A review of Green Building Assessment Systems-

Introduction to LEED V4 NEW Construction, Core & Shell, Schools

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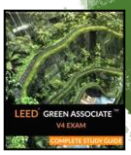

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Overview

- Why do we need Green Building evaluation systems?
- Why do we need Green Buildings?
- The Development of Green Buildings evaluation systems-history
- Challenges of Designing Evaluation systems
- Developing Green Building Evaluation system challenge!
- Introducing some of the Green Building Evaluation systems Worldwide
- LEED Variants
- LEED V4 Structure and Processes
- LEED V4-New Construction Categories
- LEED-shortcomings
- Future directions of the movement

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Green Buildings

- Reducing the overall impact of the built environment on human health and the natural environment by:
  - 1- Efficiently using energy water, and other resources.
  - 2-Reducing waste, pollution, and environmental degradation
  - 3- Protecting occupants' health and improving employee productivity

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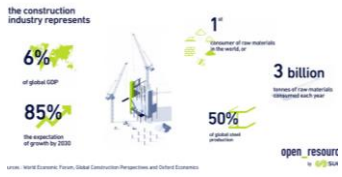

Environmental Impacts of Buildings- Depletion of Raw Materials

- The earth's crust contains enough of most minerals that technically can be extracted, but not at reasonable costs affordable for the poor.
- The issue we are facing: "costs, geography and timeframes"

⇒Making the economy less vulnerable by Reducing the need for raw materials through:

- Recycling,
- lengthening product lifespans,
- sharing products

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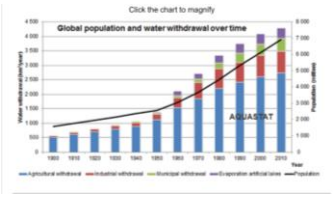
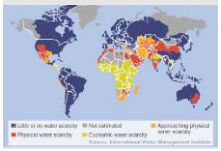


Environmental Impact of Buildings- Water consumption

One-third of the world's population will be affected by fresh water scarcity by **2025**, with the situation only becoming more dire thereafter and potentially catastrophic by **2050.**



Source: Physical water scarcity and economic water scarcity by country, 2006

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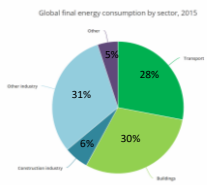

Environmental Impact of Buildings- Energy Consumption

- Building & construction sector account for 36% of energy consumption worldwide.
- World energy consumption is growing by the average rate of 1.4%/ year (from 2012 to 2040)

Potential problems:

- Running out of energy sources?!
- Access to energy sources?!
- Energy crisis?!

Sources: Energy Technology Perspectives 2017,

U.S. Energy Information Administration | International Energy Outlook 2016

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Construction Industry Waste production

- Average building waste: 10-15% of raw materials that go to a building
- Many are hazardous

Are we going to run out of land if we continue disposal of our wastes?

What are the problems of sending construction wastes to landfills?

- Waste of natural resources
- Increases construction cost, especially the transportation process
- Occupies a large area of land
- Reduces soil quality
- Could Cause water pollution
- Methane and C02 emissions

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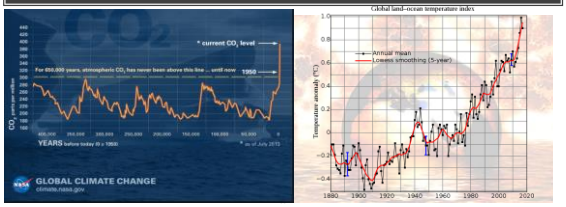
Global Warming

"The uncertainties have shifted from the science to the politics."



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Global Warming Impacts on weather & oceans

- Meltdown of the frozen water on earth/ Rising see levels
- Changing precipitation & expansion of deserts in subtropics
- More frequent extreme weather events
- Ocean expansion, acidification, & rise of temperature

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Global warming impacts on human life and prosperity

- Threat to agriculture
- Increase in the level of ground level- Ozon, threatening human heath
- Damaging infrastructure
- Increase in infectious diseases

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Global Warming Impact on Natural Habitat

- The ice Arctic animals are vanishing
- Coral and Shellfish are suffering
- Forests are more prone to deadly infestations

If we stop our emissions today, will be able to stop global warming and go back to the past?

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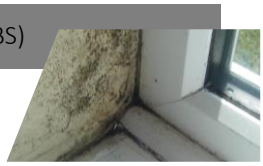
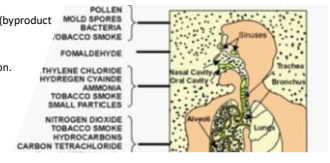
Sick Building syndrome (SBS)



- Flaws in the HVAC systems.
- Contaminants produced by:
  - Outgassing of some types of building materials (PM),
  - volatile organic compounds (VOC),
  - molds,
  - improper exhaust ventilation of ozone (byproduct of some office machinery),
  - light industrial chemicals used within
- Lack of adequate fresh-air intake/air filtration.



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Purpose of Green Building Assessment Systems

Promoting high-performance buildings

Help facilitate political goals, such as national requirements related to Kyoto and other protocols on climate change.

Promote occupants' health and well being

Prevent "greenwashing" (false or exaggerated claims)

Promote whole building, integrated design process

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The development of Green Building

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Incentives for Applying Green Principles

Tax deductions & other incentives (Through the Energy Policy Act of 2005):

-Solar-electric systems, solar water heating systems and fuel cells, small wind energy systems, & Geothermal heat pumps

-Federal tax credits for using energy-efficient products.

Promoting Green Building programs

-Use the achievement as a marketing tool

- Mandating public projects to be certified

Defining Sustainable Communities

Sustaining the citizens' core values: the community; environmental stewardship and responsibility; economic prosperity, opportunity, and security; & social equity

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Challenges of Green Building Assessment Systems

BD+C | ID+C | O+M | ND | HOMES

- **Framing criteria based on metrics that are quantifiable, measurable, and comparable while offering an accurate measure and understanding of the overall criteria.**
- **Different units of measurement:**
  -Environmental effects: local, regional, national, and global scales.
  -Resource impacts: mass, energy, volume, parts per million, density, area.
  -Building health: presence or absence of chemical and biological substances within circulating air; the relative health and well-being of the occupants.
- **Discrete performance criteria vs. integrated System**
- **Time**
  -The shift to continual recertification
- **Buildings' function**
  -Increasing specializations of the tools

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Major choices in designing building assessment systems

1- use a single number to describe the building's overall performance

- Being easy to understand
- Arbitrary

2- provide an array of numerical and qualitative information.

- Yields more complexity
- Difficult to compare buildings

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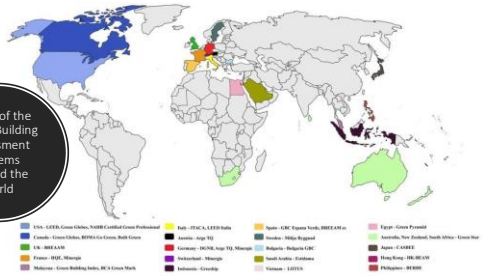
Some of the Green Building Assessment Systems around the world



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Quiz Time!

- Currently, which of the following is a more critical condition in the world?

A) Running out of raw materials
B) Running out of water
C) Running out of fossil fuels
D) Excessive Co2 emissions

Correct Answer: (D)- The earth's crust contains enough of most minerals that technically can be extracted, but not at reasonable costs ;

Technically there is enough fresh water at global scale. However, one-third of the world's population will be affected by fresh water scarcity by **2025**, with the situation only becoming more dire thereafter and potentially catastrophic by **2050.**

At expected rates of energy demand growth we have enough for thirty years supply. However, not every country's access to energy is secured.

With regards to global warming earth has already reached the 1.°C threshhold.

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Activity Time: Establishing Measurable Criteria for your Green Building Assessment System!

- You have 15 minutes!
- Divide into groups of 4-5 students
- Design your own Green Building Assessment System!
  - What are the main criteria a building needs to poses in order to be deemed green in your opinion?
  - How do you intend to measure such criteria?
- Hint: Use sticky notes to collect criteria and then group them to build the main categories
- Do not use internet!

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BREEAM Worldwide

Registered Assessments

www.greenworks.bg

BREEAM®

-BREEAM is used in more that 70 countries,

-has issued almost 500,000 certificates globally,

-on more than 250,000 Projects,

-with over 1 million registered for assessment.

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BREEAM Scheme by Lifecycle stages

BREEAM®

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BREEAM New Construction

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CASBEE

- CASBEE for Buildings (New Construction)
- CASBEE for Buildings (Existing Buildings)
- CASBEE for Buildings (Renovation)
- CASBEE for Market Promotion
- CASBEE for Commercial Interiors
- CASBEE for Temporary Construction
- CASBEE for Heat Island
- CASBEE for Urban Development
- CASBEE for Cities
- CASBEE for Detached Houses (New Construction)
- CASBEE for Homes (Detached Houses)
- CASBEE Health Checklist
- CASBEE for Housing Renovation Checklist
- CASBEE Community Health Checklist

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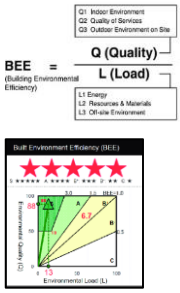

Ranks	Valuation	BEE value, etc.	Indication
S	Excellent	BEE = 3.0 or more and Q = 50 or more	★★★★★
A	Very Good	BEE = 1.5-3.0 BEE = 3.0 or more and Q is less than 50	★★★★
B+	Good	BEE = 1.0-1.5	★★★
B	Fairy Poor	BEE = 0.5-1.0	★★
C	Poor	BEE = less than 0.5	★

CASBEE (Japan)

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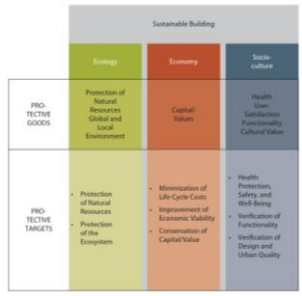

Schemes:
- Office and administrative buildings,
- retail buildings,
- industrial buildings,
- hotels,
- residential buildings,
- mixed-use buildings and
- educational facilities.
- (Hospitals being devised)

DGNB (Germany)

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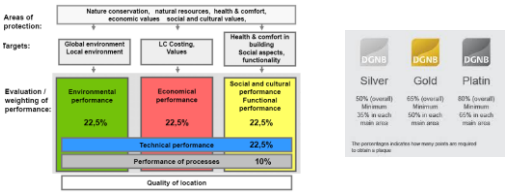

DGNB (Germany)

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Living Building Challenge

...in pursuit of a future that is socially just, culturally rich and ecologically restorative

- launched by the Cascadia Green Building Council (a chapter of both the U.S. Green Building Council and Canada Green Building Council)
- Could be applied to developments at all scales.
- There are 73 certified projects; only 15 have achieved Living certification.

LIVING BUILDING CHALLENGE

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The Living Building Challenge (US)

LIVING BUILDING CHALLENGE

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Quiz Time!

- What was the first green building assessment tool?

A) Green Globes
B) LEED
C) BREEAM
D) CASBEE

Correct Answer: (C)

The history of Green Building Assessments systems starts with the birth of the green building industry at the UK Building Research Establishment in 1990,

which predated the formation of the US Green Building Council in 1993

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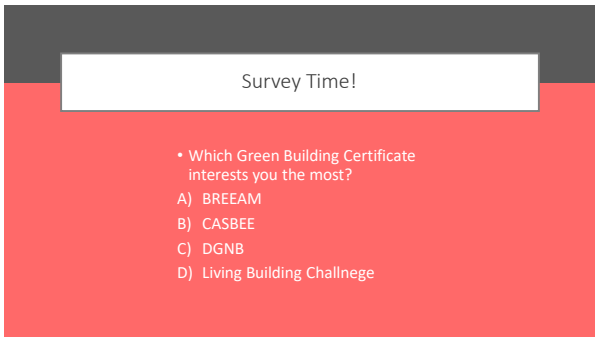
Survey Time!
• Which Green Building Certificate interests you the most?
A) BREEAM
B) CASBEE
C) DGNB
D) Living Building Challnege

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