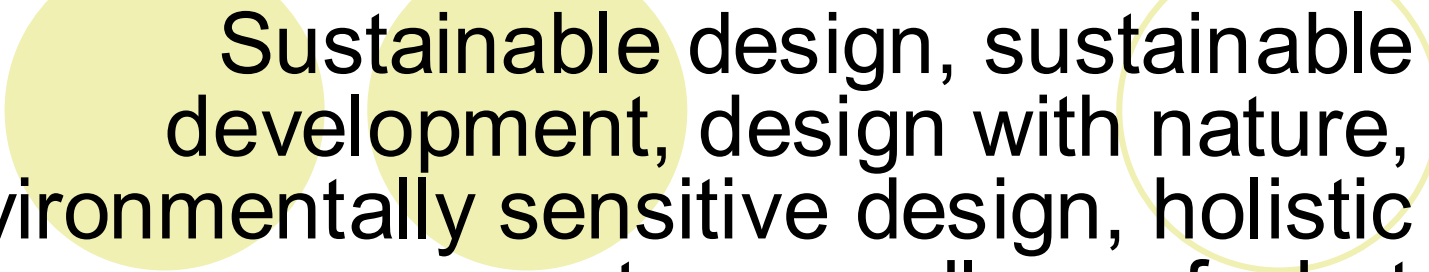


Eco Housing - National and International Perspective

Tanmay Tathagat
International Institute for Energy
Conservation (IIEC)

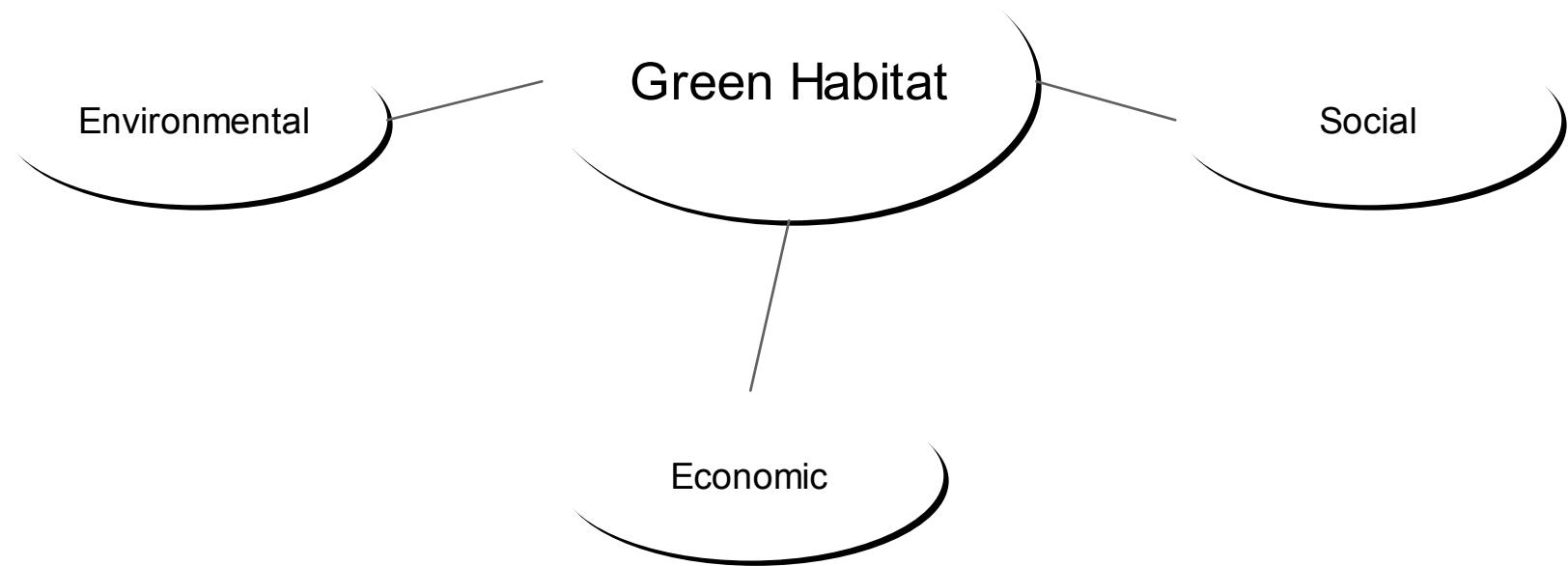


Sustainable Development - Driving Force



Sustainable design, sustainable development, design with nature, environmentally sensitive design, holistic resource management - regardless of what it's called, "sustainability," the capability of natural and cultural systems being continued over time, is key.

Sustainable Habitation Impact



Green Buildings Anyone?

- Is sustainable development sustainable?
 - In absence of an active market for sustainable services it's not!
 - Standalone Demo projects, individual initiatives, and short term efforts don't work
 - Numerous Examples of failed efforts
- How can this market be created?
 - By creating demand for and providing supply of green products/services
 - Setting up institutions to support it
 - Several Mechanisms exist for doing this
 - Market Transformation, Demo Projects, Standards and Labels, Codes and Standards



Issues

- Sustainable development has not become the standard practice [mainstream]
 - Sporadic, disconcerted efforts have failed to mobilize the market
 - The scale of operation limits mainstream market participation
 - There is no well defined institutional setup to support the movement



What is Eco-Housing?

- Sustainable Buildings
- Healthy Productive Environment
- There is no international standard

Solution



- Active partnership among all stakeholders
- Development and adoption of a new business model, that internalizes the environmental and social costs
- Developing sound financial mechanism
- Scaling up existing green building practices and technologies
- Setting up institutions that support and propel the market

Approach



- A thematic extension of the Green Buildings Program
 - Geographical
 - SARI, Brazil, South Africa
 - Institutionalization
 - Business models, ESCOs
 - Technology
 - Renewables, Construction Materials, Tools, Products

Eco-Housing Assessment Tools

The image features a title 'Eco-Housing Assessment Tools' in a dark green, sans-serif font. The text is arranged in two lines: 'Eco-Housing Assessment' on the top line and 'Tools' on the bottom line. The words 'Assessment' and 'Tools' are partially overlaid by a solid light green circle. Below the title, there are five circles of the same light green color. Two are solid and positioned on the left side, while three are hollow with a thin light green outline, positioned on the right side. The overall design is clean and modern.

Assessment Methods



- Scope of the evaluation
 - building products
 - building processes
 - structural members/elements
 - single buildings
 - building services
 - groups of buildings
 - stocks of buildings

Assessment Methods

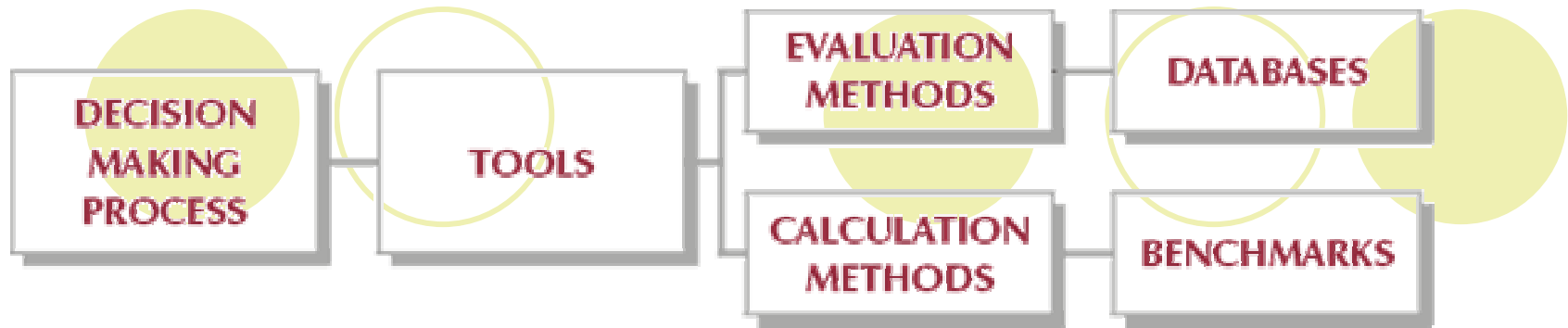


- Approach

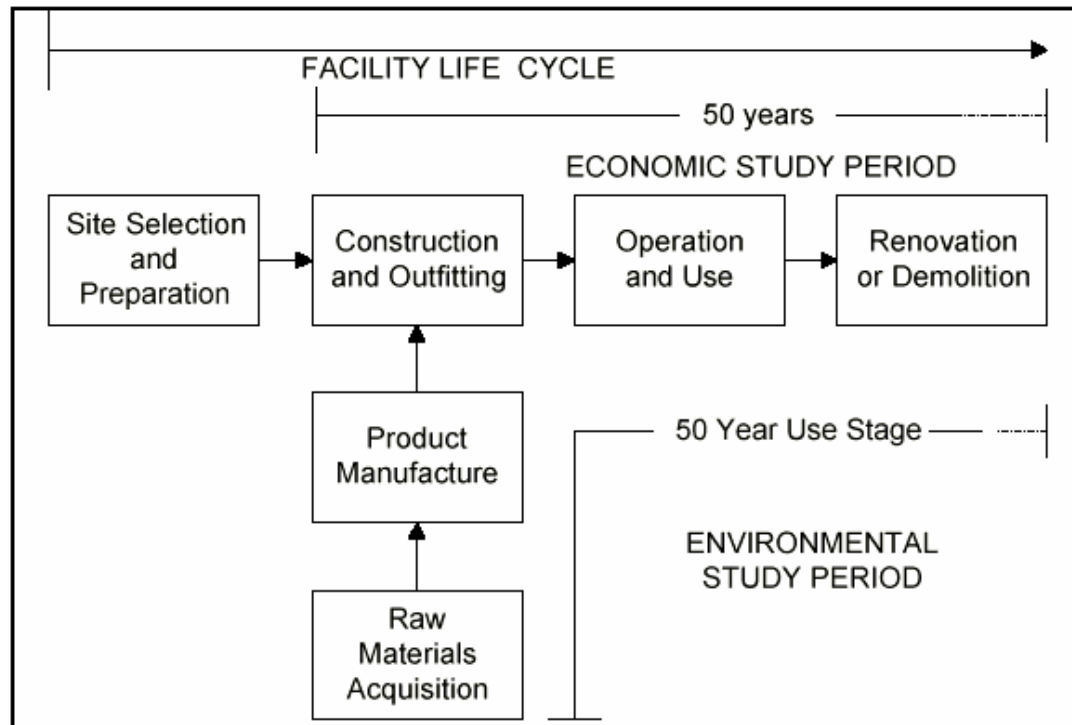
- checklists or forms
- computer-based methods
 - spreadsheet
 - computer programs

- Models used

- environment model
- product model
- life cycle model



Support for decision making process



Life cycle model for environmental and economic performance

Assessment Methods



- Types of tools

- computer-aided planning tool
- computer-aided assessment tool
- certification (e.g. energy certification, building certification, building rating)
- audit (certificate)
- catalogue
- guideline
- product/process information

Assessment Tools



- Examples (whole building)
 - BREEAM-UK
 - BREEAM-Canada
 - BEPAC-Canada
 - LEED (USA)
- Examples (building material or product)
 - Athena (Canada)
 - BEES (USA)

Assessment Tools

- Developing at present

- ECO QUANTUM (Netherlands)

- ECO-PRO (Germany)

- EQUER (France)

- GBTool (Green Building Challenge)



- Asian countries

- HK-BEAM

- Taiwan Green Building Label

- Japan Green Building Guide



Assessment Tools

- BREEAM - UK

- **B**uilding **R**esearch **E**stablishment
Environmental **A**ssessment **M**ethod

- *building fabric and services*

- global issues | local issues | indoor issues | management issues

- *building operation and management*

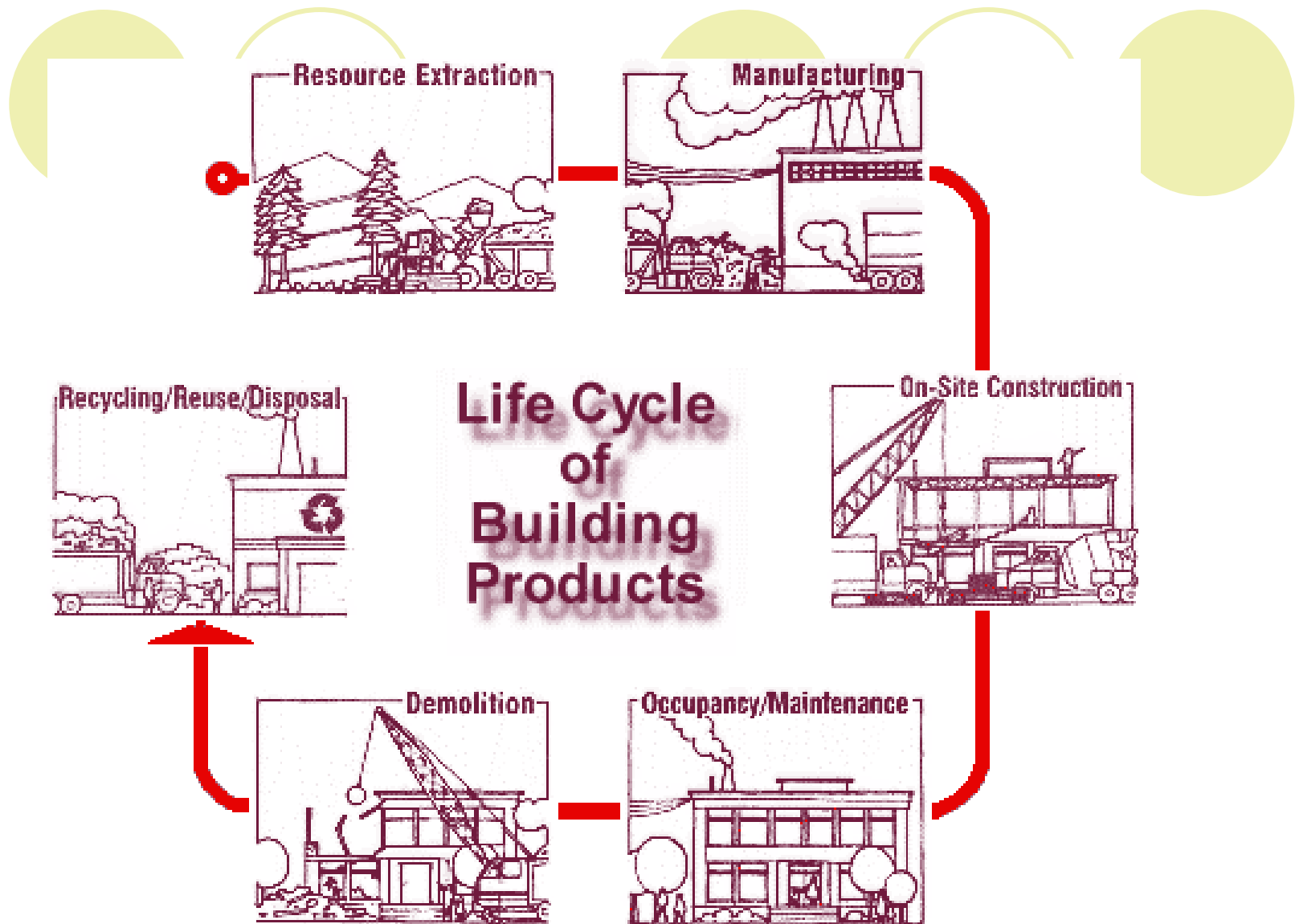
- environmental policy | global issues and use of resources | local issues | indoor issues

- as a model for similar methods (e.g. HK-BEAM, and BREEAM in Canada & Australia)

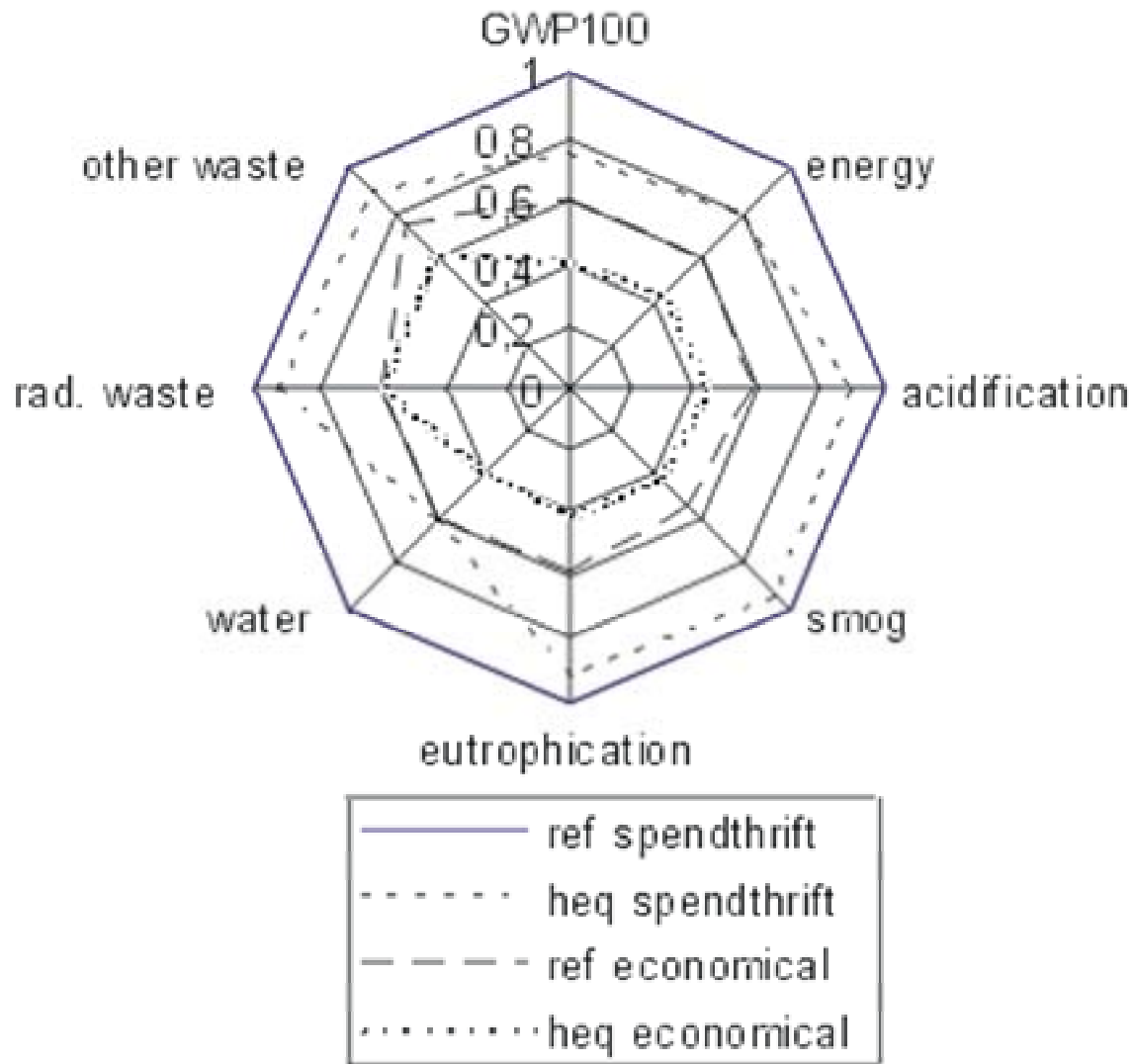
Assessment Tools

- LEED Green Building Rating System
 - by US Green Building Council
 - Leadership in Energy & Environmental Design
 - scores
 - sustainable sites
 - water efficiency
 - energy and atmosphere
 - materials and resources
 - indoor environmental quality
 - innovation credits





Model of Athena sustainable material assessment tool



Radar chart from the EQUER life cycle tool (France)

Assessment Tools

- GBTool

- GBC (Green Building Challenge) for 19 countries

- issues considered

- resource consumption (**R**)
- environmental loadings (**L**)
- indoor environmental quality (**Q**)
- quality of service (**S**)
- economics (**E**)
- pre-operations management (**M**)
- architectural quality (? not included)



Assessment Tools

- HK-BEAM

- version 1/96R - for new office designs

- version 2/96R - for existing office buildings

- version 3/99 - for new residential buildings

- Taiwan Green Building Label (since 1999)

- Japan Green Building concepts

- government building checklist

- Symbiotic Housing



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Assessment Tools



- Limitations

- issue of over-simplification
- difficulty to 'weight' the criteria
- practicality and cost of making an assessment
- participation in the evaluation process

- Recommendations

- integration with other design issues and constraints is important
- use the assessment results for improvement



BRE – ECO HOMES

- EcoHomes, sponsored by National Home Builders Council, is the homes version of BREEAM (the BRE Environmental Assessment Method)
- EcoHomes serves as a simple label for new and renovated homes including houses and apartments.
- The issues assessed are grouped into seven categories namely, Energy, Transport, Water, Ecology and land use, Pollution, Health and well being and Materials
- All the issues in EcoHomes are optional, making it flexible and enabling developers to adopt the most appropriate aspects of sustainability for their particular development and market



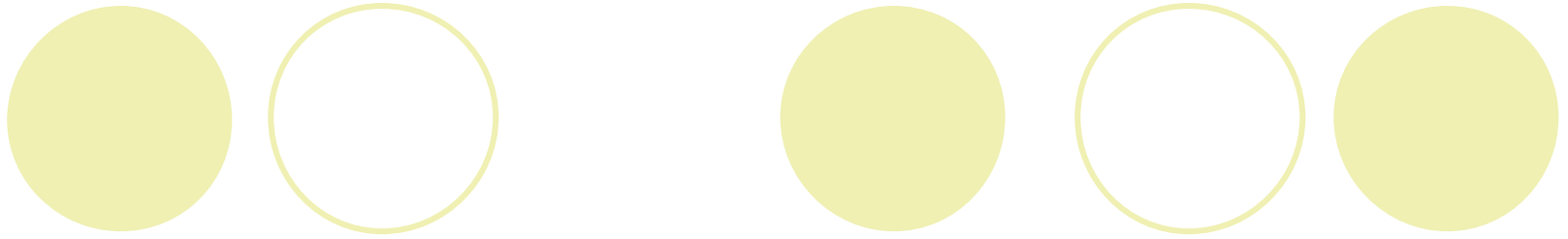
City of Austin – Home Rating System

- This is an excellent case of a building rating system customized to city-scale requirement and region-specific climatic condition
- The Austin GBP rated almost 2200 homes during 1998-2002, using the Single-Family Residential (SFR) rating tool
- The SFR rating assesses houses on the extent that they follow a set of *Basic Requirements (BR)* and a set of recommended *Green Building Measures (GBM)*.
- The BR are compulsory and do not receive any points, while each GBM receives points from 1-5

Environmental Declaration and Classification of buildings



- A method of practical use for environmental declaration and classification of buildings is under development by the Danish ministry of Housing and Urban Affairs
- In the first phase the indicators for declaration and a reference basis for assessment of these indicators were established
- In the second phase of the project, results expected, the method will be tested in practice by applying it to 3 to 5, office and residential, buildings during construction
- Danish Building and Urban Research has developed the computer program BEAT 2001 for inventory and assessment of environmental impacts related to production, operation and demolition of buildings.



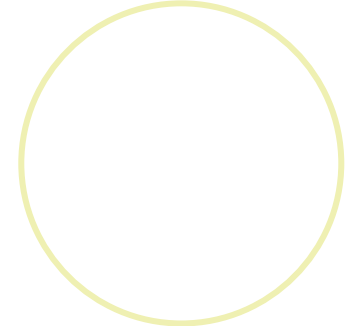
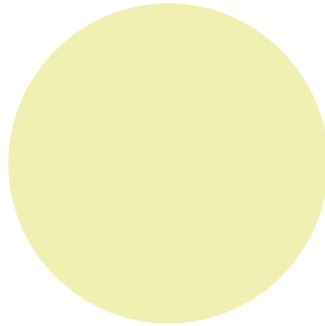
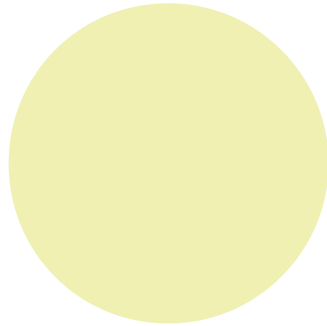
- There are more than 120 GBM organized under the six headings
 - Energy efficiency in design, construction and operation
 - Quality of workmanship in construction
 - Indoor and Outdoor water conservation measures
 - Health and Safety including humidity control, pest management and use of pollutants, contaminants
 - Material use efficiency, life-cycle burden, longevity and construction waste management
 - Site and Community accessibility
- The SFR Rating has five rating levels indicated by stars, One Star is lowest and Five Stars the highest

Energy Star - Homes



- ENERGY STAR is a national, voluntary program sponsored and developed by the U.S. Environmental Protection Agency (EPA) that promotes energy-efficient products, including homes.
- Homes that have earned the ENERGY STAR meet the EPA's performance guidelines for energy efficiency and receive third party verification from an accredited organization
- Benefits of the Energy Star Home
 - Tight Construction – reduced infiltration
 - Tight ducts
 - Improved Insulation
 - High Performance Windows
 - Energy Efficient Heating and cooling equipment

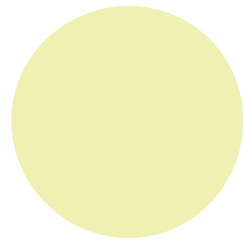
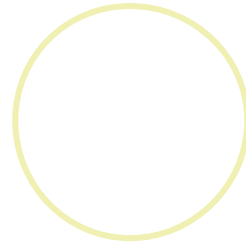
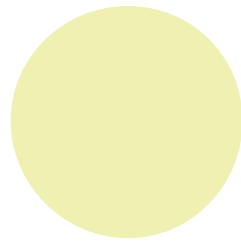
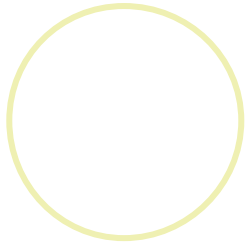
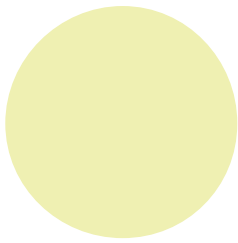
International Green Building Programs - Examples





International Green Building Programs

- Energy Star New Homes Program
 - Energy Star New Homes Program relates to homes that are three stories or less; only looks at heating, cooling and water heating
 - Energy Star program for existing homes was started in 1998; it has a growing contractor list and works a lot with consumer education
 - Increased design/material costs to have a house be an Energy Star Home (>86 on HERS score) are generally offset by the ability to downsize other aspects (i.e., the HVAC system)



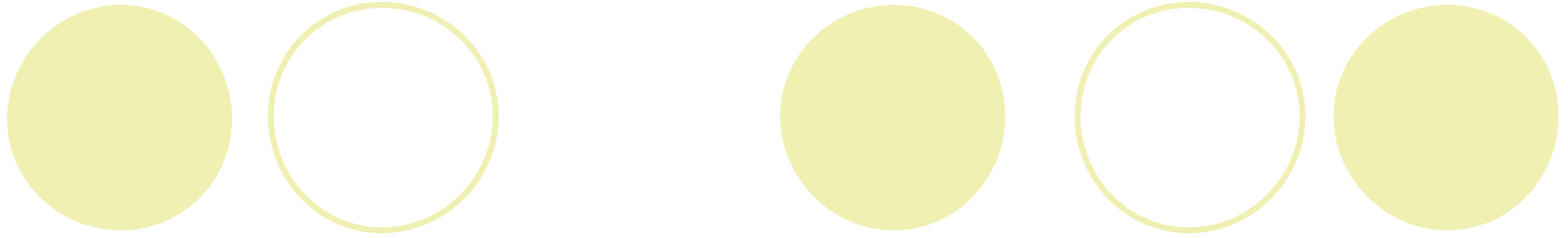
- Department of Energy – Built America Program

- [Symbolic text block]
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Indian Examples of – Green Housing

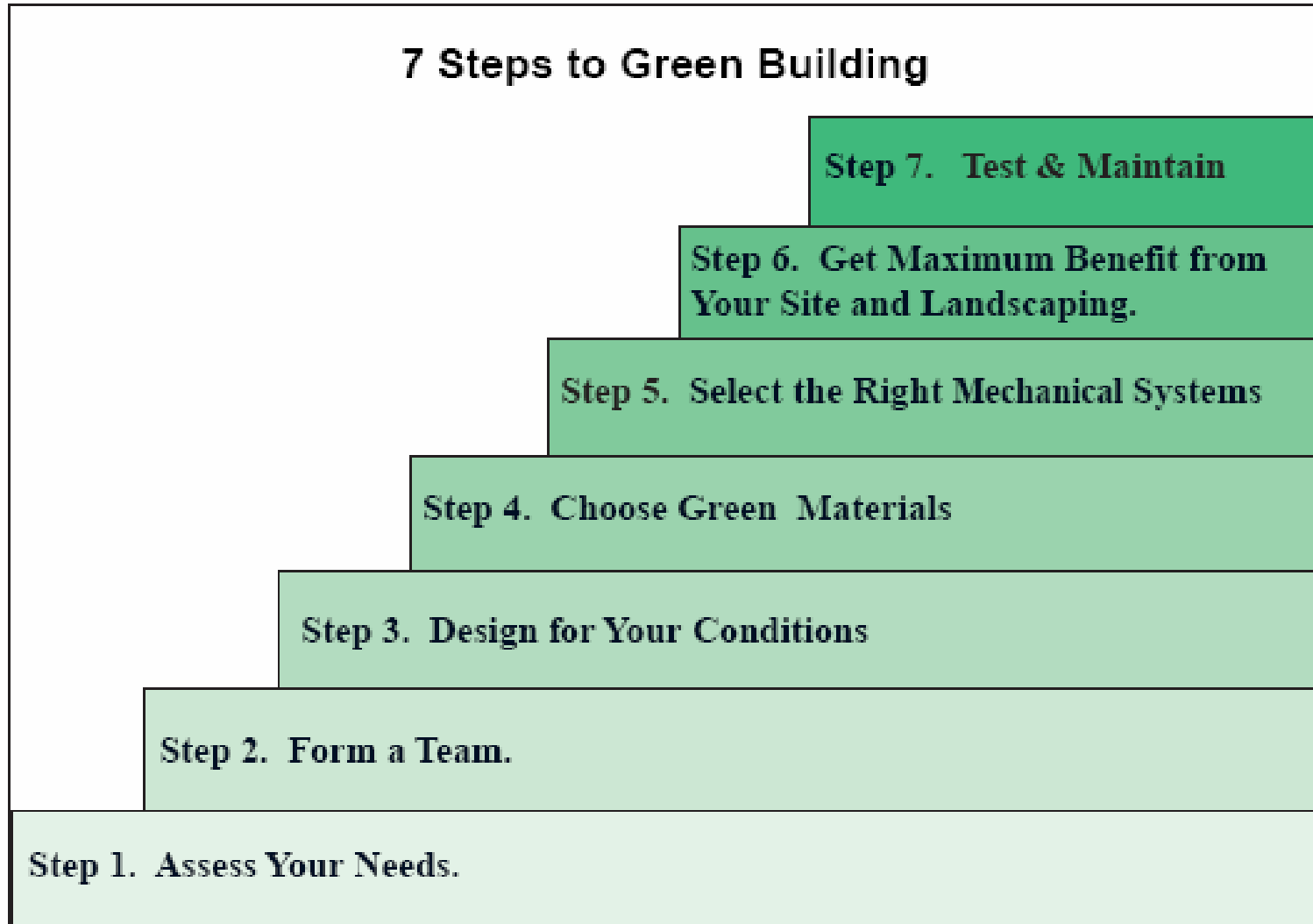
- **T-ZED – Zero Energy Development Housing, Bangalore**
 - The campus envisages 80 ZED homes in five clusters of four-floor configurations. Each cluster offers 16 homes.
 - Some salient features of the housing scheme
 - A central chilling system that is based on a benign chemical, ammonia
 - Energy-efficient design — with homes facing north or east to make the most of the solar axis, and to bring in sunlight in place of artificial lighting
 - A water strategy that enables reduction of consumption. This includes installing water-saving appliances and making the most of rain and recycled water
 - Lowered utility bills
 - Total recycling of wastes

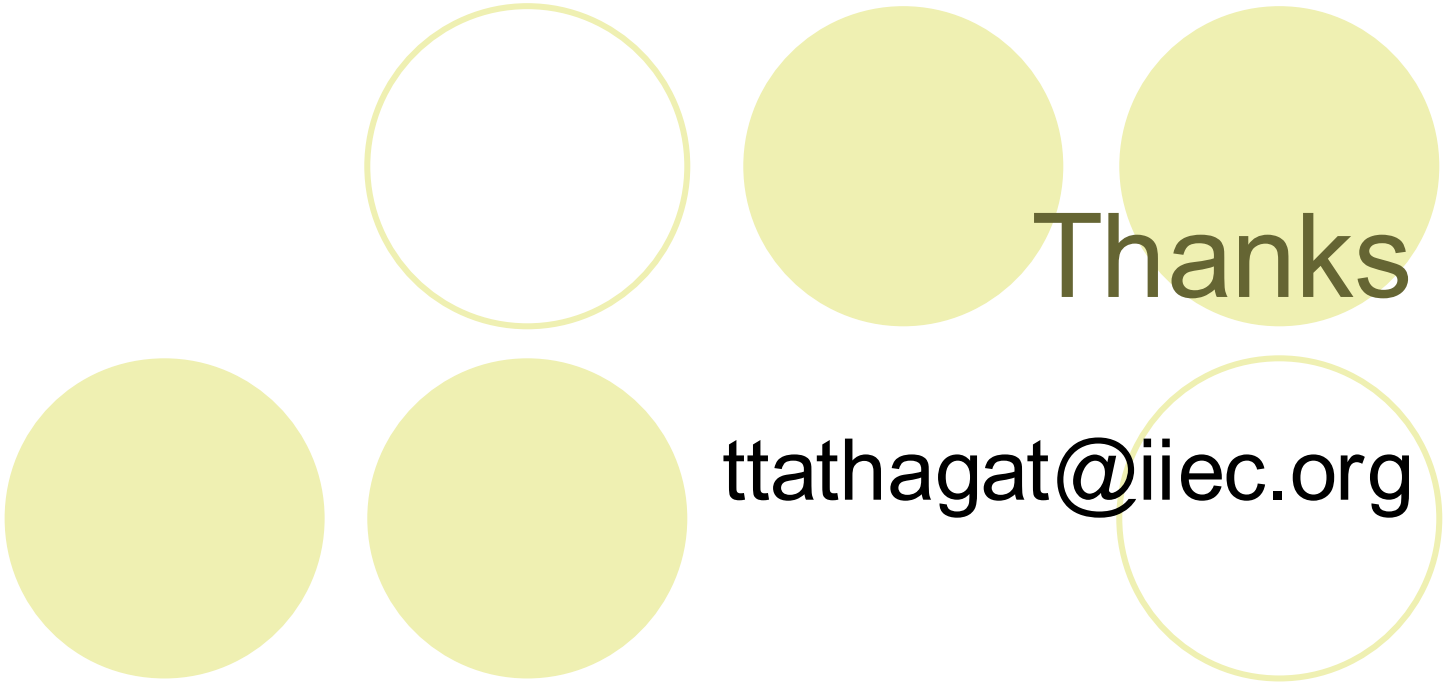


- **Eco-friendly: Home designs**

- Use of natural materials available on site
 - Earth, water, fire, sun, Wind, Space and BioDiversity
- Incorporating basements or cellars into designs makes available the earth required for construction from the site itself
- Rain water harvesting and reuse of grey water – reducing ecological footprint of water to zero
- Use of solar passive techniques – mass walls, sun shades
- Natural ventilation – strategically placed openings for capturing breeze.
- Use of Natural Light.
- Use of waste and recycled materials in the building construction

7 Steps to Green Building





Thanks

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