Global Alliance
for Buildings and
Construction

Technical Expert Meetings on Mitigation (TEM-M) 2020

"Human settlements: sustainable low-emission housing and building solutions. Technologies and design for buildings, housing and construction"

Day 1: 30 September 2020
12:00-13:45 CEST

United Nations Framework
Convention on Climate Change

Global Alliance for Buildings and Construction

TEP-M

In collaboration with:

Cool Coalition

30 September 2020

From 12:00 pm to 1:45 pm CET

Technical Expert Meetings on Mitigation

TEM-M 2020

COOL BUILDINGS FOR ALL

Human settlements: sustainable low-emission housing and building solutions. Technologies and design for buildings, housing and construction

Global Alliance for Buildings and Construction

TEM-M Session 1:Cool buildings for all

The growing cooling demand:

Trends and responses.

Gabrielle DREYFUS, Kigali Cooling Efficiency Program (K-CEP)/ Climateworks

- Cooling demand is growing rapidly with significant implications for climate, but we have the technology and Montreal Protocol driver to change how we cool and avoid equivalent 8 years of emissions.

- Need to think in terms of *pathway*: deploy available technologies with least climate impact now as we develop the skills and know-how to adopt newer technologies and systems together with improving urban and building design and operations.

- Managing growth in cooling demand critical to meeting climate objectives, while also supporting pandemic and economic recovery.

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TEM-M Session 1:Cool buildings for all

Meeting cooling needs through building design:
Passive buildings & effective retrofits:

- *Jessica GROVE-SMITH, Passive House Institute*
- *Polash MUKERJEE, Natural Resources Defense Council (NRDC)*

TEM-M „Cool buildings for all“

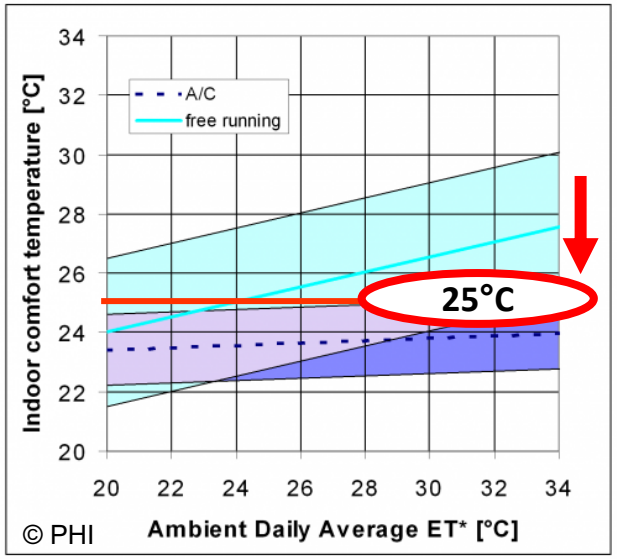
Meeting cooling needs through cooling design

Jessica Grove-Smith jessica.grovesmith@passiv.de
Passive House Institute www.passivehouse.com

Cool buildings for all – Where we stand

Cooling demand on the rise

- Warming climate
- Population growth & urbanisation
- Increase in living standards



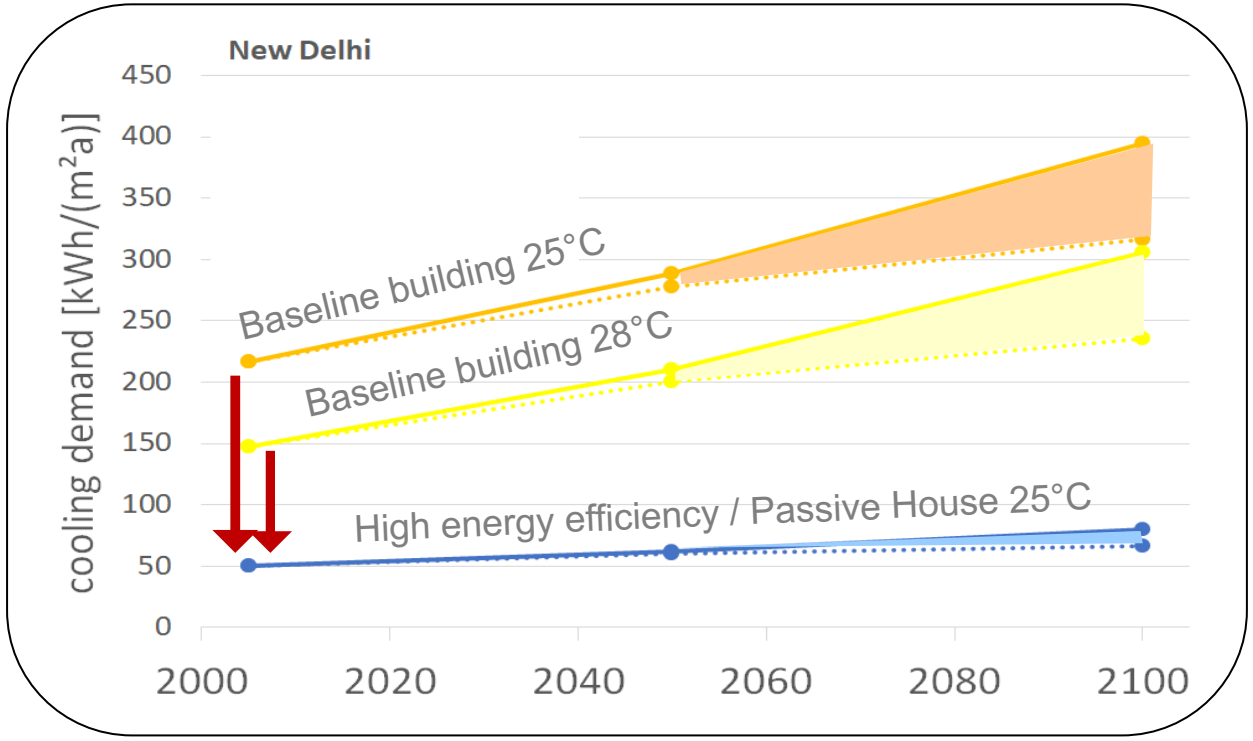
More people in dense urban living conditions with limited potential for free-cooling

More and more people can afford and expect active cooling to high comfort levels

Cool buildings for all – Where we need to go

Design buildings for resilience.

Design buildings for high efficiency active cooling from the start.




Office building, Dubai (MBRSC)

https://passivehouse-database.org/index.php?lang=en#d_5065
Photo courtesy of Mauro Bonotto

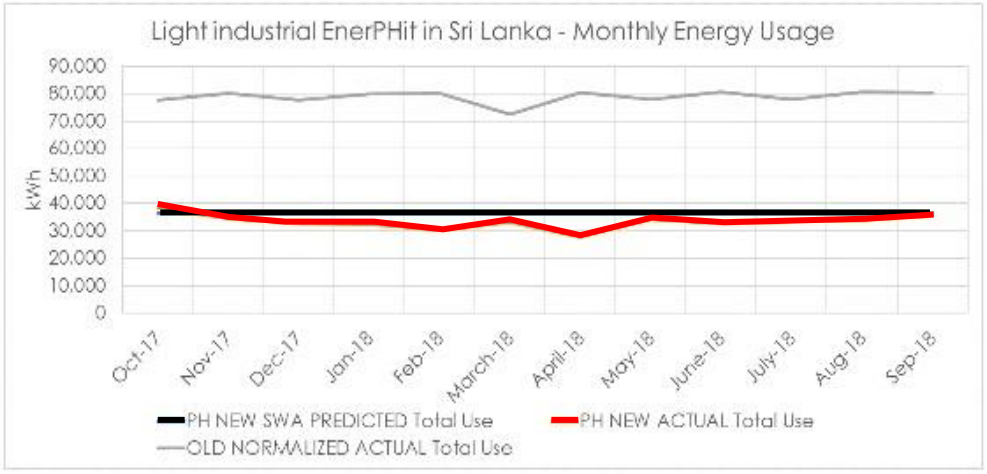
Heat and humidity control
- ✓ *Shading & cool colors*
- ✓ *Appropriate windows & glazing*
- ✓ *Insulation*
- ✓ *Mechanical ventilation with energy recovery (ERV)*
- ✓ *Airtightness*

Cool buildings for all – How we get there

Technology & concepts exist.
Projects show proof of concept with **>50% reduced cooling needs**

<u>Next steps, urgently needed:</u>

- Incentives to drive more projects & regional market development
- Low load cooling technologies that efficiently address cooling + dehumidification



Star Garment Innovation Center, Sri Lanka

https://passivehouse-database.org/index.php?lang=en#d_6030
Photo © Ganidu Balasuraya

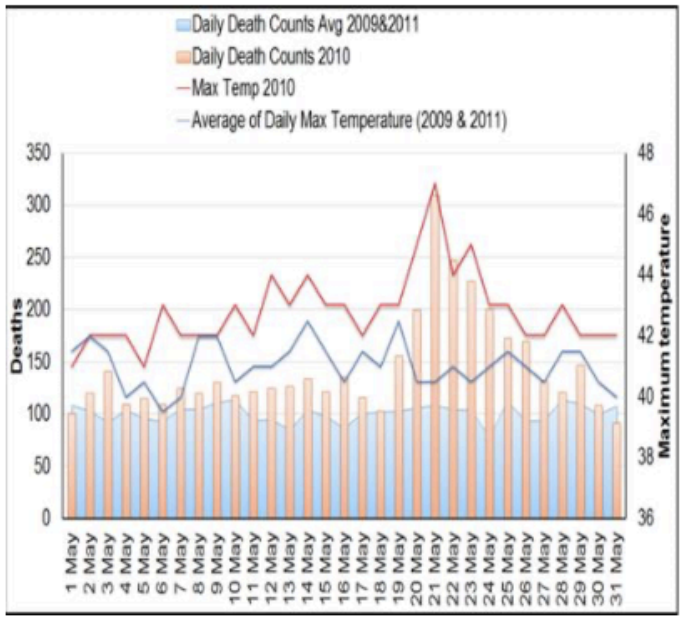
Cooling With Less Warming:
Protecting Low-Income Communities from Extreme Heat

City and state cool roof programs in India

Technical Expert meeting on mitigation (TEM-M): Cool Buildings for All
Polash Mukerjee, NRDC - September 30, 2020

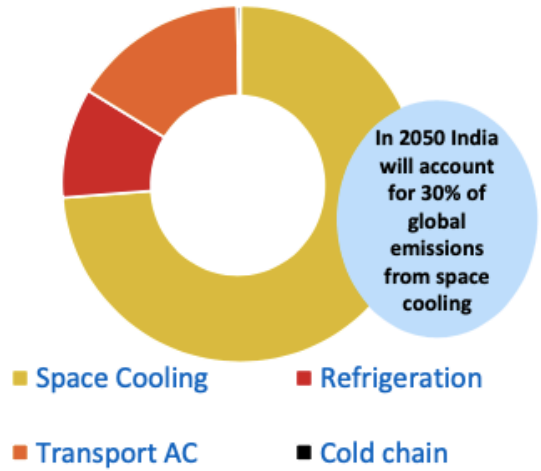
Cooling Matters: Triple Threat

Rising Temperatures Deadly Threat



Source: Azhar GS, Mavalankar D, Nori-Sarma A, Rajiva A, Dutta P, et al. (2014) Heat-Related Mortality in India: Excess All-Cause Mortality Associated with the 2010 Ahmedabad Heat Wave.

Skyrocketing cooling demand To grow 8 times by 2038



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

Emerging Economy, Rapid Urban Development

70%

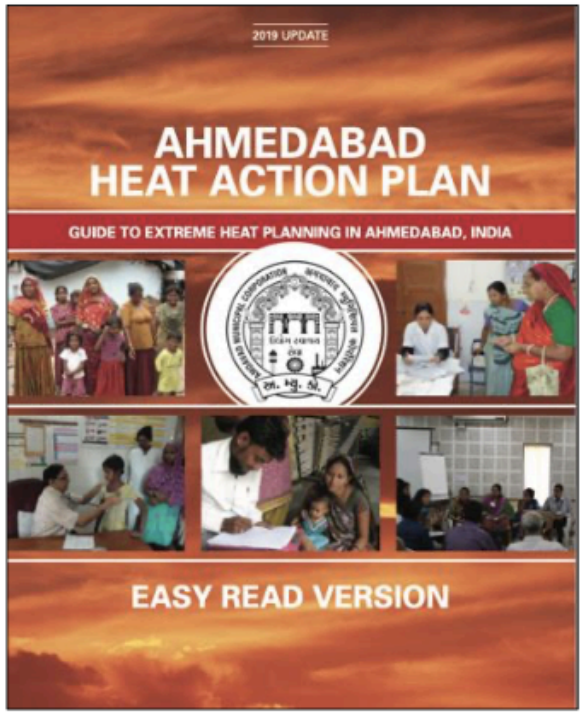
OF THE BUILDINGS THAT WILL EXIST IN INDIA BY 2030 HAVE YET TO BE BUILT

People Oriented Solutions at Local Level

Heat Action Plan

Poster on Extreme Heat in Ahmedabad

Ahmedabad Heat Action Plan



Heat Action Plan Scaled up to 23 States and over 100 Cities

Partners

INDIAN INSTITUTE OF PUBLIC HEALTH GANDHINAGAR

Promoting Cool Cities with Focus on Low-income Communities

India Cooling Action Plan Goal:
20-25% reduction in cooling demand by 2038

Building Codes and Cool Roofs

Reducing Cooling Demand

asci Leadership through Learning

phfi INDIAN INSTITUTE OF PUBLIC HEALTH GANDHINAGAR

MHT

GOVERNMENT OF TELANGANA

GHMC GREATER HYDERABAD MUNICIPAL CORPORATION

AHMEDABAD MUNICIPAL CORPORATION

INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY HYDERABAD

THANK YOU

POLASH MUKERJEE
LEAD- CLIMATE RESILIENCE & AIR QUALITY
NRDC INDIA PROGRAM
EMAIL: PMUKERJEE@NRDC.ORG

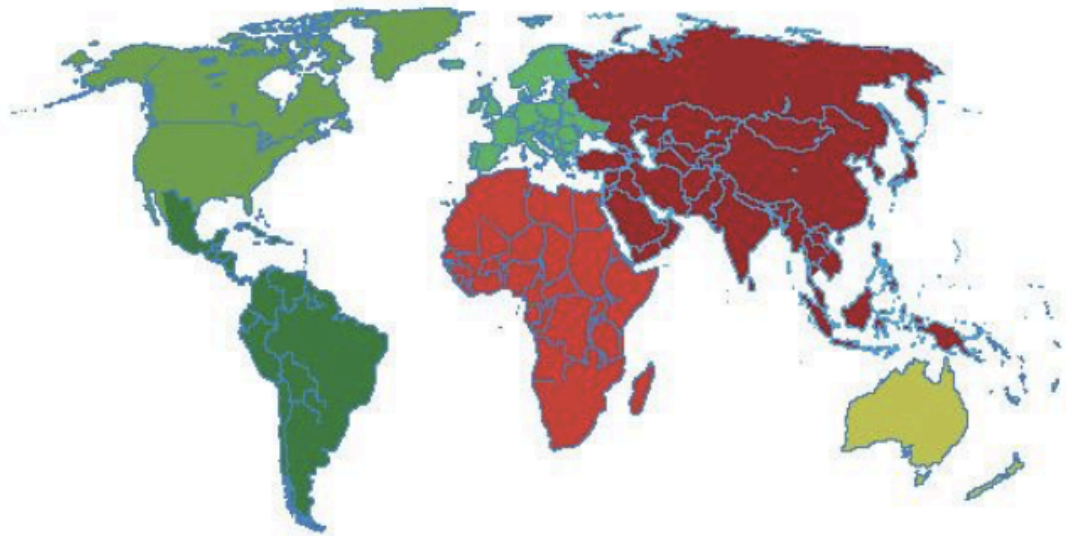
Global Alliance for Buildings and Construction

TEM-M Session 1:Cool buildings for all

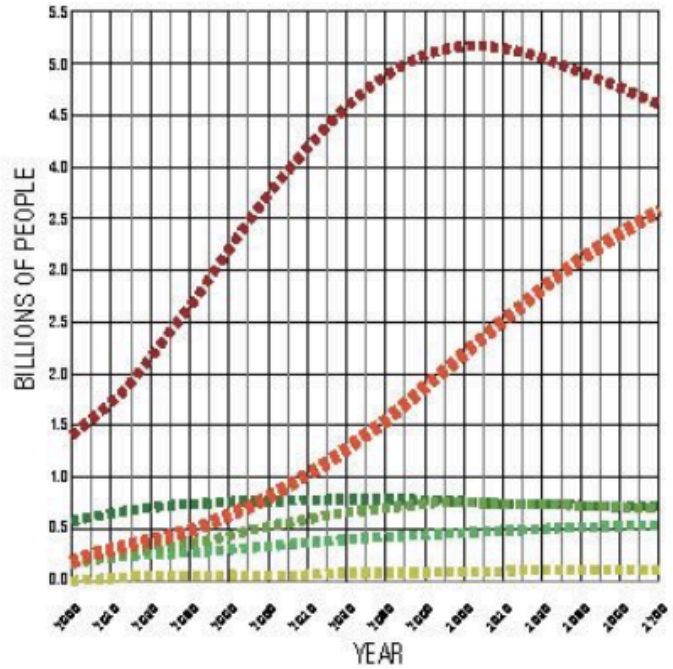
Moderator: Marion Canute, broadcaster/communications specialist

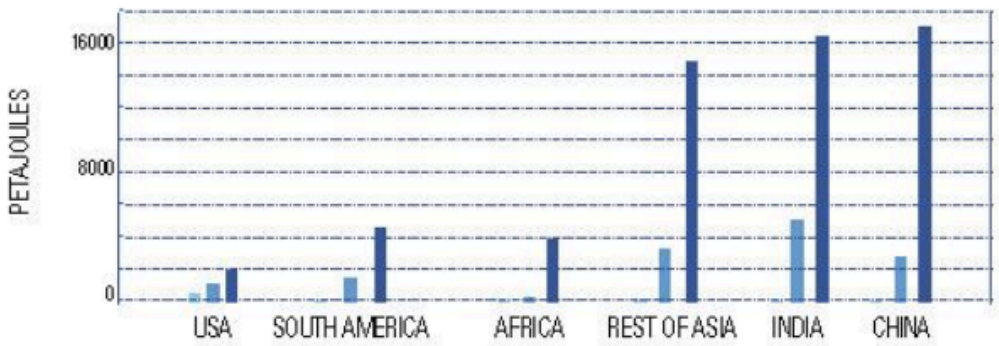
Identifying local cooling solutions: Local building materials and "vernacular integration strategies for architecture": *Mae-ling Jovenes LOKKO, Rensselaer Polytechnic Institute*

IMPACT OF GLOBAL POPULATION GROWTH PATTERNS ON RESIDENTIAL COOLING LOADS



Source : United Nations, Department of Economic and Social Affairs, Population Division: World Urbanization Prospects, the 2011 Revision. New York 2012





70% NET INCREASE COOLING LOADS[3]

current
2050
2100

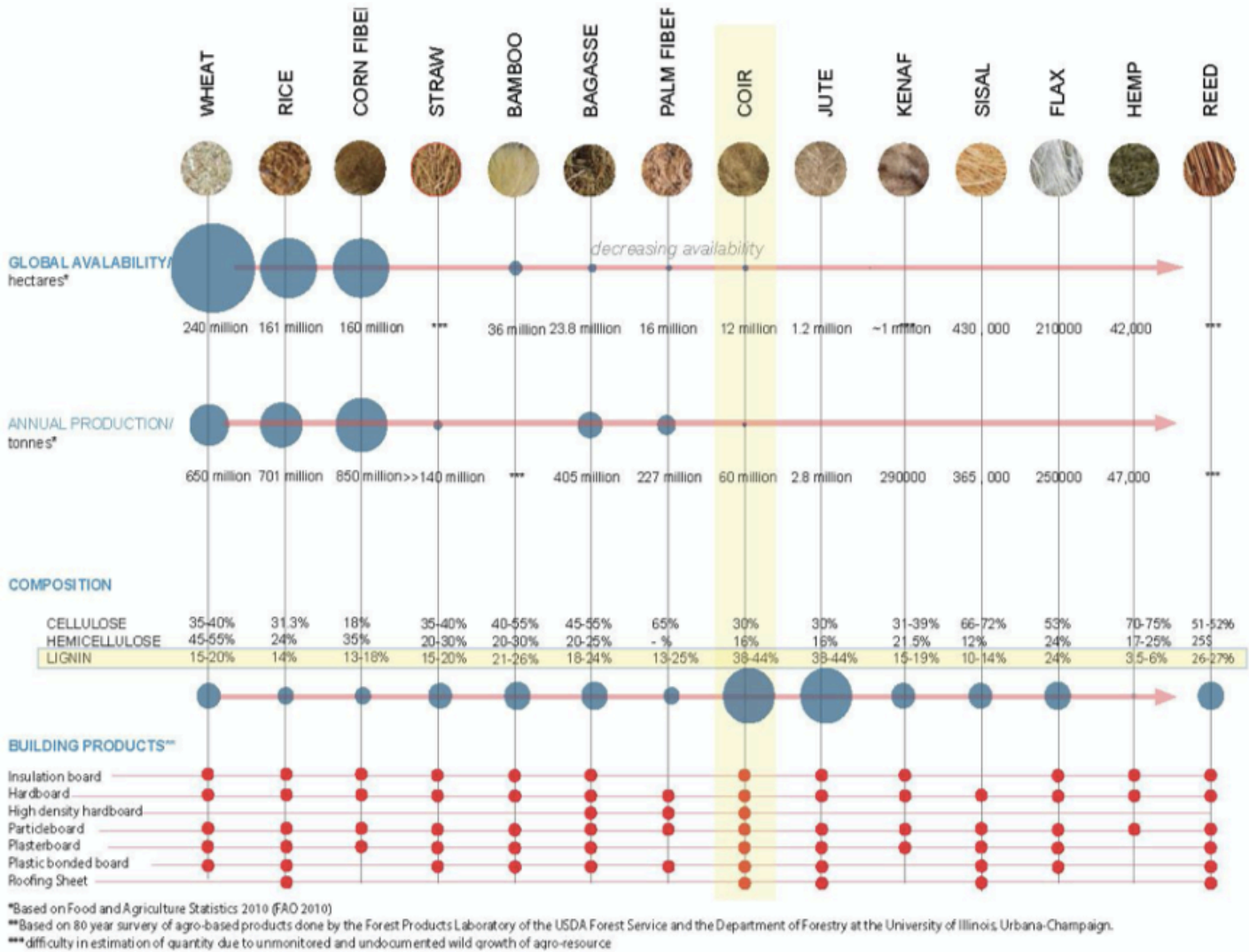
Source: Isaac, M., van Vuuren, D. P. (2009). "Modeling global residential sector energy demand for heating and air conditioning in the context of climate change" Elsevier Ltd.

GLOBAL POPULATION GROWTH DRIVING PRODUCTION OF RENEWABLE HYGROSCOPIC AGROWASTE MATERIAL RESOURCES

+ 140 - 350
Billion Tons of Agrowaste Generated Annually

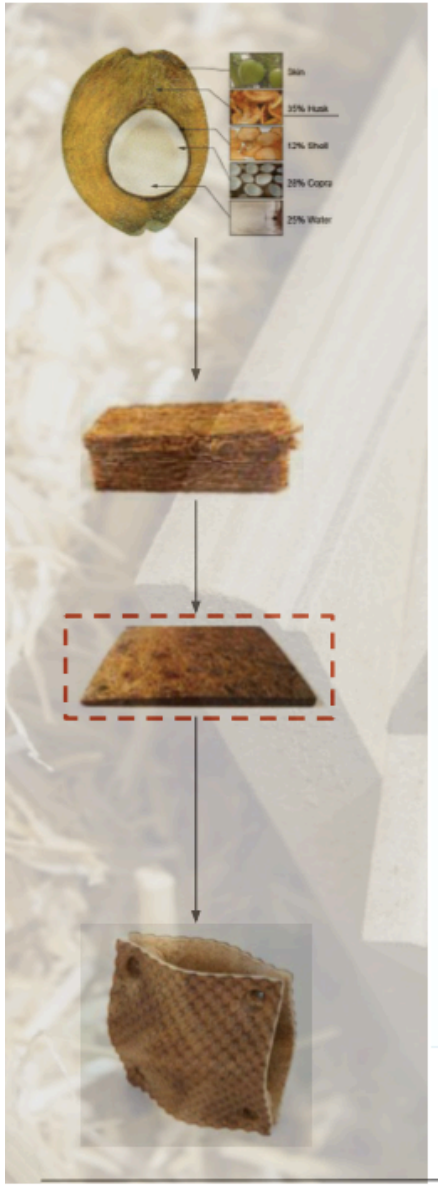
- **Lack of distributed ecomanufacturing infrastructures for agrowaste building technologies**

- **Deeply-seated social / cultural negative perceptions of using 'low-tech', waste materials.**

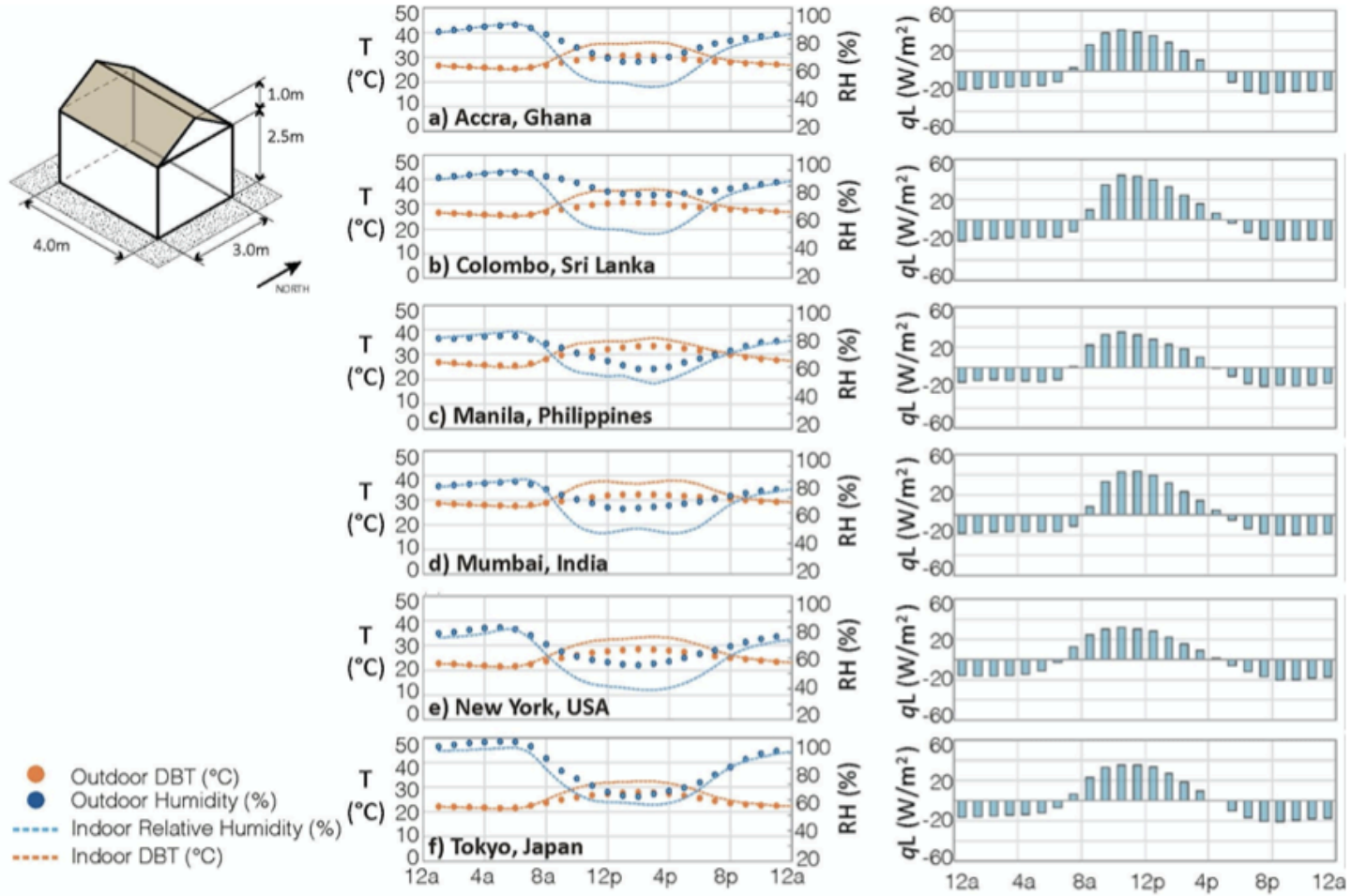


*Based on Food and Agriculture Statistics 2010 (FAO 2010)
**Based on 80 year survery of agro-based products done by the Forest Products Laboratory of the USDA Forest Service and the Department of Forestry at the University of Illinois, Urbana-Champaign.
***difficulty in estimation of quantity due to unmonitored and undocumented wild growth of agro-resource

LEVERAGING AN EXPANDED AGROWASTE CHAIN FOR COOLING APPLICATIONS



INTRINSIC EVAPORATIVE COOLING PERFORMANCE OF COCONUT FIBERBOARD ROOF ACROSS HOT-HUMID CLIMATE TYPES



1. Rempel, A. R., & Rempel, A. W. (2016). Intrinsic evaporative cooling by hygroscopic earth materials. *Geosciences*, *6*(3), 38.
2. Lokko, Mae-ling Jovenes. *Invention, design and performance of coconut agrowaste fiberboards for ecologically efficacious buildings*. Rensselaer Polytechnic Institute, 2016.
3. Lokko, Mae-ling, and Alexandra Rempel. "Intrinsic Evaporative Cooling with Natural Ventilation and Shading for Adaptive Thermal Comfort in Tropical Buildings." (2018).

willow Rensselaer

Global Alliance for Buildings and Construction

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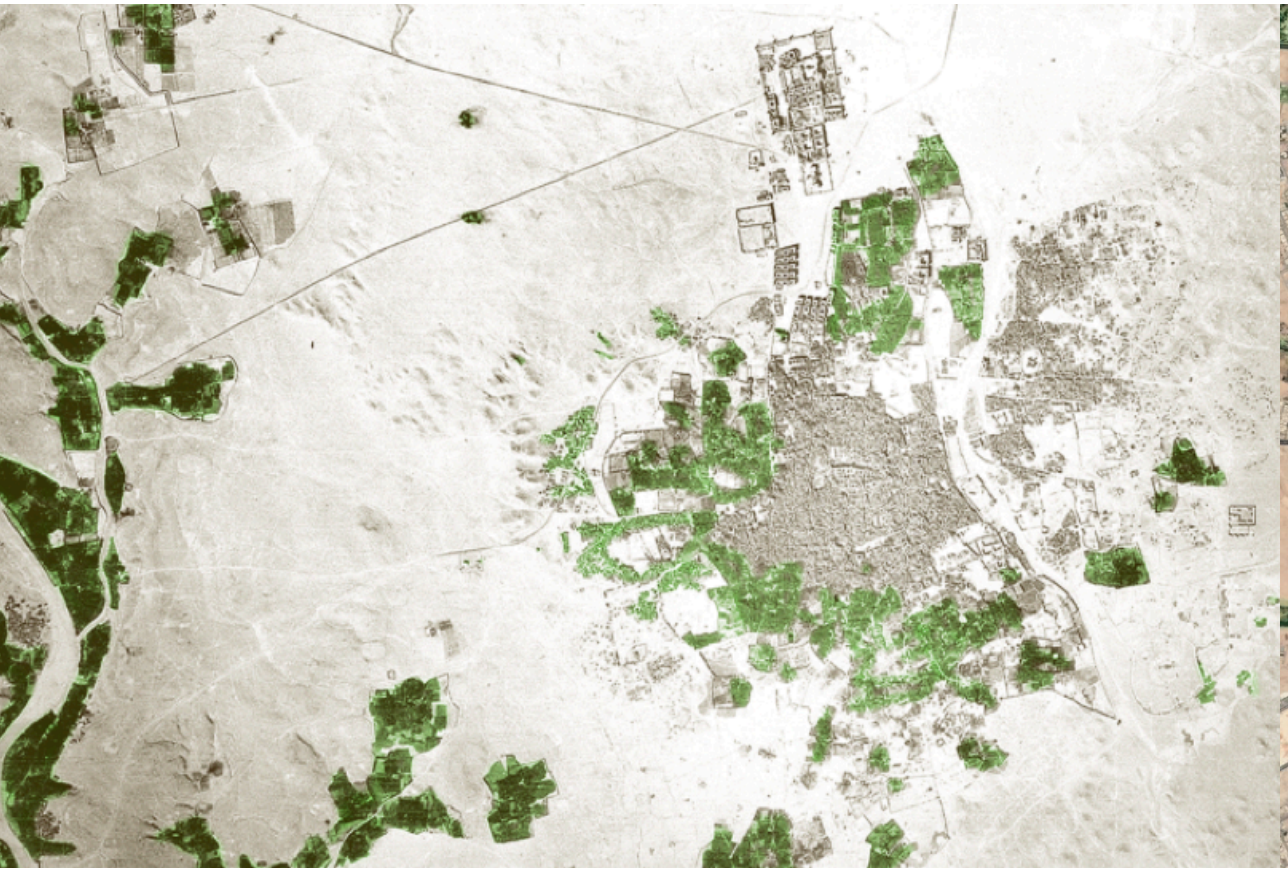
Nature-based solutions for cooling and greening:

- *David CALLOW, City of Melbourne*
- *Yvonne LYNCH, City of Riyadh*

الهيئة الملكية لمدينة الرياض
ROYAL COMMISSION FOR RIYADH CITY

الرياض
الرياض الخضراء
GREEN RIYADH

YVONNE LYNCH
lynchy@rcrc.gov.sa



1950

Riyadh´s Evolution

2020

Strategy	Vision Statement	Strategic Objectives	Key Performance Indicators (KPIs)
City Development Programs	National Parks	City Parks	Wadis
	Neighborhood Parks	Micro Landscapes	Accessible Streetscapes
	Schools & Mosques	TSE NETWORK	WSUD

Strategic Enablers

Institutional Setting
- Entities Involved in Greening
- Roles of Entities
- Interaction Model

Regulations
- Environment
- Urban Planning and Development

Capabilities
- Water Availability
- Technology and Infrastructure
  - Composting
  - Nurseries
- Financing

Urban & Biophysical Conditions
- Land Availability
- Water Resources
- Soil Quality
- Climatic Conditions
- Financing

Public Outreach — **Communication & Engagement**

City Parks (Salam Park)	Living Infrastructure (MOMRA Building)	Road Greening (King Fahad Road)

THANK YOU

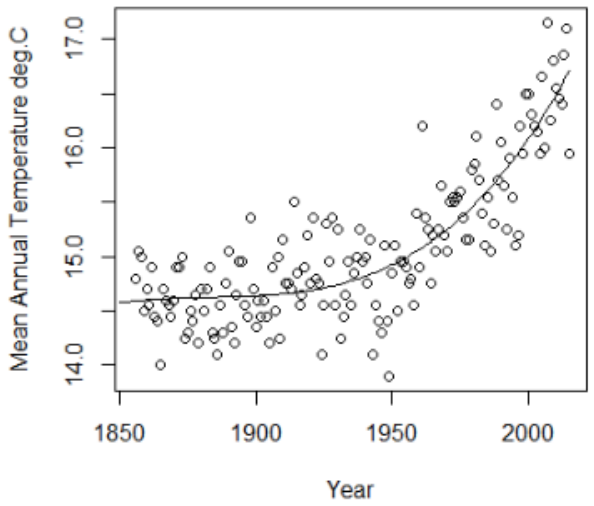
Nature-based solutions for cooling and greening

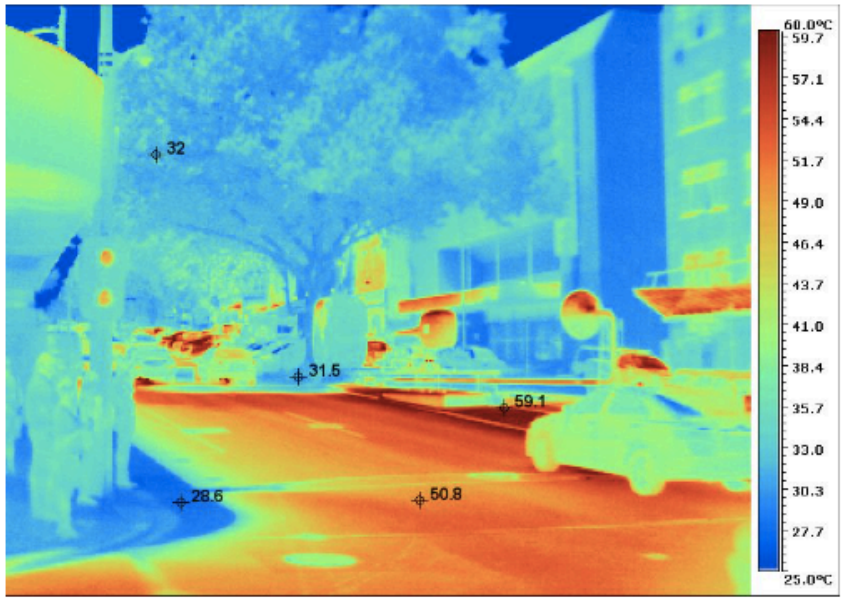
Cool Buildings for All

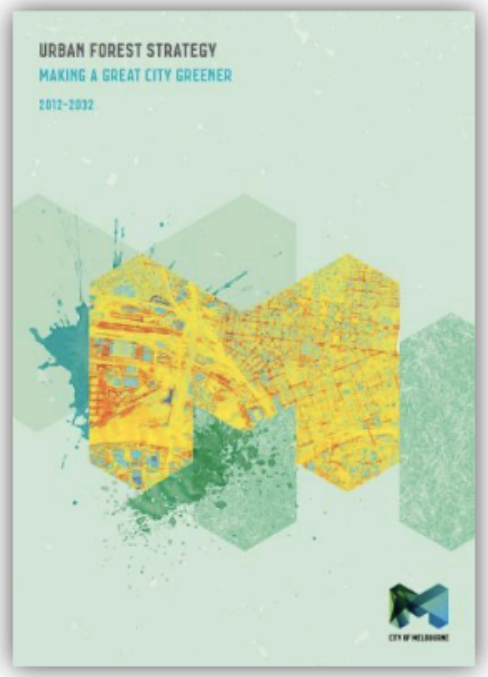
30 September 2020

Presenter: David Callow

URBAN FOREST STRATEGY – 40% TREE CANOPY COVER BY 2040





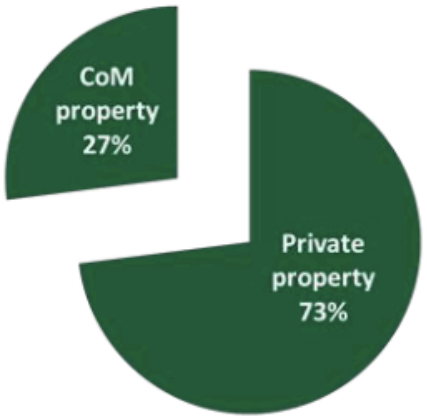


CITY OF MELBOURNE

GREENING ACROSS JURISDICTIONS

City of Melbourne 1988
Population: 39,512
Green cover: 24.6%

City of Melbourne 2009
Population: 94,341
Green cover: 13.6%



CITY OF MELBOURNE

SUSTAINABLE BUILDING DESIGN PLANNING CONTROLS AND MELBOURNE GREEN FACTOR TOOL

Sustainable Building Design Planning Controls

- 1. Overarching ESD
- 4. Waste
- 7. Stormwater Management
- 2. Energy
- 5.Urban Ecology
- 8. Water Efficiency
- 3. Sustainable Transport
- 6. Urban Heat Island

Melbourne Green Factor Tool

The Green Factor Tool is an online interface (greenfactor.com.au) for designers to input information about their proposed development—such as vegetation type and numbers, soil depth, trees retained, accessibility—and receive a Green Factor score.

$$\textit{Green Factor score} = \frac{\textit{weighted area of greening}}{\textit{total site area}}$$

CITY OF MELBOURNE

Global Alliance for Buildings and Construction

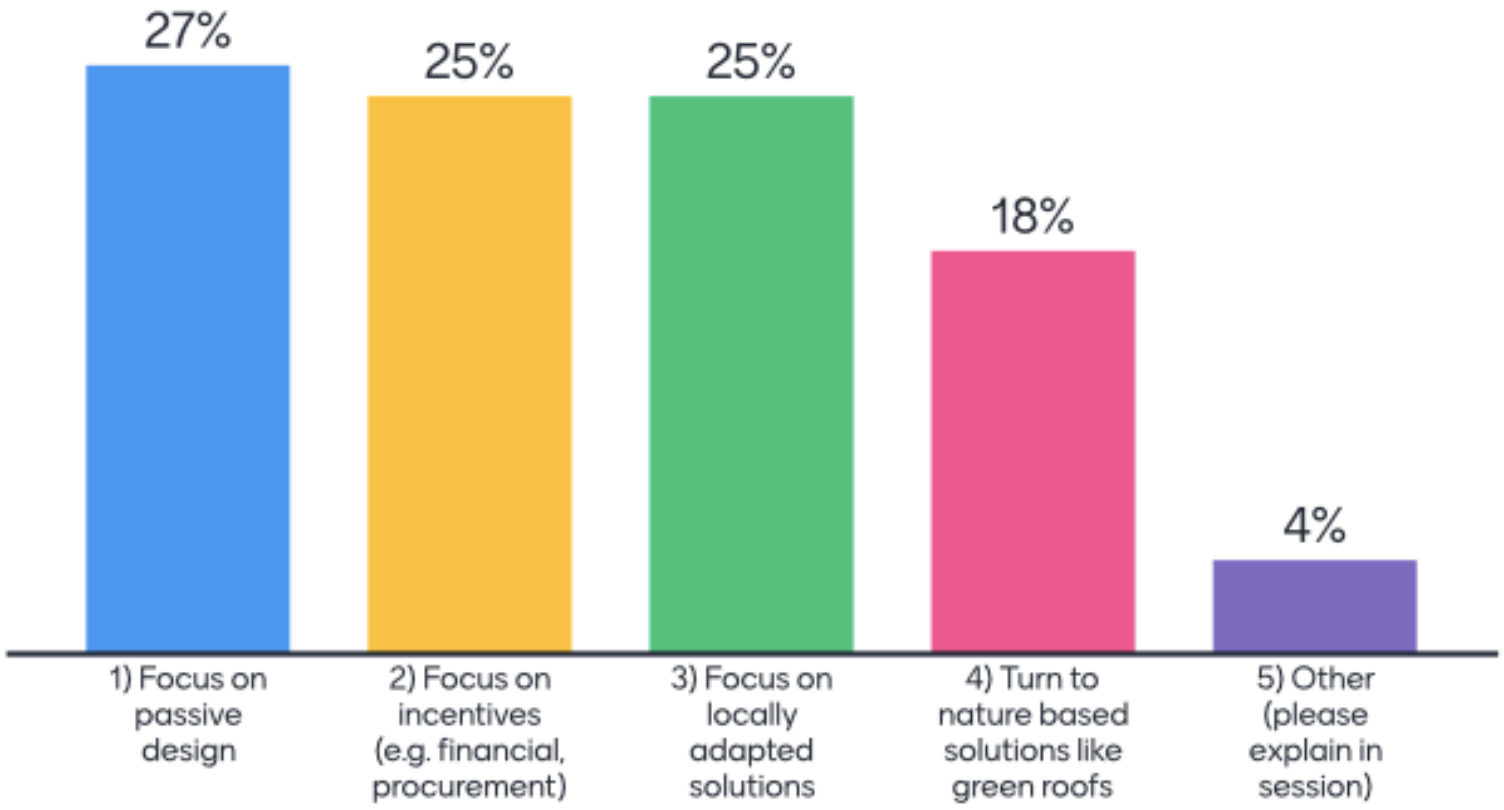
Q & A

- Submit your Questions via the Chat function
- Please mention if the question is for a particular speaker or to all panelists.

Polling via Mentimeter: How can national and local governments support the uptake of sustainable cool buildings?

- www.Menti.com
- Code: 97 77 81 8

How can national and local governments best support the uptake of sustainable cool buildings?



Global Alliance for Buildings and Construction

TEP-M

UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

In collaboration with:

Cool Coalition

For more information about the GlobalABC and the Cool Coalition, please contact respectively Nora Steurer (nora.steurer@un.org) and Sophie Loran (sophie.loran@un.org).