

Driving Energy Efficiency through Evidence Generation: Development of Knowledge Products & Policies Formulation

Knowledge Products & Policies

**Baseline Report**

**Hollow Fired Brick Production Manual**

**Energy-Efficient Building Design Manual**

**Building Insulation Materials Manual**

**Formulation of EE provisions in policies of Local Governments**

- 1465** Samples  
Baseline Survey in 12 representative municipalities
- 12** Simulation Studies
- 8** Performance Monitoring
- 12** Design Charrette

**4 - Bio Climatic Zones of Nepal**

- Day use Office Building
- Residential Building
- Hotel Building

Results from Simulation Studies (Examples)

### Residential Building

**Residence In Ghorahi**  
Ghorahi SubMetropolitan City  
28°01'N, 82°29'E | Altitude: 667 m  
Temperate Climate  
Built-up Area: 217 m<sup>2</sup>

**Wall**  
Cement Plaster + Burnt Bricks + Cement Plaster

**Glazing**  
Single Clear Glass + Wooden Frame

**Roof**  
Cement Plaster + RCC Slab + Air gap + Gypsum Board

**Ground Floor**  
Tiles + Scream + RCC Plinth Slab

**25 -30%**  
Hours in Summer

Discomfort Hours during the summer months (April to June)

**55 -65%**  
Hours in Summer

Discomfort Hours during the winter months (Dec to Feb)

**Suggested Energy Conservation Measures**

- High Impact: Roof Insulation, Wall Insulation
- Medium Impact: External Movable Shading, Ground Insulation
- Low: Double Glaze Unit (DGU)

With the combination of all the strategies

**93%** Comfort Hours Annually

### Office Building

**Sub Metropolitan City Office**  
Butwal  
27.68°N, 83.43°E | Altitude: 211 m  
Warm Temperate Climate  
Built-up Area: 1300 m<sup>2</sup>

**Wall**  
Cement Plaster + Burnt Bricks + Cement Plaster

**Glazing**  
Single Tinted Glass + Wooden Frame

**Roof**  
Cement Plaster + RCC Slab + Air gap + Gypsum Board

**Ground Floor**  
Tiles + Scream + RCC Plinth Slab

**EPI 72** Annual EPI of the building

kWh/m<sup>2</sup> year

Components: Cooling Electricity, Equipment Electricity, Lighting Electricity

**Suggested Energy Conservation Measures**

- High Impact: External Movable Shading, Night Ventilation
- Medium Impact: Double Glaze Unit (DGU), 25 % WWR
- Low: High SRI paint

With the combination of all the strategies the reduction is

**10-15%** Annual Electricity Usage

### Hotel Building

**Samipya Hotel**  
Ghandruk, Annapurna  
28.37°N, 83.81°E | Altitude: 2012 m  
Cool Temperate Climate  
Built-up Area: 5117 m<sup>2</sup>

**Wall**  
Cement Plaster + Burnt Bricks + Cement Plaster

**Glazing**  
Single Clear Glass + Wooden Frame

**Roof**  
Cement Plaster + RCC Slab + Cement Plaster

**Ground Floor**  
Cement Plaster + PCC + Sand Filling + Stone Soiling

**50 - 40%** Hours Annually

Discomfort Hours Annually

This discomfort hours are due to lower temperatures in indoor spaces. During winter months the Indoor temperature is going 6° C in some space.

**Suggested Energy Conservation Measures**

- High Impact: Wall Insulation
- Medium Impact: Ground Insulation, Roof Insulation
- Low: Double Glaze Unit (DGU)

With the combination of all the strategies

**96%** reduction in Discomfort Hours

Monitoring the Performance of Energy Conservation Measures on-site

### Summer Monitoring: Bhaisepati

Location: Bhaisepati, Lalitpur  
27.38°N, 85.18°E  
Altitude: 1345 m  
Climate Zone: Temperate

Business as usual	Energy Efficient Construction	Temperature Difference Achieved	
<p><b>Wall</b> Cement Plaster + Burnt Bricks + Cement Plaster</p> <p><b>Glazing</b> Single Clear Glass + Wooden Frame</p> <p><b>Roof</b> Cement Plaster + RCC Slab + Cement Plaster</p> <p><b>Ground Floor</b> Cement Plaster + PCC + Sand Filling + Stone Soiling</p>	<p><b>Wall</b> Cement Plaster+ Bricks+ Polystyrene+ Brick+ Cement Plaster</p> <p><b>Glazing</b> Double Glass Unit + Aluminium Frame</p> <p><b>Roof</b> Tiles + Polystyrene + RCC Slab + Air Gap + Gypsum Board</p> <p><b>Ground Floor</b> Cement Plaster + Polystyrene + PCC + Sand Filling</p>	<p><b>Exposed Wall Surface</b> Day: 3° C Night: 1.2° C</p> <p><b>Roof Internal Surface</b> Day: 4° C Night: 1.2° C</p> <p><b>Partition Wall Surface</b> Day: 1.2° C Night: 1.8° C</p>	<p>Difference in Air Temperature during Day: <b>1.5°C</b></p> <p>Difference in Air Temperature during Night: <b>2.2°C</b></p>

### Winter Monitoring: Jiri House

Location: Jiri, Dholakha  
27.64°N, 86.22°E  
Altitude: 2265 m  
Climate Zone: Cool Temperate

Business as usual	Energy Efficient Construction	Temperature Difference Achieved	
<p><b>Wall</b> Cement Plaster + Burnt Bricks + Cement Plaster</p> <p><b>Glazing</b> Single Clear Glass + Wooden Frame</p> <p><b>Roof</b> CGI Sheet + Wooden structural member + Ply Wood</p> <p><b>Ground Floor</b> Cement Plaster + RCC Plinth Slab</p>	<p><b>Wall</b> Wood Plank + Mineral Wool + Air gap + Wood Plank</p> <p><b>Glazing</b> Double Glass Unit + Aluminium Frame</p> <p><b>Roof</b> CGI Sheet + XLPE Sheet + Wooden structural members</p> <p><b>Ground Floor</b> Elevated Floor: Wooden Plank + XLPE Sheet + Wooden Rafter</p>	<p><b>Exposed Wall Surface</b> Day: 6.8° C Night: 3° C</p> <p><b>Roof Internal Surface</b> Day: 4° C Night: 4.4° C</p> <p><b>Floor Surface</b> Day: 3.4° C Night: 1.5° C</p>	<p>Difference in Air Temperature during Day: <b>5°C</b></p> <p>Difference in Air Temperature during Night: <b>2°C</b></p>