SUSTAINABLE & ENERGY EFFICIENT BUILDING PRACTICE

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Climate Change Adaptation Program
Global Cities Research Institute
CERES: Community Environment Park
1200 Buildings Program
Key Concepts

- **Sustainable Urban Design and Planning:**
  - Mixed and high-density land use;
  - Adequate public transport;
  - Public space accessible for both pedestrians and cyclists;
  - Sustainable energy use;
  - Water and waste management;
  - Urban agriculture;
  - Reduction of ‘heat island’ effect.
Integrated Building Design

- Interaction between building envelope and HVAC system optimised to work as a system – whole-building approach – energy saving + comfortable indoor conditions.

- Daylight to reduce artificial lighting. Special glazing to allow daylight without raising temperature.

- High efficiency lighting (eg CFLs) reduce electricity use and heat gain, so smaller cooling systems can be used.

- Energy-efficient appliances/equipment available – fridges, washing machines, printers, etc.

- Cumulative energy savings from integrated system higher than if energy savings features implemented individually (40-50% compared to 20-25%).

- Need for all members of planning, design, construction and operation to work together for an integrated system to save energy and reduce environmental impact. Different from traditional silo process where specialists work in respective areas in isolation.
Passive Design

- Design in accordance to climate and site conditions.
- Orientation: Assists passive cooling and lighting.
- Insulation: Improves building envelope performance by minimizing heat gain.
- Thermal mass: Appropriate envelope materials to regulate indoor temperature according to diurnal temperature variation.
- Windows/glazing: Natural ventilation through opening size/position; glazing to allow daylight but keep out heat.
- Shading: According to orientation. Shading of glass critical as unprotected glass key heat gain source.
- Building should allow a degree of comfort even if power supply disrupted.
Passive Design
Impacts in the life cycle of a designed system

Yeang 2006

Life Cycle Assessment

Greenhouse gas emissions per m² of house (kg CO₂eq)
Green Building Rating Systems

The LOTUS Green Building Assessment Scheme

- First system to combine **Sustainability** and **Climate Change** Adaptation and Mitigation for the built environment in Vietnam.
- Based on analysis of other international systems; adapted for Vietnam.
### Rating system (10 credits)

<table>
<thead>
<tr>
<th>Checklist</th>
<th>1</th>
<th>2</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td><strong>E-1 Total Building Energy Use (kWh/M²/Yr)</strong></td>
<td>4 features below</td>
<td>5 features below</td>
<td>6 features below</td>
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<tr>
<td><strong>E-2 Energy Policy and Management</strong></td>
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<tr>
<td><strong>E-3 Building Envelope</strong></td>
<td>OTTV Meets EEBC</td>
<td>OTTV &lt;450W/M²</td>
<td>OTTV &lt;450W/M²</td>
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<td></td>
<td>U Value Meets EEBC</td>
<td>Improved by 10%</td>
<td>Improved by 20%</td>
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<tr>
<td><strong>E-4 Natural Ventilation</strong></td>
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<tr>
<td><strong>E-5 HVAC</strong></td>
<td>Meets EEBC</td>
<td>Improved by 10%</td>
<td>Improved by 30%</td>
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<td><strong>E-6 Artificial Lighting</strong></td>
<td>Improved by 15%</td>
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<td><strong>E-7 Hot Water</strong></td>
<td>Meets EEBC</td>
<td>Improved by 2%</td>
<td>Improved by 5%</td>
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<tr>
<td><strong>E-8 Energy Monitoring</strong></td>
<td>Improved by 10%</td>
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<tr>
<td><strong>E-9 Energy Efficient Practices and Features</strong></td>
<td>2% energy saving over total building energy consumption</td>
<td>4% energy saving over total building energy consumption</td>
<td>6% energy saving over total building energy consumption</td>
</tr>
<tr>
<td><strong>E-10 Renewable Energy</strong></td>
<td>2% renewable energy</td>
<td>5% renewable energy</td>
<td>10% renewable energy</td>
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Vertical Planting Design
Human and municipal waste contains nutrients for food/ non-food crop production.

Reuse of municipal waste water and solid waste in urban agriculture can reduce waste treatment and disposal, provided public health not impaired.

Integration of urban and peri-urban agriculture into urban environmental sanitation.

Contribute to reduction of ‘heat island’ effect and act as carbon sink.
Break-out session

- What potential synergies (re: Sustainable/EE Buildings) exist within RMIT?
- How can collaborative research be encouraged?
- What is the way forward?