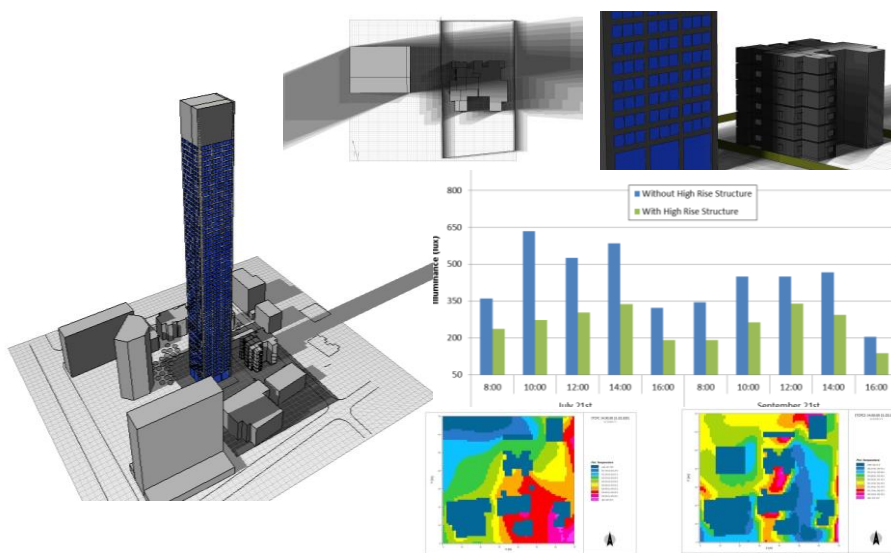


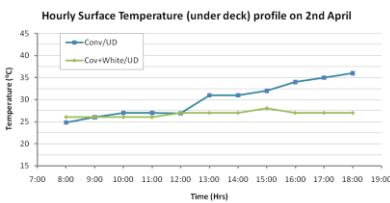
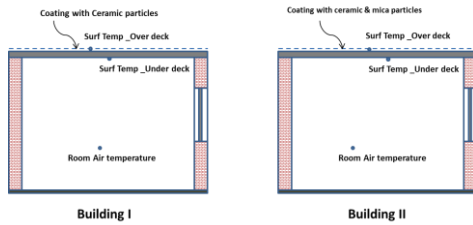
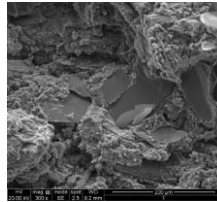
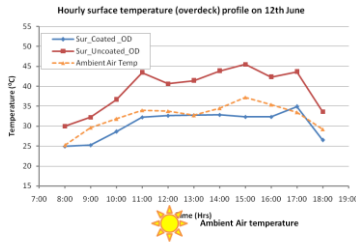
## Envelope Performance Evaluation Studies- in Collaboration with Industry

**D E V S Kiran Kumar**  
Associate Fellow  
Sustainable Habitat Division  
The Energy and Resources Institute

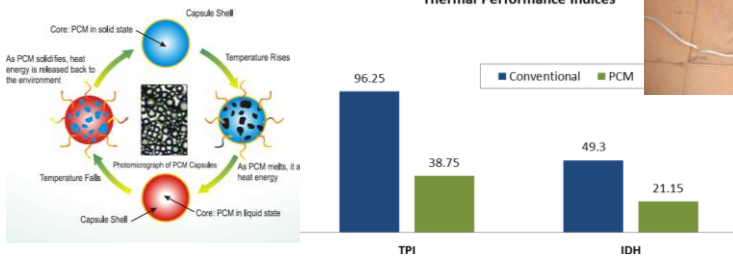
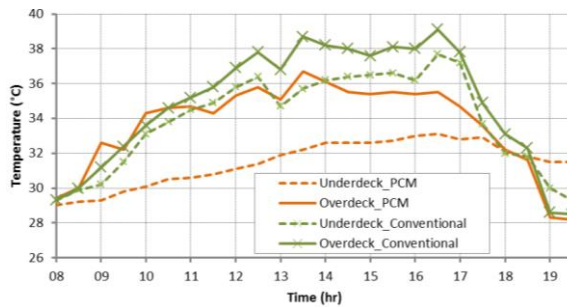
### Impact of skyscraper on an adjacent low rise building



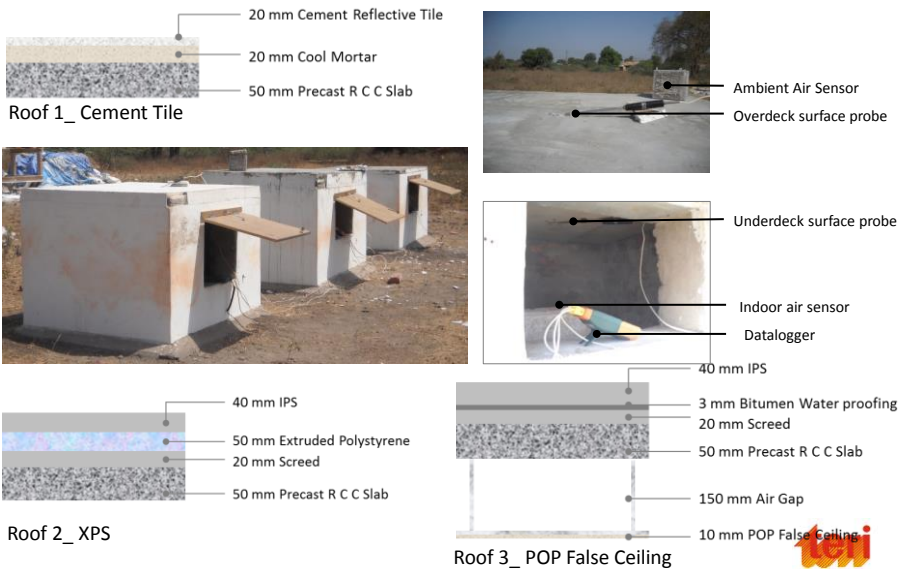
## Nano insulation reflective roof coatings



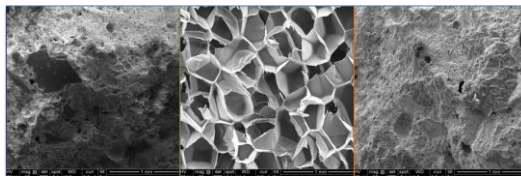
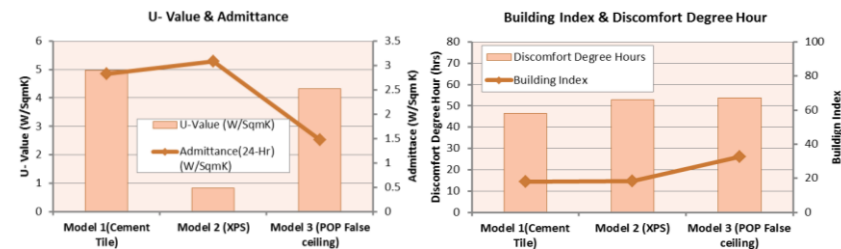
## PCM embedded roof tile



## Mineral based cement tile



## Mineral based cement tile



Cool mortar - Model 1		Extruded Polystyrene- Model 2		POP false ceiling board- Model 3	
Conductivity	0.451	Conductivity	0.028	Conductivity	0.499
Specific heat	0.87	Specific heat	1.25	Specific heat	0.2
Density	1850	Density	34	Density	1080
Volumetric Heat Capacity	1925	Volumetric Heat Capacity	1290	Volumetric Specific heat	764

Need for a more specific and climate wise thermal performance indices for the codes like Energy Conservation Building Code (ECBC)



## Movable window shading device

Horizontal fin tilted at 60 degree angle to shade the direct sun but allow the light. This inclined position helps the fin in self cleaning during the rains

Vertical fins as window grill, in combination with horizontal fins provides an effective shading

Angle sections & struts for support  
Fixed Horizontal fin (Aluminium)  
The for security (MS)  
Window grill with vertical fins for security (MS)

cover blades  
Louver frame/ movable horizontal fin (Aluminium)  
Wheeling mechanism

Month	Mar	Apr	May	Jun	Nov	Dec	Jan	Feb	Jul	Aug	Sep	Oct
HSA	10	5	0	5	25	25	25	25	5	0	5	10
VSA	40	40	40	45	25	25	25	25	45	40	40	40
Month	Oct	Sep	Aug	Jul	Feb	Jan	Dec	Nov	Jun	May	Apr	Mar

## Hollow Clayblocks

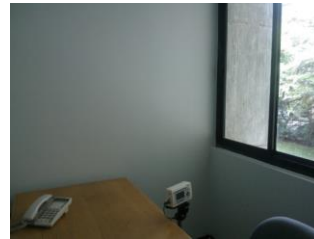
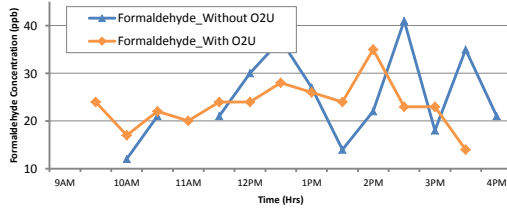
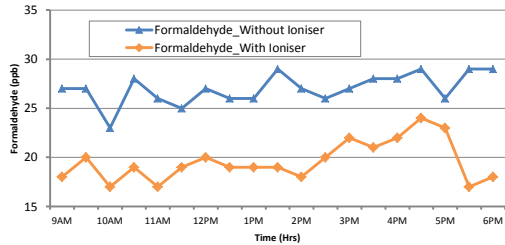
### Thermal comfort in living room in moderate climate

Wall masonry	Comfort hours (%)
Solid clay blocks	~97.5
AAC	~94.5
CMU	~99.0
Hollow clay blocks	~96.0

### Peak summer day air temperature profile in Living room with various envelope options in Moderate Climate

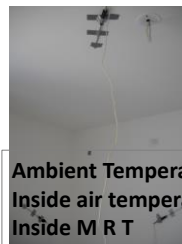
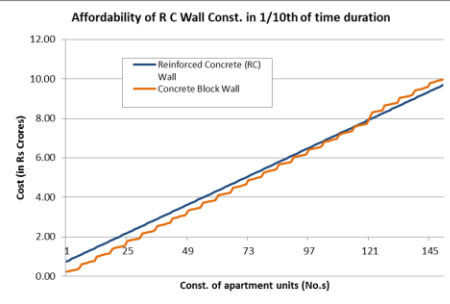
### Comparison of air temperature between zone and ambient by using hollow Clay block and concrete Masonry Unit in moderate climate

## Interior paint additive for better air quality



## RCC shear wall

	R C Wall	Concrete Block Wall
Quantity of Concrete (Sqm)	80	10
Rate (Rs/ Unit)	7425	12375
Quantity of Bricks (Sqm)	0	70
Rate (Rs/Unit)	0	2520
Total Material Cost (Rs)	5,94,000	3,00,150
Formwork Cost (Rs)	70,00,000	20,00,000
Reuse of Formwork	350	6
Labour Cost (Rs/Sqm Wall)	60	140
Total Wall Area (Sqm)	80	80
Total Labour Cost (Rs)	4,800	11,200
Time of Construction (Days)	6	60



Ambient Temperature = 33.5 °C  
 Inside air temperate = 29.6 °C  
 Inside M R T = 29.15 °C



## Roller Blinds for glazed facades

- Test bed measurements
- Simulation Studies

Thermal and visual comfort parameters

Heat flux, thermal camera measurements  
Colour temperature, luminance levels  
Comfort surveys

Simulation studies for parametric runs with  
different glazing system

- Thermal comfort and energy benefits
- UDI, DA, DGP and ASE



# Thank You

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