Building a More Sustainable Future: A Look at Industry Trends in Building Design

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Agenda

- **A sustainable future starts now!**
  It is important to harness our passion and enthusiasm to take action and produce change today.

- **Industry trends to strengthen innovation**
  Today, buildings are a profitable business influenced by innovation; additional muscle to manpower is required to build them.

- **Collaboration is key for sustainability in construction**
  Successful relationships are based on mutual creation of value, in which companies, government and society benefit

- **We help you invent the future™**
A Sustainable Future Starts Now!

- As a consumer of regular products and services
- As a developer, making decisions at work
- As an innovator, entrepreneur and thought leader

- People in general know that options exist
- Sustainable options are convenient, available everywhere
- It is a matter of go out and get them
A Sustainable Future Starts Now!

- As a consumer of regular products and services
- As a developer, making decisions at work
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✓ Many options are available; just a few of them are easy to incorporate
✓ Decisions are usually made at the executive level (top down)
A Sustainable Future Starts Now!

• As a consumer of regular products and services
• As a developer, making decisions at work
• As an innovator, entrepreneur and thought leader

✓ There is knowledge to create
✓ Technology to develop
✓ Markets to incorporate
✓ Regulation to standardize

TRENDS
Industry trends to strengthen innovation

- **Life cycle assessment** to select building materials
- **Building simulation** to anticipate occupant comfort, construction costs
- **Performance certificates** to change consumer behavior
Life Cycle Assessment – Introduction

Raw materials to produce
Energy and water sources
Transportation

PRODUCT Manufacturing

Net benefit over lifetime
Energy and water to maintain
Waste or recycling

LCA results
overall impact to global warming 70
overall impact to acid rain, smog 10
overall impact to natural environment 35

How to use these numbers
• Compare with best-in-class
• Benchmark with previous years
• Identify areas of improvement
• Make better informed choices
LCA from a “popcorn perspective”

galvanized steel for the kettle
acrylic windows around the cart
raw kernels
sunflower oil
butter and salt
lots of seasonings
natural gas for heating the oil, popping kernels
sewage from washing the kettle, draining oil
waste bin and cleaning
rubber tires for the kettle
social impacts of a business on a kettle
long hours
low income
ethics
child labor
obesity
heart diseases
allergies
paper bags, decoration
overall impacts of paper mills
70
10
35
Translating LCA to building materials

- façades with 20-year durability
- walls with high levels of insulation
- fresh air distribution
- green roofs with low maintenance
- concrete panels with recycled fibers
- structures with higher productivity on site and lower waste

Over 1,500 building materials in a project!
Building Simulation – Introduction

**OBJECTS**
- Building Materials
- Life Cycle

**PROJECTS**
- Building Systems
- Performance

**Simulation**
- Energy demand and peak consumption
- Structural stability and durability
- Acoustical and visual comfort
- Constructability and work planning

**How to use software**
- Create multiple scenarios
- Anticipate utility costs
- Reduce construction conflicts
- Make better informed choices
Opportunity:
Accommodate more people moving from rural, small urban to densely occupied urban areas.

Opportunity:
Allow free form and indoor environments with high quality.

Building simulation to address complexity

Design Concepts

Rapid Urbanization

Economic Constrains

No Time to Deliver

Opportunity:
What? Is this not done yet?

Opportunity:
Influence policies on insurance rates, access to credit, utility contracts.
Performance certificates – Introduction

After completion, buildings must deliver a performance level according to their Basis of Design and Project Requirements.

Demonstration of such performance is recognized by 3rd party labels.

Information can be used to promote sales.
Performance certificates – Categories

- Energy efficiency
- Renewable energy source
- Water efficiency
- Green procurement
- Indoor air quality
- Commitment to an environmental policy
- Selected aspects of high performance green buildings
  - Durability
  - Carbon footprint
  - Recyclability
Anatomy of an innovation muscle

Laboratory

Building simulation

Better buildings

Materials with data
Collaboration in the construction industry

Innovation to deliver
- Regenerative solutions
- High performance building
- New industry capabilities
- More job opportunities

In collaboration with:
- Universities
- Local, State, Federal Institutions
- Civil Society
- Media

Job Sites
OEMs
Design Firms