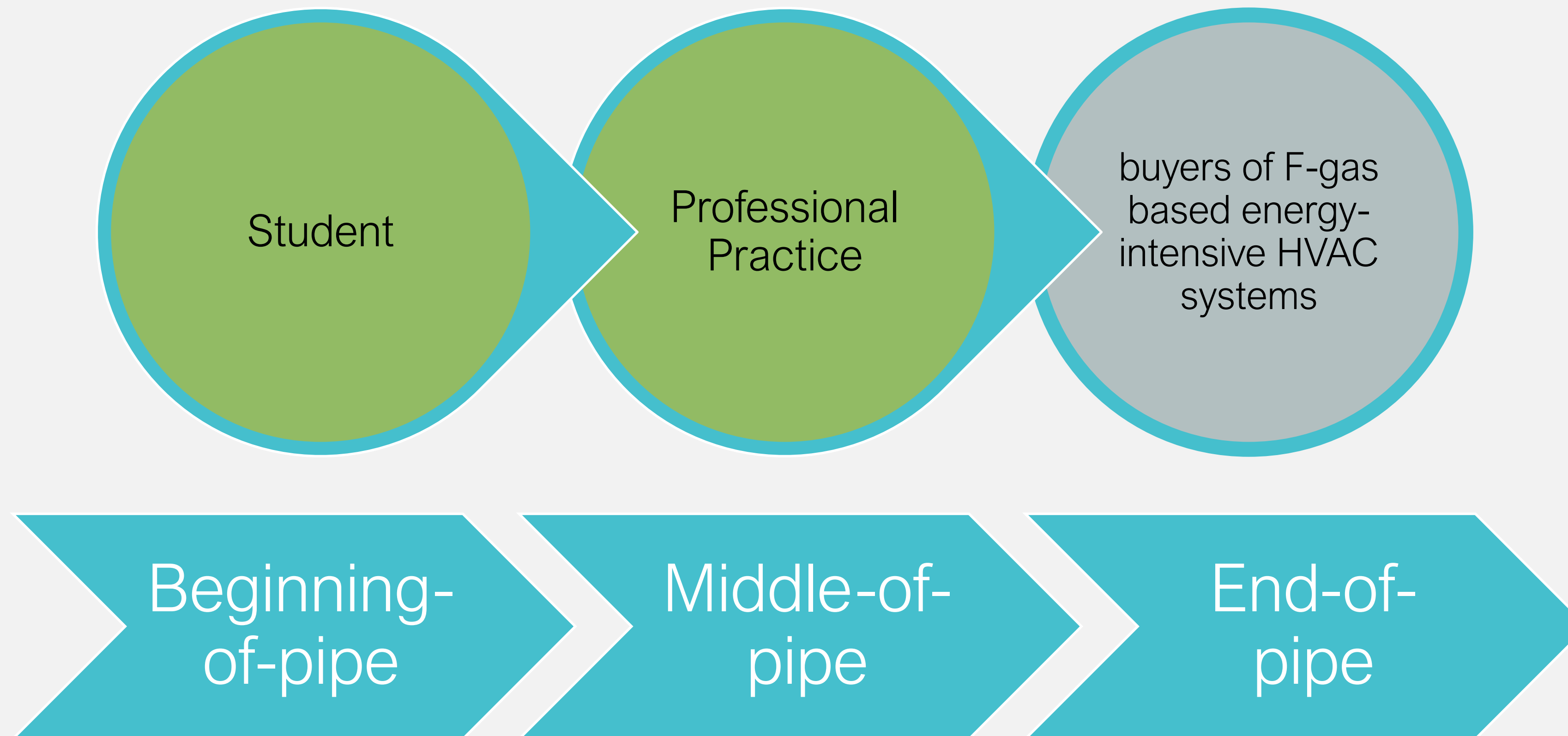
fAIR CONDITIONING

An initiative supported by



- Fairconditioning is a Building-Cooling Demand-Side-Management (DSM) related education, capacity building, and pilot implementation programme.
- It is an evidence-based policy support programme that is creating a cohesive sustainable cooling ecosystem and deriving from it, a critical mass of evidence for institutionalizing academic, professional, and corporate-level transformations to achieve behaviour change amongst occupants of conditioned indoor spaces, reduce building heat loads (cooling demands), reduce energy and GHG intensity of artificial cooling systems.
- In operation since October 2012, Fairconditioning aims to deeply integrate sustainability and efficiency into architectural and HVAC-engineering higher education curricula, into practicing architecture & HVAC consulting firms, and into commercial enterprises.

Simplified Ecosystem Diagram



fAIR CONDITIONING

The program is organized into four (4) projects that focus on:

- Education (Academic Curricula Integration Project)
- Professionals (Professional Ecosystem Support Project)
- Enterprises (Technology Adoption Project, Corporate Thermal Comfort Policy Project)

—PROFESSIONAL ECOSYSTEM SUPPORT PROJECT

This is a twin-purposed capacity building and eco-system building project. The project seeks to provide a spectrum of support services to architects and HVAC engineers to enable them to offer sustainable cooling-related design services to the building industry. Through their professional practice of offering active and passive design solutions, these professionals will play a pivotal role in reducing the principal energy load in buildings: Artificial Cooling

This project responds to the following lacunae detected amongst commercial actors (manufacturers and HVAC-related executive decision makers) in the ecosystem:

1. Deficient Tech-Support

- Deeper technical training for Sustainable Cooling Technologies required amongst Architects and HVAC engineers
- No intuitive understanding of heat load requirements and savings opportunities from sustainable cooling technologies
- Poor life-cycle-cost analysis and communication skills to convey low-life-cycle costs to clients.
- No early-stage web-based interactive decision support tool for sustainable cooling

—PROFESSIONAL ECOSYSTEM SUPPORT PROJECT

2. Professional Reticence

- Architects waiting for 'client' (residential and commercial) mindset to change
- Perception of sustainable designs as aesthetically inferior; largely unaware of sustainable design alternatives that do not undermine creative freedom.
- Believe that green rating systems must change for a paradigm shift to occur
- Self-deprecating view of Architects of their own ability to engage with HVAC consultants on projects and persuade exploration of sustainable cooling technologies.

3. Fragmented Ecosystem

- Siloes amongst 'Conventional' Architects, 'Sustainable Design' Architects, 'Conventional' HVAC Consultants, Sustainable HVAC Suppliers, and Progressive Builder/Developers

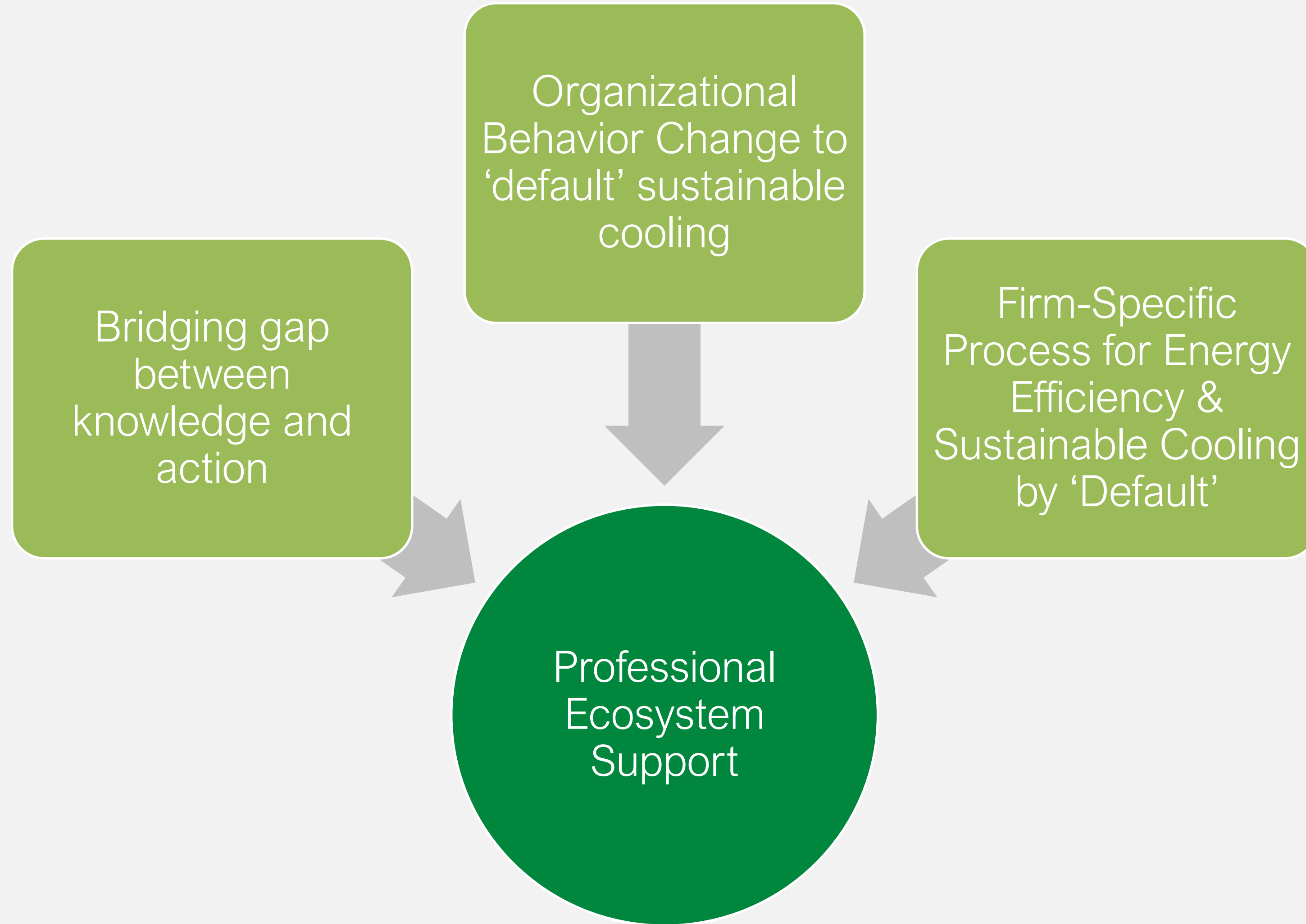
4. Big-Scale Project Focus

- BEEP and other programs focus on big firms and their big projects as their means of impact creation
- Most programs have a 'reductive' atomic view of ecosystem, do not see the architecture firm as an organism which requires a 'system thinking' approach to understand and unravel

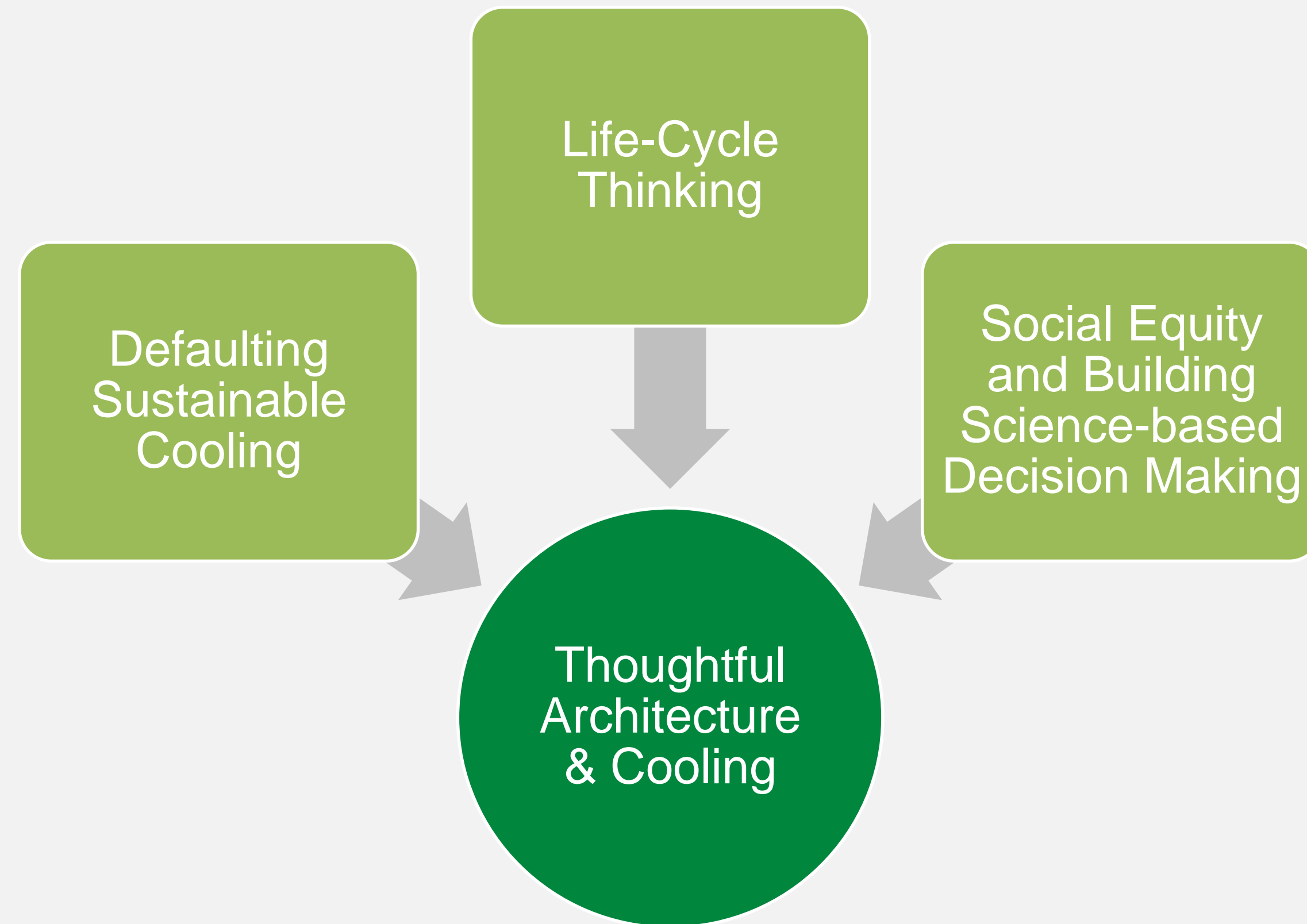
Theory-of-Change

PROJECT	ACTIVITES	OUTPUTS	OUTCOMES	IMPACT	LEGACY
Professional Ecosystem Support Project	Tool Building and Training Material Creation, Knowledge and Tools Capacity Building Workshops, Behavior Change Workshops for Architects and HVAC Consultants	Non-IPR Protected Professional Behavior Change and Business Decision Support Tools added to the commons, Architects at 24 firms learn climate-responsive passive building design and building-energy modeling software	Practicing architects incorporate sustainable cooling & sustainability principles early in the building-design process	Evidence base for Integration of sustainable cooling into Architecture and HVAC Engineering Licensing created and appropriate designated authorities are influenced through reputed advocacy groups	Council of Architecture (CoA), Indian Society of Heating Refrigerating and Air-Conditioning (ISHRAE), and Green Building Professional Training Programs formally adopt sustainable cooling capacity building amongst building professionals as part of training activities
		Industry approved and low cost Sustainable Cooling Modelling Tool developed, HVAC engineers at 24 firms learn heat-load calculation and sustainable HVAC-system modeling software	Practicing HVAC Consultants design sustainable HVAC-systems and size their systems appropriately		

Goals

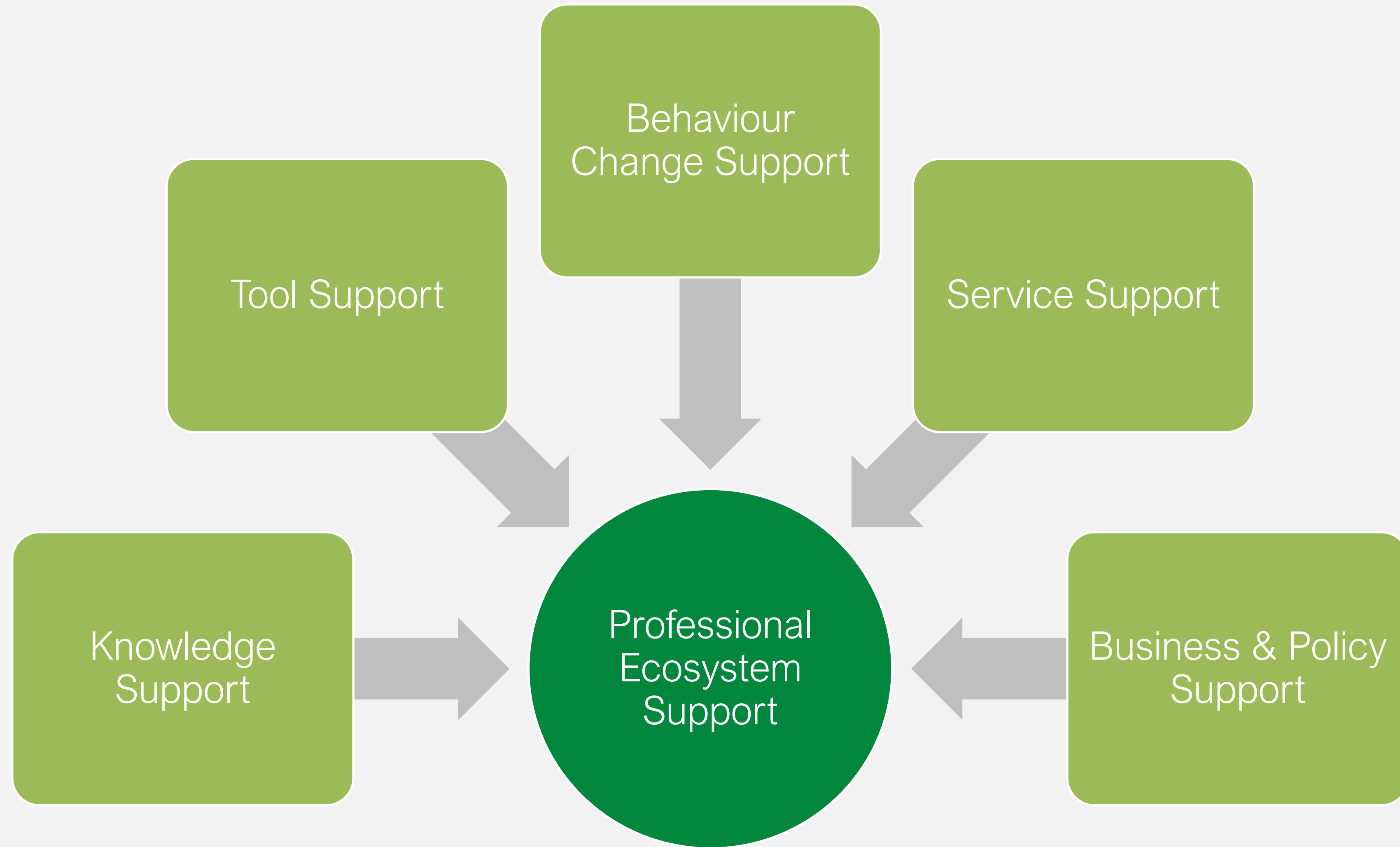


Principles



The program is guided by the principles of ‘defaulting’ basic best-practices into the praxis of the profession to achieve low-energy and low life-cycle carbon footprint designs, acute awareness of social, economic and environmental impacts through the life-cycle of proposed designs, and exercising responsible stewardship of the environment by integrating social equity and building science-based considerations (rather than the parochial considerations emergent from exclusively client-satisfaction-centric decision making).

Benefits

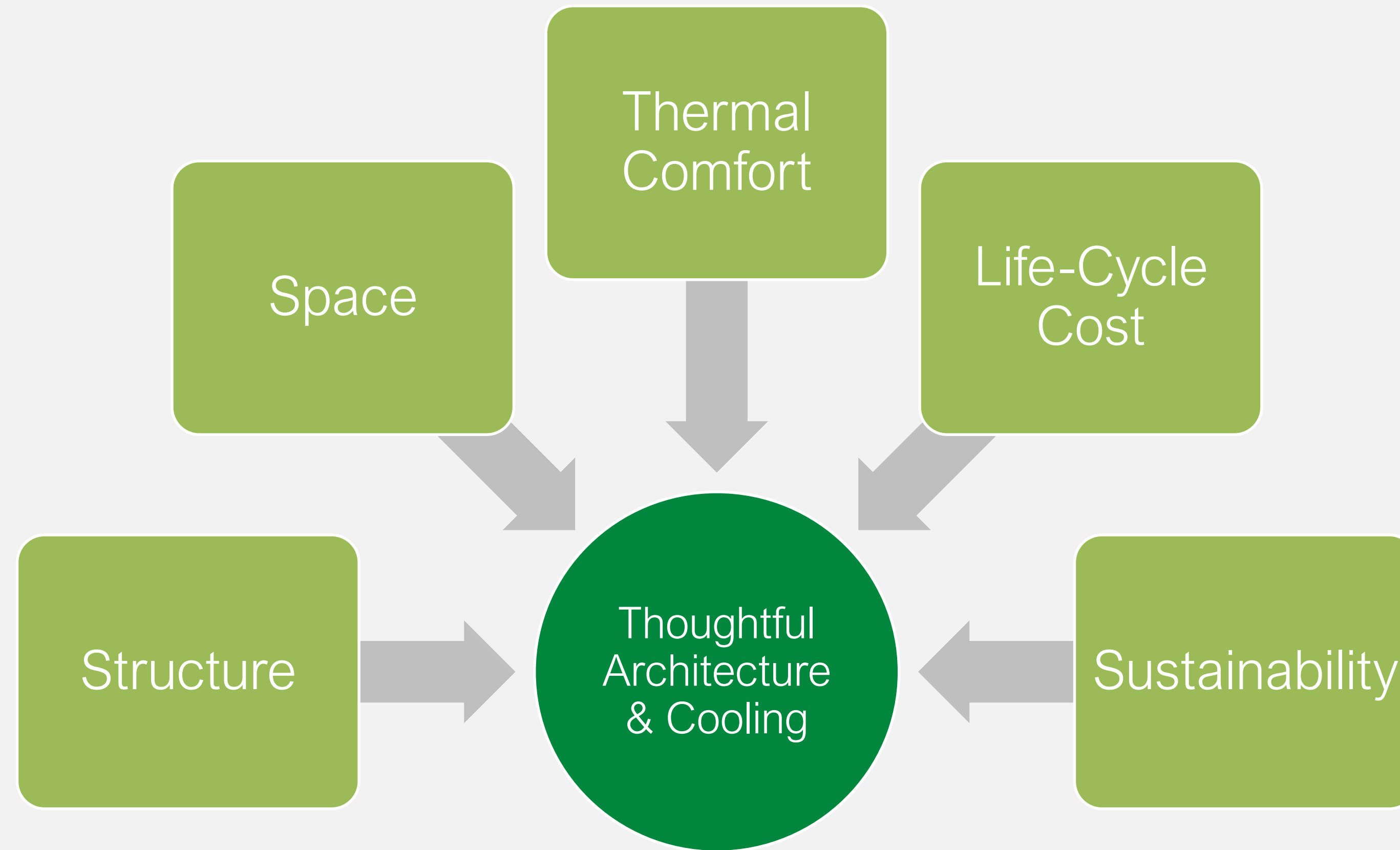


— Fellowship Programme for Architecture Firms



- 6 month fellowship programme for small to medium sized firms launched in 6 cities across India
- Aims to help architecture firms embed sustainability in growth strategy and design process
- Encompasses the 5 support systems offered by the Fairconditioning Programme

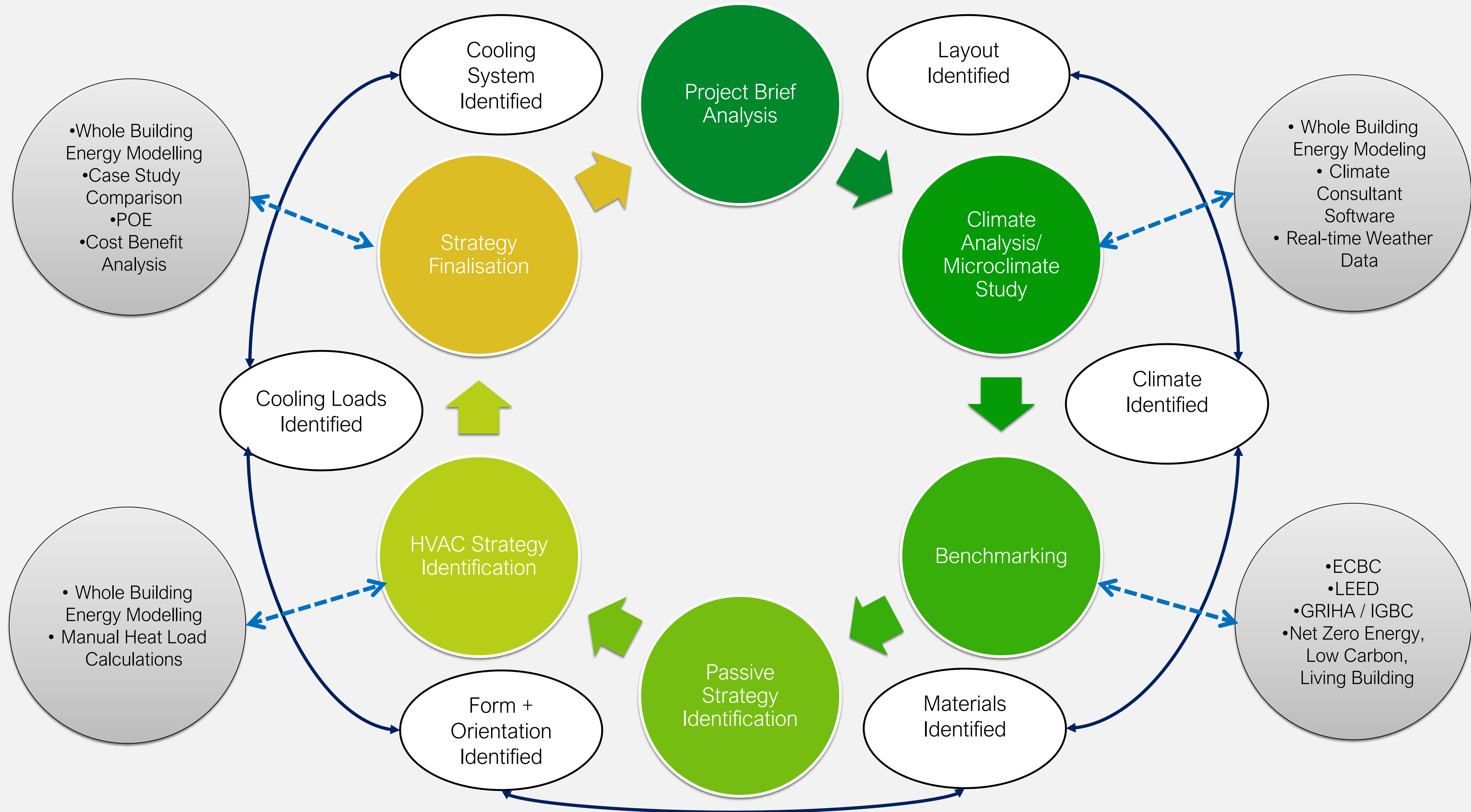
— Fellowship Programme for Architecture Firms



The program envisages a practice of architecture and HVAC engineering where sustainability considerations are at par with spatial, structural, life-cycle cost and thermal comfort considerations in design thinking and execution.

Knowledge Support: Architects

Design Process Development



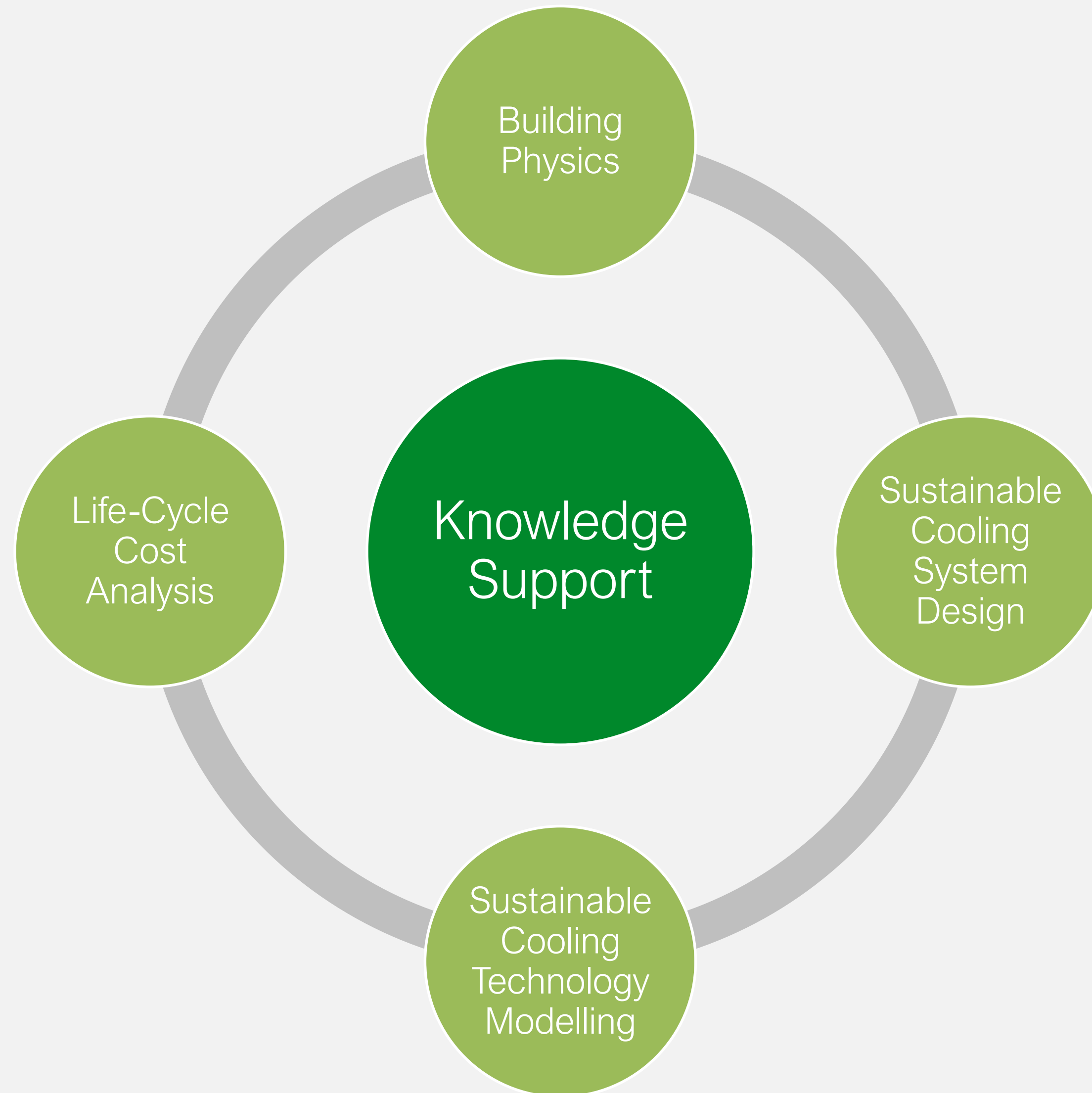
— Knowledge Support: Architects

Workshop Training Content



— Knowledge Support: HVAC Consultants

Workshop Training Content



— Tool Support: Architects

Subsidized Licenses



— Tool Support: Architects

Tool 1: Modelling Tool for Strategy Selection Support

An easy-to-use excel-based tool with a graphical user interface to demonstrate energy conservation potential, GHG mitigation potential and as well as life-cycle capital and operation costs savings from active and passive sustainable cooling systems.

This tool is designed to enable design teams (architects and engineers) to understand the interconnections between different energy saving strategies for better decision making.

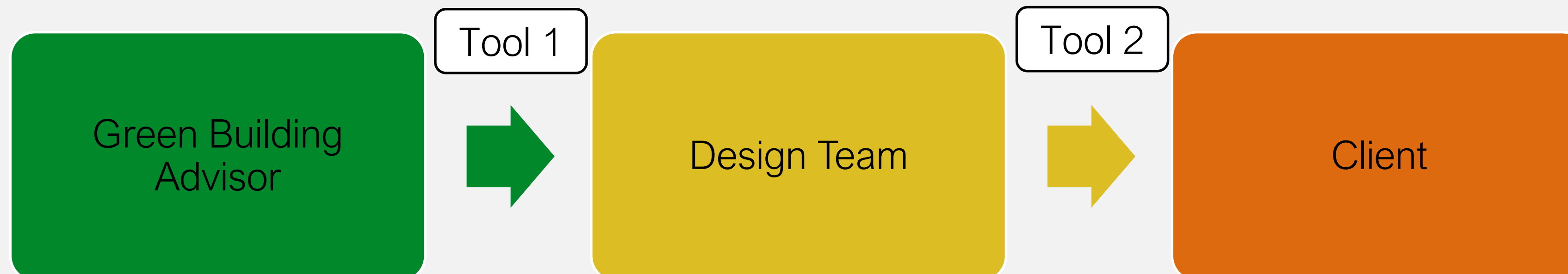
It's intended users are Architects, HVAC Consultants.

Tool 2: Modelling Tool for Business Decision Support

A visually appealing, easy-to-use tool for Rapid Visual Demonstration of Energy Conservation Potential, GHG Mitigation Potential and most importantly: Life-Cycle Capital and Operation Costs Savings from Active and Passive Sustainable Cooling Systems as well as Behavioural Change Strategies geared to influence procurers, operators and occupants of Indian commercial buildings.

This tool is designed to persuade decision-makers from the four selected corporate industries. It's intended users are Architects, HVAC Consultants, and company Facility/Energy Managers.

The target stakeholders are decision-making Executives in HVAC-Intensive Cluster Consuming companies who are vested with the authority to make capital-investment decisions as part of the company's energy, carbon, and cost conservation strategy.



Tool Support: HVAC Consultants

SMARTENERGY

✔ Getting Started

➔ Project Information

✔ Schedule Master

✔ Occupancy

✔ Lighting

✔ Equipment

✔ SetPoints (Cooling)

✔ SetPoints (Heating)

✔ Coil Availability (Cooling)

✔ Coil Availability (Heating)

✔ Construction Master

✔ Building Details

Internal Load

External Load

HVAC System Details

Simulate

✔ Trouble Ticket

Project Information

?

Quick Help

1. Enter details for the project.

2. Select application of project which helps you to get default values.

3. Simple user has to fill the inputs asked in this screen.

4. Click on save button in order move to save the U values.

5. Click on " " button in order move to the next screen.

Project Name :

Demo 2 Default

Customer Name :

Aryn

Description :

Select Building Type (Principal Building Activity) :

Apartment (General Comfort)

Project Type :

☒ Simple

☐ Detailed

Simple Project Type Details

Click to Close

Enter U-value

Walls (Btu/hr-ft2-F):

0.33

Roofs (Btu/hr-ft2-F):

0.13

Floor (Btu/hr-ft2-F):

0.44

Partition Walls (Btu/hr-ft2-F):

0.30

Enter the Details for Windows

U-Value (Btu/hr-ft2-F):

1.02

SHGC :

0.56

Save

Tool Support: HVAC Consultants

System - Details

System Name :

Select System Type :

Select Set Point Schedule :

Select Zone :

Ideal Load Air System

Fan Coil Systems

Package Terminal AC System

Unitary System (With Economizer)

Unitary System (WithOut Economizer)

VAV Chilled Water (With Economizer)

VAV Chilled Water (WithOut Economizer)

Series Fan Powered VAV System (With Economizer)

Series Fan Powered VAV System (WithOut Economizer)

Parallel Fan Powered VAV System (With Economizer)

Parallel Fan Powered VAV System (WithOut Economizer)

Radiant Cooling

Direct Evaporative Cooling

Two Stage Evaporative Cooling

Solar Vapour Absorption System

Ammonia based Vapour Absorption System

R 290 Propane based Chiller

— Behavior Change Support

Tool to 'nudge' professionals into bridging gap between knowledge and action

- A mobile-application based tool that harnesses concepts of behavioural psychology to trigger and motivate participating professionals to apply knowledge and integrate sustainable cooling into the DNA of their practice.
- Remains active for a specific number of months after first workshop and provides users the option to opt-out of 'nudges' after specified minimum period.

Opinion Shaping & Motivation Building

- Amplifying the opinion-shaping potential of thought-leaders in the profession through creating and social-media dissemination of compelling audio-visual communication materials including video and TED-like talks; permeate social-media networks of city-architecture-fraternities (eg. 'Architects of Bangalore') and local chapters of Indian Institute of Architects (IIA).

— Behavior Change Support

Workshop Training Content

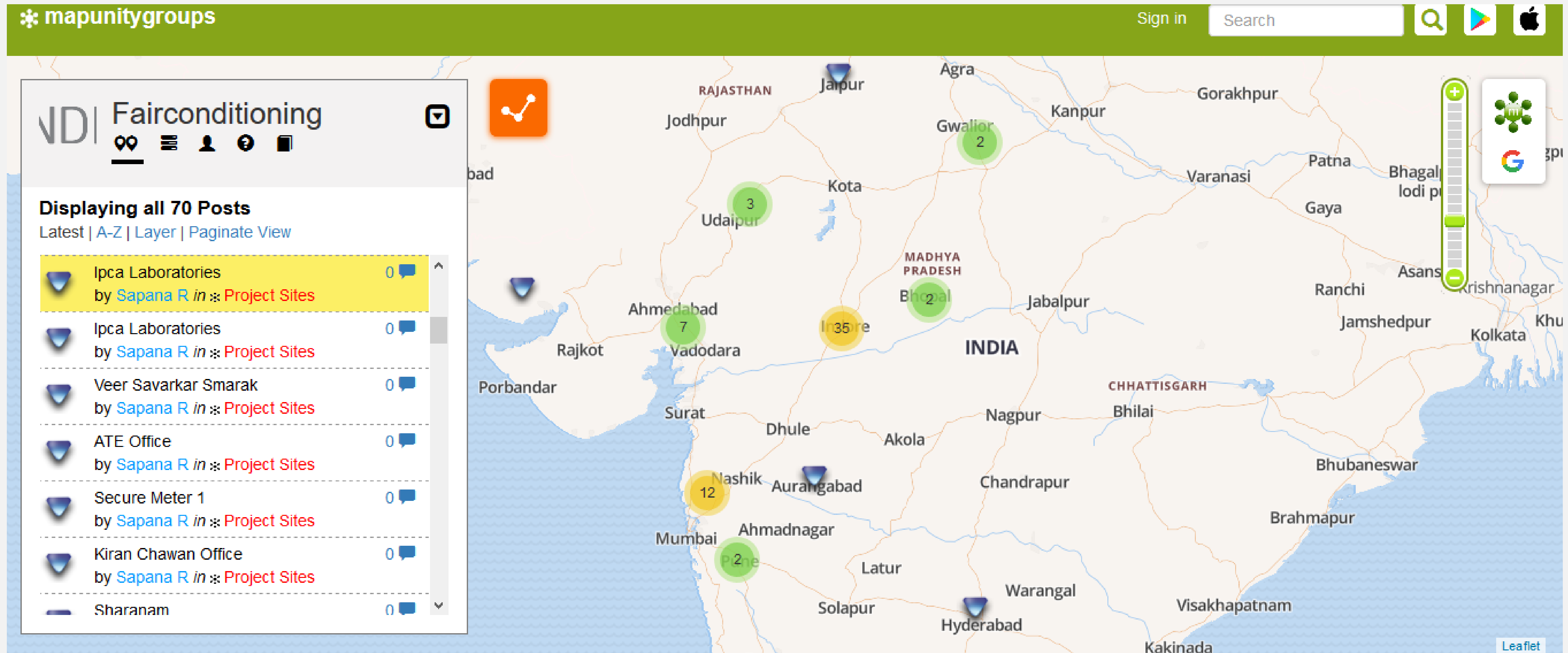


— Service Support

Low-Cost Sustainable Cooling Modelling & Advisory

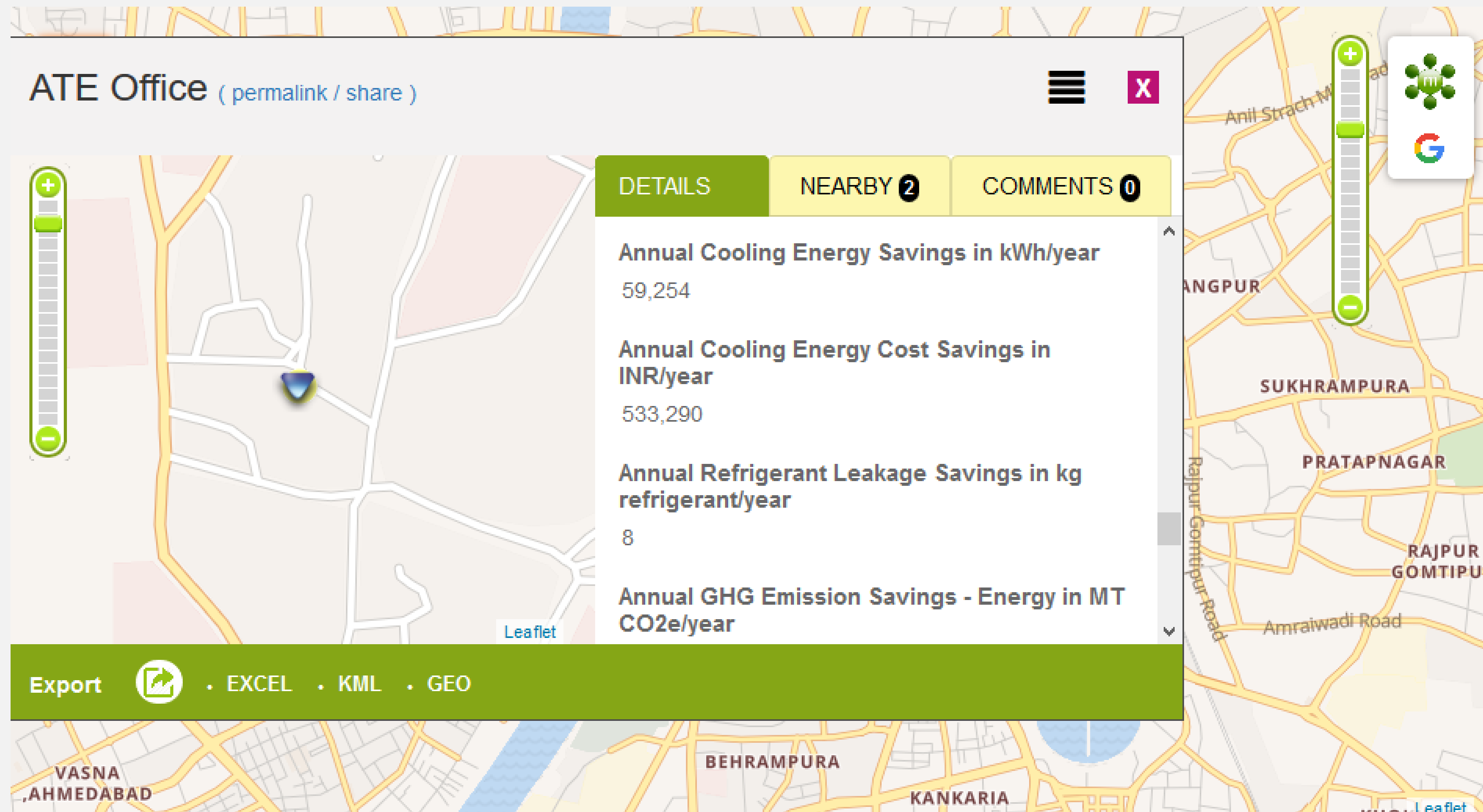
Creation of city-specific networks of vetted energy modelling consultants engaged to provide standardized and subsidized sustainable cooling modelling and advisory services to participating professionals/firms for the first year post successful completion of knowledge support workshop.

Business & Policy Support



India's first, open access, web-based sustainable cooling map that broadcasts real-time cooling performance and energy consumption data from various sustainable cooling sites amongst stakeholder sectors in India on the Mapunity platform to allow users to view, interpret, and visualize sustainability efforts quantitatively and qualitatively.

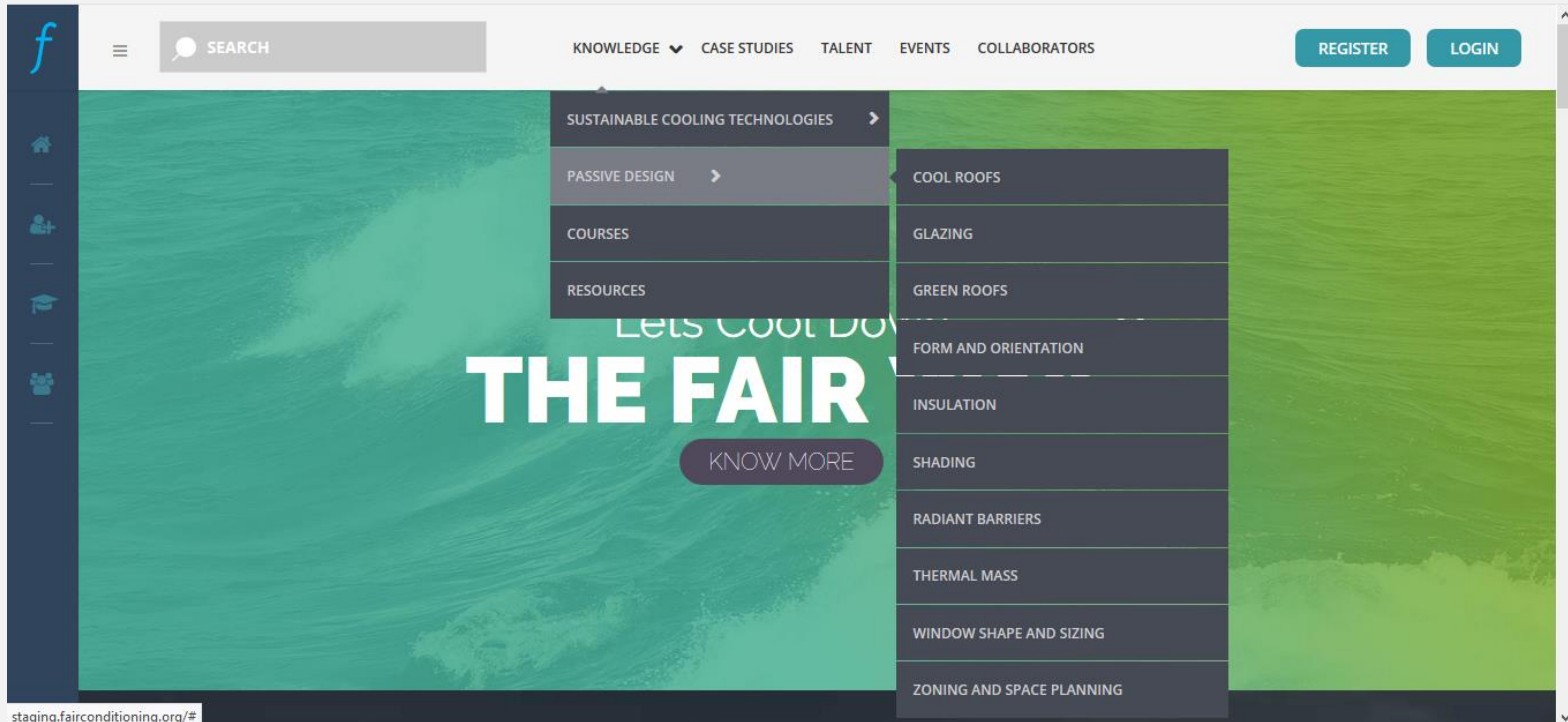
Business & Policy Support



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Business & Policy Support

Rebuilding the Commons, not Intellectual Property
Stimulating Collaboration, not Competition



Business & Policy Support

Rebuilding the Commons, not Intellectual Property
Stimulating Collaboration, not Competition

SEARCH

KNOWLEDGE CASE STUDIES TALENT EVENTS COLLABORATORS

REGISTERLOGIN

LOCATION

Ahmedabad (2)

Bangalore (251)

Baroda (1)

Belgaum (1)

Chennai (117)

VIEW MORE

COLLABORATOR TYPE

Architect (619)

HVAC Consultant (18)

Architecture Professor (186)

Engineering Professor (34)

Architecture Student (40)

Engineering Student (370)

Other (3)

VIEW LESS

KNOWLEDGE DOMAIN

Architecture - Building Energy Modelling (2)

Architecture - Building Physics (2)

Architecture - Conventional Architecture (59)

A. Srivathsan

None Selected

Ahmedabad

enquiries@cept.ac.in

A. A. Patil

Engineering Professor

Pune

anup.patil@mescoepune.org

A. C. Mitra

Engineering Professor

Pune

amitra@mescoepune.org

A. K. Goel

Architect

Delhi

A. R. Tejas Rao

Engineering Student

Certified by Fairconditioning

Architect

Pune

13:17

— Business & Policy Support

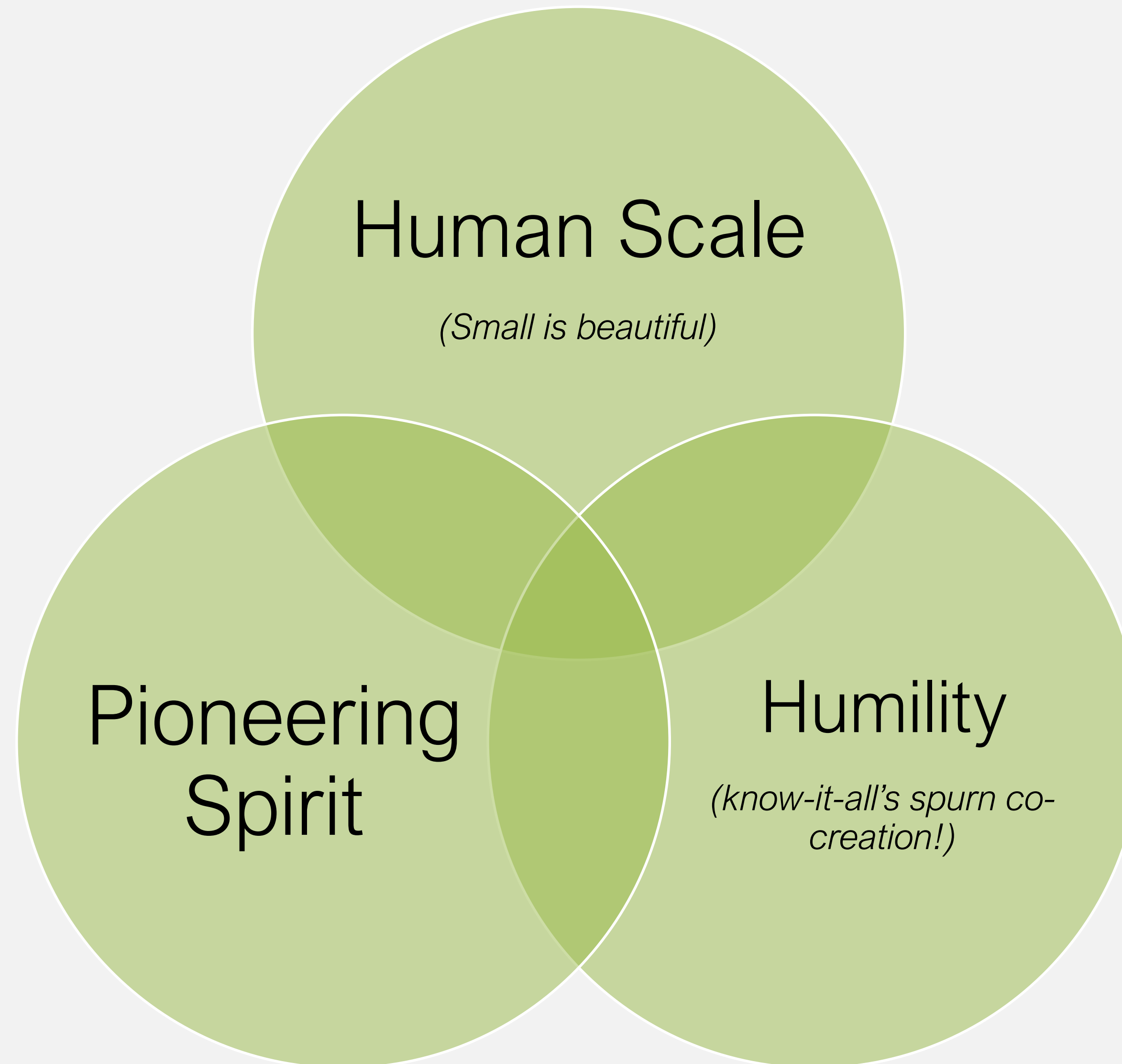
- Empowering Architects and HVAC consultants in their quest to convince clients through integration of Sustainable Cooling in Green Building Rating Systems – IGBC, GRIHA and LEED. Thereby ensuring that importance of sustainable cooling is underscored above less-critical elements of building operations in terms of life-cycle energy consumption and GHG emissions (eg. lighting), and not merely recognizing it cursorily as a single parameter in the points system (eg. as innovation credit)
- Influence professional certification for practicing architects and engineers through lobbying Council of Architecture (COA) and ISHRAE by embedding passive design and sustainable cooling related capacity building into continuing professional development requirements for license maintenance.
- Ensuring sustainable cooling systems are integrated into the ECBC for Commercial and Residential buildings to prevent conflict of interest when selecting strategies.

— Business & Policy Support

Sustainable Cooling Practitioner and Client Network

- Creation of city-specific networks of consultants (architects and engineers) and clients (real-estate corporates, banks, hospitality)
- Enables a vibrant demand-supply chain.
- Activities to include networking events, joint R & D projects

Factors for selection of firms



Performance Metrics

The Ministry of Power could spend **INR 5.3 crore to increase capacity by 1 MEGA-watt**

Or

Spend **INR 26,000 to generate 1 NEGA-watt** through sustainable cooling design capacity amongst Architects and HVAC Engineers

Our Ask

Fairconditioning spends **INR 3.5 lakhs per small-medium sized HVAC Consulting or Architecture Firm** to embed sustainable cooling into their design DNA

— Track Record: Jan 2015 +

Current beneficiaries of our support

- **Education:** 32 Architecture and 10 Engineering Colleges
- **Architecture Firms:** 136 firms
- **Banking:** ICICI
- **Real-Estate:** Swastik Realty, Satguru Builders, Aavishkar Realty, Kanchan Developers, Oriocon Developers, Orange County Foundation, Great Value India
- **Hotels:** CGH Earth Hotels
- **Commercial Buildings:** GITS Food Products, WIPRO, NIIT, Sai Life, School of Planning & Architecture

Advisors & Partners

Advisory Board

- **Roshni Udyavar Yehuda**, Head of Department, Rachana Sansad's Institute of Environmental Architecture, Mumbai, India
- **Dr. Vishal Garg**, Associate Professor & Head at Center for IT in Building Science, International Institute of Information Technology Hyderabad (IIITH), Hyderabad, India
- **Suresh Vaidyarajan**, Architect - Vernacular Architecture, Delhi, India
- **Surendra Shah**, Engineer, Inventor. Founder & Owner, Panasia Engineers Pvt. Ltd., Mumbai, India
- **Dr. Satish Kumar**, President at Synurja and Senior Advisor to Lawrence Berkeley National Laboratory and Schneider Electric, India
- **Fionnuala Walvarens**, Campaign Manager, Environmental Investigation Agency, London
- **Rajendra Shende**, Independent Expert on Refrigerants, Former UNEP Ozone Unit Head, TERRE Policy Centre, Pune, India
- **Dr. Jyotimay Mathur**, Head of Centre for Energy and Environment and Professor in Mechanical Engineering Department at Malaviya National Institute of Technology (MNIT), Jaipur, P.G. in energy studies from the Indian Institute of Technology (IIT), New Delhi
- **Janos Mate**, Ozone Policy Consultant at Greenpeace International, Vancouver, Canada
- **Nina Masson**, Head of Market Research & Projects, Shecco, Brussels, Belgium
- **Dr. Ardeshir Mahdavi**, Professor and Director of Department of Building Physics and Building Ecology, Vienna University of Technology, Austria
- **Dr. Ratnadip Joshi**, Associate Professor, Maharashtra Institute of Technology (MIT), Pune, India
- **Brent Hoare**, Independent Expert on Refrigerants, Green Cooling Association INC., Katoomba, Australia
- **Aalok Deshmukh**, General Manager - Energy-Efficiency, Schneider Electric, Mumbai, India
- **Nicholas Coxx**, Independent Expert on Refrigerants, Earthcare Products Limited, Ware, UK

Partners

- Centre for Science and Environment
- Smart & Sustainable Space Cooling Coalition
- ISHRAE
- Alliance for an Energy Efficient Economy
- Council of Architecture
- All India Council for Technical Education
- GRIHA Council

Management Team

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Fairconditioning Board member
Managing Director, cBalance Solutions Hub
Ashoka Fellow
BSc in Chemical Engineering, Florida Institute of Technology
MSc in Environmental Engineering, University of Massachusetts
Bureau of Energy Efficiency Certified Energy Auditor
Co-founder of GreenSignal Ecolabel and The NO2CO2 Project
Founder of the Informed Voter Project

Dhruvit Parikh, Technology Manager for Sustainable Cooling
Adoption Network
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MSc in Solar and Alternative Energy, Amity University
Bureau of Energy Efficiency Certified Energy Manager
ISO 14001 LEAD Auditor

Geneva

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Fairconditioning Executive Board member
Political science, University of Geneva. Held several positions in local and national environmental NGOs. Freelance journalist. Co-founder of Noé21 and DATAS press agency, Noé21 Coordinator.

Chaim Nissim, Executive Board Chairman, Engineer, Noé21
Founder
Fairconditioning Executive Board member
Diploma in Information Technology and Electronics. CERN and expertise in several nuclear magnetic resonance machines. Four term MP in the Geneva Canton parliament. Author of several laws on energy. Noé21 Secretary General.

Dr. Felix Dalang, Scientific Adviser, Noé21
Fairconditioning Executive Board member
PhD in environmental chemistry, Swiss Federal Institute of Technology, and Swiss Federal Institute of Aquatic Science and Technology. Specialisation in indoor air quality control and energy policy.

Visit fairconditioning.org/team to view all team member profiles.

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