Financing Green Buildings in North America

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March 4, 2010
United Nations Environment Program

Presentation
1. Role of Buildings in Climate Change
2. What are Green & Sustainable Buildings
3. UNEP Sustainable Buildings & Climate Initiative
4. Common Metrics for Sustainable Buildings
Greenhouse Effect

IPCC (Intergovernmental Panel on Climate Change) states, we must reduce emissions by 50-85% by 2050 to limit temperature increase to 2°C

Climate Change

GHG emissions increased by 70% from 1970 to 2004

Current GHG levels highest in 650,000 years
IPCC assessment of emission reduction potential in different sectors depending on the carbon market price (<$20, <$50, <$100)

**GHG Emission Reduction Potential by Sector**

- **Electricity Use:**
  - **Global average = 5.5 MWh/capita/yr**
  - **TOP TEN:**
    1. Denver (24.3)
    2. Los Angeles (15.5)
    3. Toronto (14.4)
    4. Cape Town (14.4)
    5. Bangkok (13.5)
    6. New York (12.2)
    7. London (10.5)
    8. Prague (10.1)
    9. Geneva (8.7)
    10. Barcelona (4.6)

In USA: **76%** of Electricity Used by Buildings
Energy Use

Energy Consumption Varies
(Buildings = 33% in Canada)

Residential

Commercial


WBCSD Study of Energy Use in 6 regions

Residential Energy Use

Source: WBCSD, 2009
In all 6 Regions; 50% of use occurred in the Residential Sector:

- Single Family
- Multi-Family

Why Buildings?

Environmental Impact of Buildings in USA:

- Land Use: 12%
- Other Releases: 13%
- Water Effluents: 20%
- Water Use: 25%
- Solid Waste: 25%
- Raw Materials Use: 30%
- Atmospheric Emissions: 40%
- Energy Use: 42%

40% of global energy use
1/3 of global energy related emissions
What is a Green Building?

Agreed on 5 Categories of Concern

- Transportation
- Site
- Water
- Energy
- Material
### Transportation

- **Commuting**
  - Location – urban areas
  - Mass Transit

- **Moving Goods & Services**
  - Local Materials & Products

### Site

- **Biodiversity**
  - Conservation
  - Protection
  - Connection
**Water**

- **Site Water**
  - Rain Water Harvesting
  - Vegetated Roofs
  - Storm Water Management
  - Native, Drought Tolerant Landscaping

**Water Use & Wastewater Management**

- Low-flow Fixtures
- Waterless Urinals
- Dual Flush Toilets
- Constructed Wetlands
- Reuse Treated Effluent for Irrigation
Energy

- **Energy Sources**
  - Wind Turbines
  - Photovoltaics
  - Waste Heat

- **Passive Systems**
  - Solar Gain, Breezes, Shading
  - Solar Hot water

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**Energy**

- Commissioning
- Metering
  - Sub-metering
  - Building Automation System
  - Remote Monitoring
- Equipment Efficiency

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Basic components of a flat plate collector system
Energy

- Interior Lighting
  - Daylighting
  - Sun Shades
  - Light Shelves
  - LED Fixtures
  - Controls

Energy

- Plug & Process Loads
- Data Centers
  - Consolidation
  - Virtualization
  - Thin-Client
- Automated Shut-off/Start-up
**Materials**
- Renewable
- Content
  - Recycled
  - Toxins
  - Embodied Energy

**What is a Sustainable Building?**

**Environmental Concerns + Social**
- Transportation
- Site
- Water
- Energy
- Material
- Indoor Environment
Indoor Environment

Healthy Building
- Air Quality
- Thermal Comfort
- Lighting
- Views
- Acoustics

What is a Sustainable Building?

Environmental Concerns + Social & Economic

- Transportation
- Site
- Water
- Energy
- Material
- Indoor Environment
- Economic

90% of our time spent indoors

Salaries and Benefits 85.8%

Source: E source: data from Right Light Consortium

Source: US GSA
What are the barriers?

Fragmentation in design and delivery:

Professional and Trade Responsibilities (Functional gaps) + Building Delivery Process (Management discontinuities) = Operational Islands (Ineffective coordination; poor communication)

Source: WBCSD

What are the barriers?

Long-tail section of end-use units:

Source: Cheng, et al. 2008
UNEP-FI North American Task Force Meeting
Toronto, Canada
March 4, 2010

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Sustainable Buildings & Climate Initiative
Members of UNEP SBCI
Sustainable Buildings & Climate Initiative

UNEP-SBCI Results
Research and tools through Think Tanks and Partnerships

Tools and demonstration projects
- Policy Models
- Carbon Index
- Pilot projects

Positioning & recommendations
- Call to Action
- Common Metrics
- Submissions to UNFCCC
- Support partner calls

Public dialogue and specialized consultations
- Changsha 2006
- Rabat 2007
- Kuala Lumpur 2007
- Bali 2007
- Saint Lucia 2008
- Bonn 2008
- Madrid 2008
- Poznan 2008
- Delhi 2009
- Stockholm 2009
- Washington 2009
- Bonn 2009
- Brasilia 2009
- Singapore 2009
- Copenhagen 2009
Corporate Real Estate - Barriers
Sustainable Buildings in the Marketplace:

In 2009 Survey by CoreNet Global & Jones Lang-LaSalle; respondents claimed the following challenges to demonstrating value of sustainable buildings:

- 63% insufficient comparable industry metrics;
- 59% availability of necessary data collection tools;
- 56% difficulty of building certification process; and
- 54% difficulty in calculating ROI (Return on Investment).

SB Index Steering Committee

Purpose of SB Index:
To provide globally consistent framework for understanding, measurement, reporting, and verification of actual building performance on core sustainability issues, particularly in developing countries.

- Energy Efficiency & Greenhouse Gases
- Water
- Materials (consumption, scarcity, life-cycle and waste generation)
- Site/Biodiversity
- Indoor Environment
- Economic
Technical Advisory Committee

Financial Stakeholders

- Owners
- Lenders
- Investors
- Insurers
- Appraisers
- Loan Officers
- Real-estate Professionals

Common Economic Metrics for SB

1. Default – lower interest rates
   a. Operating Cost
2. Risk – reduced insurance premiums
   a. Claims
   b. Absenteeism
   c. 3rd Party Commissioning/Rating
3. Valuation – underwriting
   a. Asset Value
   b. Sales Price
   c. Occupancy Rate
   d. Rental Rate
   e. Vacancy Rate
   f. Turnover

Courtesy: Image 390x426 to 501x640
Stakeholders Galvanize Around Tools

1. **Benchmarking** ➔ labeling & ratings
   - **Stakeholders** = Designers, Owners, Tenants

2. **Baselines** ➔ targets & regulation
   - **Stakeholders** = Policy Makers, Shareholders

3. **Monetization** ➔ rebates & incentives
   - **Stakeholders** = Investors, Financiers, Real-estate Professionals

Source: World Green Building Council

Common Denominator for Energy/GHG

**Energy Efficiency** ➔ Carbon Dioxide (CO₂) equivalent (e)

1. Benchmarking
2. Baselines
3. Monetization

Source: World Green Building Council
**Common Carbon Metric**

Measuring Energy Use & Reporting GHG Emissions from Building Operations

**Energy**
- kWh/m²/yr
- kWh/occupant/yr

**Emissions (equivalent (e))**
- tCO₂e/m²/yr
- tCO₂e/occupant/yr

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**Operation of Buildings = 80-90% of emissions from energy use**

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<tr>
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<tbody>
<tr>
<td>Operation</td>
<td>13</td>
<td>16</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>% of life cycle energy use</td>
<td>87</td>
<td>84</td>
<td>82</td>
<td>79</td>
</tr>
</tbody>
</table>

50% of total energy can be reduced at **net zero cost** with commercially available technologies

Source: SBCI, 2007
Scope 1, 2, & 3 GHG Emissions

**Scope 1:** Direct

**Scope 2:** Electricity Indirect

**Scope 3:** Other Indirect

Baselines for Global Reporting

Standardization of building indicators, metrics, and protocol: reveals REGIONAL baselines of Energy Performance and GHG emissions by building type and climate region.
Baselines are Foundation for Policies

2003 U.S. Commercial Building Energy Consumption

- Office: 1.154 Tfin
- Retail: 1.097 Tfin
- Mall Buildings: 0.920 Tfin
- Non-Mall: 0.624 Tfin
- Education: 0.610 Tfin
- Health Care: 0.464 Tfin
- Lodging: 0.427 Tfin
- Warehouse and Storage: 0.376 Tfin
- Food Service: 0.312 Tfin
- Public Assembly: 0.206 Tfin
- Service: 0.163 Tfin
- Other: 0.126 Tfin
- HOUSING: 0.126 Tfin
- Religious Worship: 0.126 Tfin
- Public Order and Safety: 0.54 Tfin
- Vacant: 0.34 Tfin

Source: EIA 2003 CBECS, 2008

Baselines are Foundation for Policies

Energy Efficiency Rating

- A: 0-15
- B: 16-49
- C: 50-89
- D: 90-119
- E: 120-149
- F: 150-179
- G: 180+

This Home: 65
We need a long-term perspective

- **95% of 2050** building stock in *developed countries* is already built.
  
  ⇒ **Focus on renovation**

- **90% of new construction** will be in *developing countries*, doubling existing stock by 2050.
  
  ⇒ **Focus on new construction**

- **Lock-in effect**: Energy efficiency of both renovation and new construction will be locked in for **30 to 50 years** or longer...

Source: CEU 2008
### Retrofit versus New Construction

**Global Construction Spending, 2004**

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
<th>Japan</th>
<th>China</th>
<th>Germany</th>
<th>Italy</th>
<th>France</th>
<th>UK</th>
<th>Brazil</th>
<th>Spain</th>
<th>Korea</th>
<th>Mexico</th>
<th>Australia</th>
<th>India</th>
<th>Hong Kong</th>
<th>Other Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>US$ billions</td>
<td>100</td>
<td>800</td>
<td>600</td>
<td>800</td>
<td>500</td>
<td>300</td>
<td>200</td>
<td>100</td>
<td>500</td>
<td>300</td>
<td>200</td>
<td>100</td>
<td>500</td>
<td>300</td>
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</tbody>
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**Global Construction Spending Growth, 2004-09**

<table>
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<th>Country</th>
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<th>Mexico</th>
<th>Australia</th>
<th>India</th>
<th>Hong Kong</th>
<th>Other Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>% increase</td>
<td>100</td>
<td>800</td>
<td>600</td>
<td>800</td>
<td>500</td>
<td>300</td>
<td>200</td>
<td>100</td>
<td>500</td>
<td>300</td>
<td>200</td>
<td>100</td>
<td>500</td>
<td>300</td>
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Source: Davis Langdon 2005

### 5 Policy Options for Reducing GHG from Buildings:

1. Improve Energy Efficiency
2. Improve Energy Efficiency of Household Appliances
3. Encourage Power Providers to Support GHG Reductions
4. Change Operator/Occupant Behavior
5. Substitute Fossil Fuels with Renewable Energy

Source: UNEP-SBCI BCC Report 2009
Message from:
UNEP, Executive Director, Achim Steiner

Building Industry has GREENest opportunity to lead world in solutions for climate change.

Common metrics are required to accurately reflect performance and progress.

The technology is available, the payback is quick, jobs will be created, and $$$ saved - while reducing GHG emissions.

This is your CALL to ACTION!

For more information and access to reports, visit: www.unep.org/sbcı

THANK YOU