Building Envelope Insulation for Energy Conservation

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Indian Scenario

- Construction industry growing at 10%
- Power generation growing at 5-6%
- Dependence on coal based plants
- CO2 emission of 0.795 tons/MWh
- Buildings consume 60-70% of total power generation
- Maximum energy used to condition buildings
Typical Energy Consumption in Building

- HVAC: 55%
- Lighting: 14%
- Electronics: 27%
- Others: 4%
Heat Gain in Building

Source: BEE Website

- Roof: 35%
- Wall: 18%
- Doors & Windows: 16%
- Floor: 4%
- Lighting: 12%
- Equipment: 11%
- Occupant: 4%
Building Envelope Insulation

- Most effective building insulation method
- Provides barrier to building structure from direct solar radiation
- Reduces heat stress in structure
- Monolithic blanket of insulation
- Eliminates thermal breaks
- Insulation absorbs thermal shock
Polystyrene Foam Insulation

- Expanded Polystyrene Boards - Peripor & Neopor
- Offer high thermal insulation
- Water resistant boards
- Fire retardant with Class B1/B2 rating
- Ideal for thermal insulation of Roof & Wall
- Free of CFC & HCFC (Zero ODP)
- Recyclable
- Produced locally in India at multiple locations
Polyurethane Foam Insulation

- Polyurethane Foam Insulation
- High density, fire retardant grade
- Available as boards (Elastopor) & Elastospray (Spray)
- Spray PU foam ideal for profiled roof
- Offer highest thermal insulation
- Useful for Roof & Wall Thermal Insulation
- Recyclable
- Produced locally in India at multiple locations
Waterproofing to Sustain Insulation

- Insulation value drops in contact with water
- System built-up needs waterproofing that protect insulation
- Typical waterproofing membranes – Preformed TPO, Elastomeric PU
- Well insulated & waterproofed building envelope enhances life span of buildings
Building Envelope Insulation

Roof

- Roof Insulation
- Thermal Insulation
- Waterproofing
- Slope Built-up

Schematic Diagram Of A Typical Built-up
Building Envelope Insulation
Wall

Wall Insulation

- External Insulation & Finishing System (EIFS)
  - Thermal Insulation
  - Waterproofing
  - Finish Coat
Roof Insulation Comparison

Source: CBRI Studies

<table>
<thead>
<tr>
<th>Insulation Type</th>
<th>R Value (sq.m.K/W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150mm RCC</td>
<td>0.095</td>
</tr>
<tr>
<td>150mm RCC+ 100mm Brickbat Coba</td>
<td>0.218</td>
</tr>
<tr>
<td>150mm RCC+ 50mm PERIPOR+100mm Thermocrete</td>
<td>2.09</td>
</tr>
<tr>
<td>150mm RCC+ 50mm Elastopor+100mm Thermocrete</td>
<td>2.53</td>
</tr>
</tbody>
</table>
Indoor Temperature Profiling

Source: CBRI Studies

3200-3600 HOUR COMPARISON

- Indoor Air Temperature
- Ambient Temperature
- Untreated Roof
- Treated Roof
# Energy Calculations

Source: CBRI Studies

**Building Type:** Medium Income House (2 Floors, 230 Sqm)  
**Central Aircon:** Each Floor  
**Windows:** Ordinary, Single Glass, Light Coloured

<table>
<thead>
<tr>
<th>Heat Transfer Coefficient “U-Value” (W/m² K)</th>
<th>Walls</th>
<th>Roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building A (Non-Insulated)</td>
<td>2.6</td>
<td>1.8</td>
</tr>
<tr>
<td>Building B (Insulated 50mm)</td>
<td>0.57</td>
<td>0.57</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Annual Energy Consumption (kWh)</th>
<th>Building A</th>
<th>Building B</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Cooling</td>
<td>74700</td>
<td>49020</td>
</tr>
<tr>
<td>For Heating</td>
<td>9491</td>
<td>6228</td>
</tr>
<tr>
<td><strong>Total / Year</strong></td>
<td><strong>84391</strong></td>
<td><strong>55248</strong></td>
</tr>
</tbody>
</table>

**Energy Saving:** 35%
Reference Project
Bangalore International Airport
Reference Project
Godrej IT Park, Mumbai
Reference Project
Marriott Hotel, Jaipur
Atlantis Hotel
Dubai
Phase Change Material

- Technology of future PCM - Micronal
- Intelligent temperature management for buildings
- Works on concept of latent heat absorption/release and changing its physical state
- Can be used in internal plaster or in cement boards
- 3 cm Plaster with 30% PCM -
  - 18 cm Concrete
  - 23 cm Brick
BASF
Leading the Industry in the World

Fortune magazine:
America’s Most Admired Chemical Company, 2008

Global 100
World’s most sustainable corporations, 2009
BASF Group in India

- No. of Employees: > 2000
- Sales 2010: >6,000 Crore
- 9 production sites
- 31 sales offices in India
- 1 R&D centre as part of global technology platform
We don’t just make chemicals
We create chemistry

...with our employees

...In business

...And with nature
Let us build a sustainable future …
Together

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