Green Interior

What Makes Interior Green?

• Interior Design with Sustainability criterias
• It's for the occupants and environment
Green Spaces

- Minimizes Impact to the Environment
- Adds Value to the Surroundings
- Best Indoor Environmental Quality for Occupants
- Efficient in the Use of Resources

Green Spaces

Main Sustainable Strategies

- Energy Efficiency
- Indoor Environmental Quality
- Innovation
- Water Efficiency
- Site Management
- Material and Resources
Green Spaces

Considerations
– Minimize Impact to Environment
  • Energy Efficiency
  • Water Efficiency
  • Environmentally friendly and Sustainable supplies
  • Minimize Waste
– Best Indoor Environmental Quality for Productivity
  • Optimal Thermal Comfort
  • Optimal Noise Levels
  • Best Indoor Air Quality
  • Best Lighting

Green Office /Commercial
• Role of Management
  – Policies
  – Promote green
  – Identify key sustainability index
  – Provision of infrastructure
  – Identify the “prefects”
  – Monitoring key performance indexes
• Role of Occupants
  – Understand the policies
  – Provide inputs and suggestions
  – Utilize the infrastructure provided
Green Offices / Commercial

- Energy, Water, Supplies
- Office
  - Operations
  - Maintenance
  - Productivity
- Occupants
- Transportation
- Waste

Priority Pyramid

- Need/Demand
- Efficiency/Reused/Recycled
- Renewable Sources/Generation
Typical Energy Usage in a Commercial Building

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHU/FCU</td>
<td>27%</td>
</tr>
<tr>
<td>Central Plant</td>
<td>44%</td>
</tr>
<tr>
<td>Lighting</td>
<td>12%</td>
</tr>
<tr>
<td>Other Equipment</td>
<td>17%</td>
</tr>
</tbody>
</table>

Approx. 70% - Air Conditioning System

Energy and Water Use – Sustainable Practices

- Instill Good Resource Management Practices
  - Use lights when necessary
  - No “personal equipment”. Use only what is provided and condoned for use in office
  - Practice finishing work within the allocated office hours.
  - Encourage public transportation
  - Share office equipment
  - Use secondary water for office plants
  - Minimal heating for hot drinks. Extensive use of thermos for bulk heating and storing. No constant boilers
  - Water efficient fixtures if required
Green Purchasing Policy

- **Resource Efficiency**: Giving preferences to reusable content and recycled materials over virgin materials, as well as conserving water and energy.

- **Life Cycle**: Considering the environmental impact of a good or service over its lifetime (raw materials extraction, manufacturing, packaging, transport, operation, maintenance, energy consumption and disposal).

- **Pollution and waste prevention**: Processes and practices that prevent the creation of pollution and wastes, rather than managing these after they have been created.

### Equipment

<table>
<thead>
<tr>
<th>Product</th>
<th>Sophisticated Title</th>
<th>Sustainable Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office equipment such as PCs, notebooks, copiers, scanners, printers, and MFDs</td>
<td>Purchase of [PCs, notebooks, copiers, scanners, printers, and MFDs] with a reduced content of hazardous substances OR Purchase of energy efficient and socially responsible products [PCs, notebooks, copiers, scanners, printers, and MFDs] with low environmental and social impacts throughout the life cycle</td>
<td>Purchase of [pens, markers and pencils] made in environmentally and socially responsible way</td>
</tr>
<tr>
<td>Writing instruments such as pens, markers and pencils</td>
<td>Purchase of [pens, markers and pencils]</td>
<td>Purchase of [pens, markers and pencils] made in environmentally and socially responsible way</td>
</tr>
</tbody>
</table>
Lighting

<table>
<thead>
<tr>
<th>Load Density</th>
<th>Load Factor</th>
<th>Watts/ft²</th>
<th>Description (equipment for each 1000 sf of office space)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>0.5</td>
<td></td>
<td>Reserve 100 fluorescent (6 total) each with computer and monitor</td>
</tr>
<tr>
<td>Medium</td>
<td>1.0</td>
<td></td>
<td>Reserve 125 fluorescent (8 total) each with computer and monitor</td>
</tr>
<tr>
<td>Medium/Heavy</td>
<td>1.5</td>
<td></td>
<td>Reserve 150 fluorescent (10 total) each with computer and monitor</td>
</tr>
<tr>
<td>Heavy</td>
<td>2.0</td>
<td></td>
<td>Reserve 200 fluorescent (13 total) each with computer and monitor</td>
</tr>
</tbody>
</table>

Space Maintenance

a. Specify, wherever possible and reasonably practicable, the use of environmentally friendly materials, components and products.

b. Promote the use of less-toxic products that protect the health and safety of employees and minimize harmful emission to our air, water and land.

c. Ensure that appropriate consideration is given to the costs and benefits of environmentally friendly alternatives.

d. Consider, where appropriate, environmental and social criteria using life cycle assessment in awarding contract.

e. Incorporate the sustainability criteria at the early stage of procurement process.

f. Develop sustainable specifications in tender and contract documents.

g. Encourage and persuade suppliers to offer environmentally preferable products and services at competitive price.
Pest Control

Audit & Identify

Natural/green pest management

Analyse

Prevention Plans

Pest Control

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection</td>
<td>• Check for any sightings of pests, shells, eggs and droppings&lt;br&gt;• Discover any damage caused by rodents&lt;br&gt;• Lay out some baits and traps at high-risk areas&lt;br&gt;• Record any findings&lt;br&gt;• Determine the type of pests found inside the premises&lt;br&gt;• Identify the areas that traces of pests found</td>
</tr>
<tr>
<td>Prevention</td>
<td>• Make sure all cracks and holes at wall are sealed properly&lt;br&gt;• Ensure all doors and windows remain shut at all times&lt;br&gt;• Proper clean-up&lt;br&gt;• All foods and beverages are disposed accordingly&lt;br&gt;• Dust bin lid are tightly closed&lt;br&gt;• Reduce the items to be stored on the floor&lt;br&gt;• Utilize waste regularly</td>
</tr>
<tr>
<td>Pest Management</td>
<td>• Use baits and traps&lt;br&gt;• Nuncating&lt;br&gt;• Natural chemicals e.g., vinegar, borax acid, bacteriobiothergicin&lt;br&gt;• Herbicides&lt;br&gt;• Develop method of statement on usage of pesticide on the area identified&lt;br&gt;• Identity location for pesticide sprayer&lt;br&gt;• Make sure chemicals used are in compliance of manufacturer’s instructions and registered under Pesticide Board of Malaysia&lt;br&gt;• Pest management company engaged is established and registered under Pesticide Board&lt;br&gt;• Keep the usage of pesticide at minimum</td>
</tr>
<tr>
<td>Record</td>
<td>• Update database with recorded data&lt;br&gt;• Introduce complaint log book to record any pest complaint&lt;br&gt;• Detailed analysis of the recorded data&lt;br&gt;• Reports on treatment activities undertaken, existence of pest problems, complaints and remedial action taken</td>
</tr>
</tbody>
</table>
# Waste Management

## Waste Types

<table>
<thead>
<tr>
<th>Category</th>
<th>Waste Categories</th>
<th>Examples</th>
<th>Symbol</th>
<th>Recycling?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>Plastic bottles, milk bottles, plastic containers, etc.</td>
<td>Recyclable through recycling facilities</td>
<td>PE-HD</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Glass bottles, bottles, jars, jugs, and pet bottles</td>
<td>Recyclable through recycling facilities</td>
<td>PET</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Plastic film and flexible packaging</td>
<td>Non-recyclable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Styrofoam (PS)</td>
<td>Recyclable through recycling facilities</td>
<td>PS</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Foil</td>
<td>Non-recyclable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cans</td>
<td>Non-recyclable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cardboard</td>
<td>Recyclable through recycling facilities</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Newspapers, magazines, and office paper</td>
<td>Recyclable through recycling facilities</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Unprinted paper</td>
<td>Recyclable through recycling facilities</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Printed paper</td>
<td>Recyclable through recycling facilities</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

## Waste Strain

<table>
<thead>
<tr>
<th>Waste Stream</th>
<th>Waste Minimization Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>White paper</td>
<td>Reduce: Change to use duplex printing. Staff will be encouraged to print on both sides of each sheet.</td>
</tr>
<tr>
<td></td>
<td>Reuse: Discarded paper with print only on one side will be used for note pads/crap.</td>
</tr>
<tr>
<td></td>
<td>Recycle: Discarded paper and waste paper bales will be provided at each desk. Staff will ensure the bins are kept centrally located.</td>
</tr>
<tr>
<td>Polystyrene</td>
<td>Encourage use of polystyrene and biodegradable food containers for regular use outside food catering services. Encourage product suppliers to reduce usage or take back packing items for recycling.</td>
</tr>
<tr>
<td>Building renovation</td>
<td>Add clause to building contracts that all renovation waste that is removed from the building must be source separated and diverted as reasonably possible.</td>
</tr>
<tr>
<td>Furniture</td>
<td>Furniture in good condition is being reused. Try to look into donation of damaged furniture for repair and reuse.</td>
</tr>
<tr>
<td>Paper Towel</td>
<td>Install electric hand dryers in all restrooms to minimize the dependency on paper towel. To eliminate the dependency on paper towel, instead, a cotton towel dispenser with a self-dispensing pump can be installed. Generally, cotton towel dispenser is more effective than electric hand dryer in terms of hygiene and speed.</td>
</tr>
<tr>
<td>Old stationery</td>
<td>Store in copy room for reuse.</td>
</tr>
</tbody>
</table>

## Implementing Recycling Programs

Implementing a recycling program within the premises, involving entire communities of PET.
Waste Management

<table>
<thead>
<tr>
<th>Item</th>
<th>Separation &amp; Storing Method</th>
<th>Storing &amp; Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newspapers and magazines</td>
<td>Room temperature</td>
<td>Disposal</td>
</tr>
<tr>
<td>White paper, cardboard and mixed paper</td>
<td>Place in separate bags and bins</td>
<td>Disposal</td>
</tr>
<tr>
<td>Cardboard</td>
<td>Open and tie in a handle securely</td>
<td>Disposal</td>
</tr>
<tr>
<td>Glass</td>
<td>1. Wash, cut off 2. Store in boxes or plastic bags</td>
<td>Disposal</td>
</tr>
<tr>
<td>Beverage Cartons</td>
<td>1. Rinse the carton package after consumption 2. Flatten and place</td>
<td>Disposal</td>
</tr>
</tbody>
</table>

- **Plastics**: 1. Separate mineral bottles and other plastic containers. 2. Wash and dry. 3. Store in bags or boxes.
- **Metals**: 1. Drain leftover liquids. 2. Wash and dry, compact, and store in bags and boxes.

Indoor Environmental Quality

- thermal comfort quality
- vibration quality
- sound quality
- light quality
- air quality
- odor quality

indoor environmental quality

top.com
Indoor Environmental Quality

- Ventilation (Indoor air quality)
- Environmental tobacco smoke control
- Carbon dioxide monitoring
- Indoor contaminant
- Thermal comfort
- Odour
- Daylighting
- Visual comfort
- Acoustics

Indoor Environmental Quality

Indoor Air Quality

Occupancy in buildings fluctuates
Implemented to modulate fresh air intake

<table>
<thead>
<tr>
<th>Indoor Air Contaminants</th>
<th>Eight-hours time-weighted average airborne concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ppm</td>
</tr>
<tr>
<td><strong>Chemical contaminants</strong></td>
<td></td>
</tr>
<tr>
<td>(a) Carbon dioxide</td>
<td>C1000</td>
</tr>
<tr>
<td>(b) Carbon monoxide</td>
<td>10</td>
</tr>
<tr>
<td>(c) Formaldehyde</td>
<td>0.1</td>
</tr>
<tr>
<td>(d) Ozone</td>
<td>0.05</td>
</tr>
<tr>
<td>(e) Respirable particulates</td>
<td>-</td>
</tr>
<tr>
<td>(f) Total volatile organic compounds</td>
<td>3</td>
</tr>
<tr>
<td>(TVOC)</td>
<td></td>
</tr>
<tr>
<td><strong>Biological contaminants</strong></td>
<td></td>
</tr>
<tr>
<td>(a) Total bacterial counts</td>
<td>-</td>
</tr>
<tr>
<td>(b) Total fungal counts</td>
<td>-</td>
</tr>
</tbody>
</table>
Environmental Tobacco Smoke

- Adopting no smoking policy
- Provision and Segregation of smoking areas
- Addressing second hand tobacco smoke by providing dedicated external areas, and/or purging/filtration system.

Indoor Environmental Quality

Air Contaminants

- Biological of contaminants
- Chemical pollutants
- Particles

FACTORS CONTRIBUTE TO INDOOR AIR QUALITY

Design, maintenance & operation of building ventilation systems

- Ventilation system design
- Outdoor air quality
- Space planning
- Equipment maintenance
- Controlling other pollutant pathways

Source of pollutants/odors

Moisture & humidity

VOC & Formaldehyde

Occupant perceptions & susceptibilities
Indoor Environmental Quality

Air Contaminants

Products used for buildings emit more than 11,000 individual chemicals
Use of low VOC and formaldehyde free products minimize exposure of occupants to indoor contaminants

Indoor Environmental Quality

Thermal Comfort

Primary factors to be addressed:
1. Metabolic rate
2. Clothing insulation
3. Air temperature
4. Radiant temperature
5. Air speed
6. Humidity
Daylighting increasingly emphasized and rising in importance in green buildings

- Reduces electrical energy consumption
- Reduces air conditioning load

Glare Control
- manual control blinds
- automatic blinds

Lighting Quality
Provide adequate lighting levels for use and ambience but not to be overly. Provide good lighting fixtures to reduce eyestrain – high frequency ballasts

External Views
Green buildings promote visual connectivity for the occupants with the outdoor environment
- good for relaxation
- reduces stress
Indoor Environmental Quality

Acoustics

Noise affects human productivity, performance and comfort

Acoustics of a space improves the ambience and mood of occupants

Noise at working spaces within acceptable levels to provides conducive working environment

Rate it!

- Leed Interior and Construction
Leed Interior & Construction

Location & Transportation  Indoor Environmental Quality
Water Efficiency  Innovation
Energy & Atmosphere  Regional Priority
Materials and Resources

Rate it!

• Green Building Index Interior Tool
### GBI INTERIORS RATING CRITERIA

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ENERGY EFFICIENCY (EE)</td>
</tr>
<tr>
<td>2</td>
<td>INDOOR ENVIRONMENTAL QUALITY (EQ)</td>
</tr>
<tr>
<td>3</td>
<td>SUSTAINABLE SITE PLANNING &amp; MANAGEMENT (SM)</td>
</tr>
<tr>
<td>4</td>
<td>MATERIALS &amp; RESOURCES (MR)</td>
</tr>
<tr>
<td>5</td>
<td>WATER EFFICIENCY (WE)</td>
</tr>
<tr>
<td>6</td>
<td>INNOVATION (IN)</td>
</tr>
</tbody>
</table>

**Thank You**