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Wood as a Material for Sustainable, Healthy Environments

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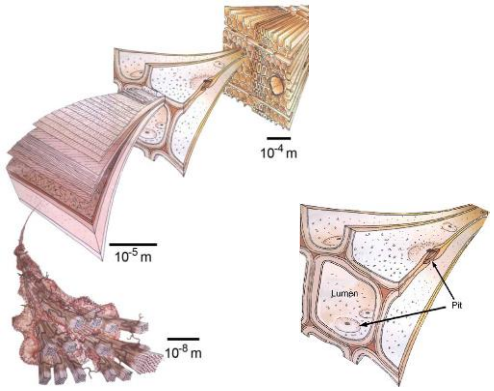
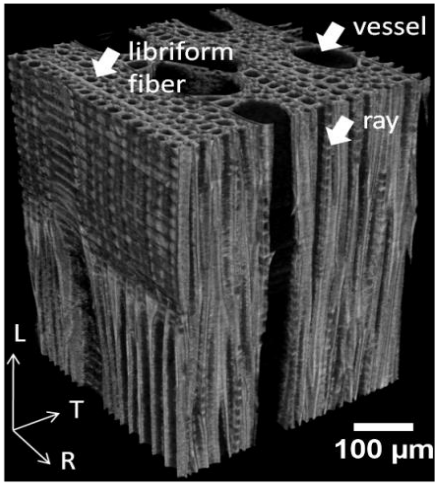
European Policy – LOW CARBON ECONOMY

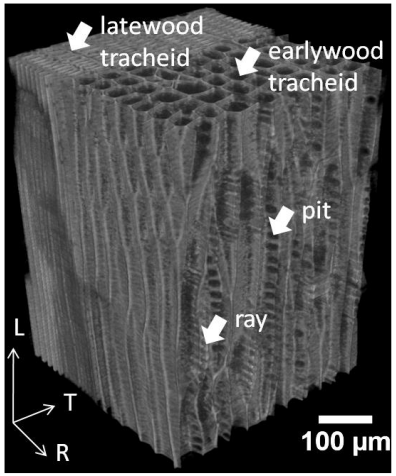
- ***EU Sustainable Development Strategy "SDS"***
- (European Council in Gothenburg, 2001, 2006)
- ***Roadmap 2050*** (2009)
- ***EU Recycling Society Directive***

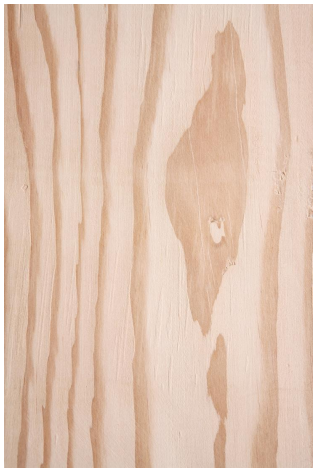
http://www.popsci.com/article/technology/worlds-most-advanced-building-material-wood-0?dom=PSC&loc=recent&lnk=1&con=the-worlds-most-advanced-building-material-is-wood

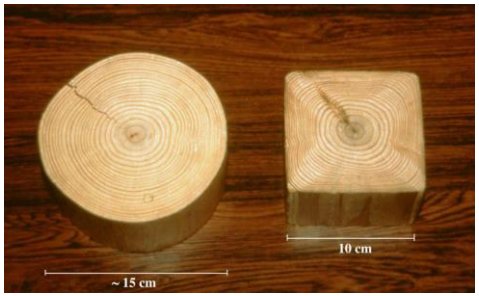


Harrington, 1998









WOOD

Our surrounding

WOOD - BUILDING MATERIAL

Renewable resource – **processing and modifications** - **building material**

Whole Value Chain

GHG:

- CH_4
- N_2O
- CFC
- ...

CO_2-e → ?

WOOD – renewable material

End of life of a wood product - it is possible to incinerate and utilize the embedded energy, which is usually greater than the embodied energy.

www.kason.com

www.kason.com

www.poweredbymothernature.com
www.greentechconcept.com

Cascade use of wood

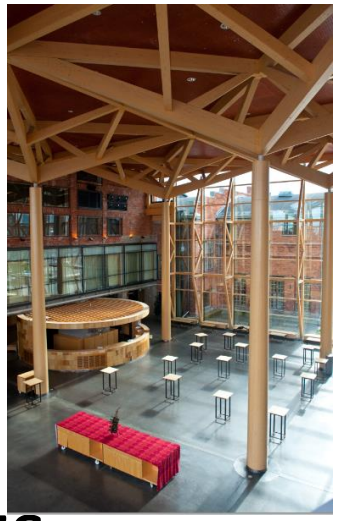
What is next - To contribute to the low carbon economy:

1. Establish a base line of **environmental impacts**.
2. Reduce emissions with **re-designs** of existing technologies.
3. Demonstrate a manufacturer's **commitment** to sustainability and showcase the manufacturer's willingness to go above and beyond.
4. Develop an **"upgrading" concept** for recovered wood products as a source of clean and reliable secondary wooden products for the industry

www.rmagreen.com

www.connexionslive.com

People spend 80-85% of their time indoors and our environment is thought to impact our health in many ways (Kaplan, 1995; USGBC, 2010; Ulrich, 1991).



In addition to the direct health impacts (stress, surgery recovery), the built indoor environment may also affect:

- Worker productivity
- Student learning
- *Stress and attention restoration*

Human health indoors

Research assessing the impacts design decisions have on building occupants is in its early stages.

Some theories regarding improving building design for occupants focus on the human-nature relationship (Kaplan and Kaplan, 1989; Ulrich, 1984).

These theories suggest bringing nature into buildings will improve occupant wellbeing.

Indoor gardens are one way…

Using natural materials is another.

Restorative Environmental Design (RED) is a building design paradigm combining *sustainable building practices* with building practices that benefit *occupant health*.

RED goes two steps further than just sustainable construction…

Buildings should:

- provide healthful benefits to occupants
- reinforce the human connection with nature

What is a **restorative environment?**

Restorative environments

In environmental psychology they have four main characteristics (Kaplan, 1995)

- Being away
- Effortless fascination
- Extent
- Compatibility

Restorative environments: Being away

How does one fulfill the sense of *being away* while inside a building?

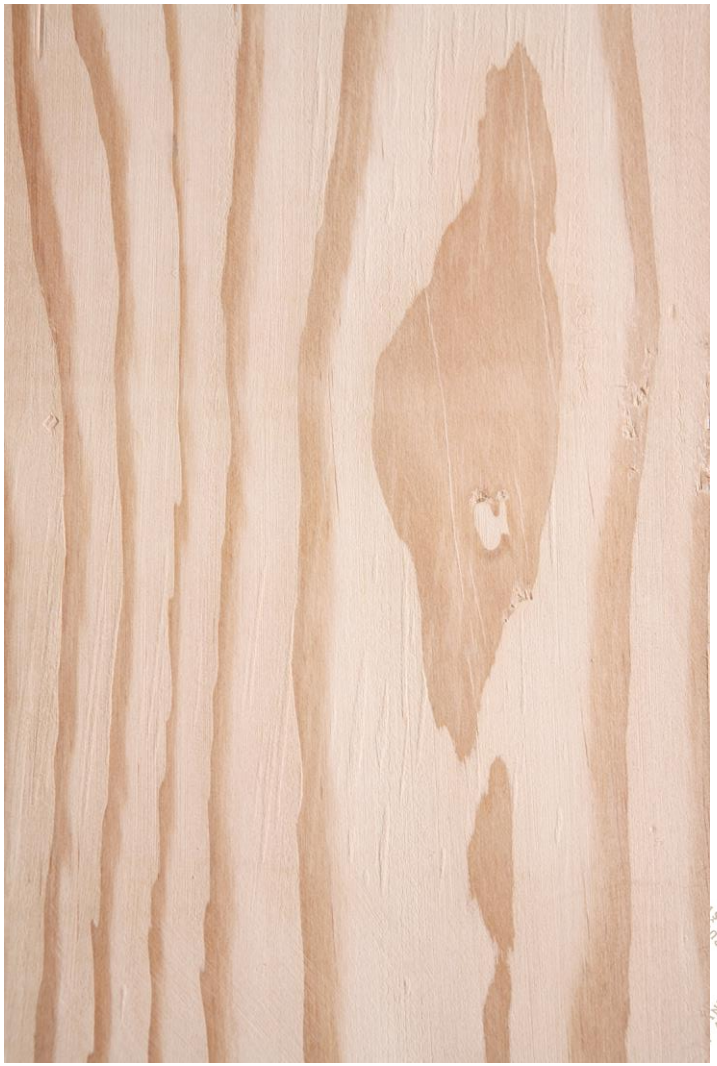
- Indoor gardens
- Views of nature
- Water features
- Any location that is different enough from a typical workstation

(Wilson, 2008)

http://www.home-designing.com/wp-content/uploads/2008/11/18.jpg

Restorative environments: Fascination

Natural patterns, shapes and forms allow the mind to *effortlessly* focus on something (Kellert, 2008; Wilson, 2008)



Restorative environments: Extent

Open spaces, ceilings with varying height, views of nature all provide a sense of *extent*

http://simingxue.wordpress.com

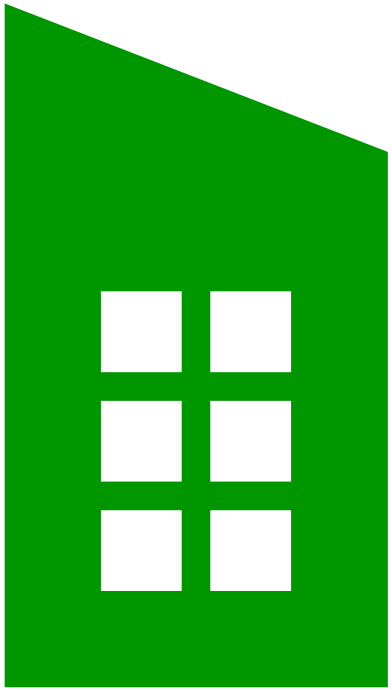
Restorative environments: Compatibility

Humans seems to have a natural affinity for nature

How do we apply RED?

Biophilic design for the occupants

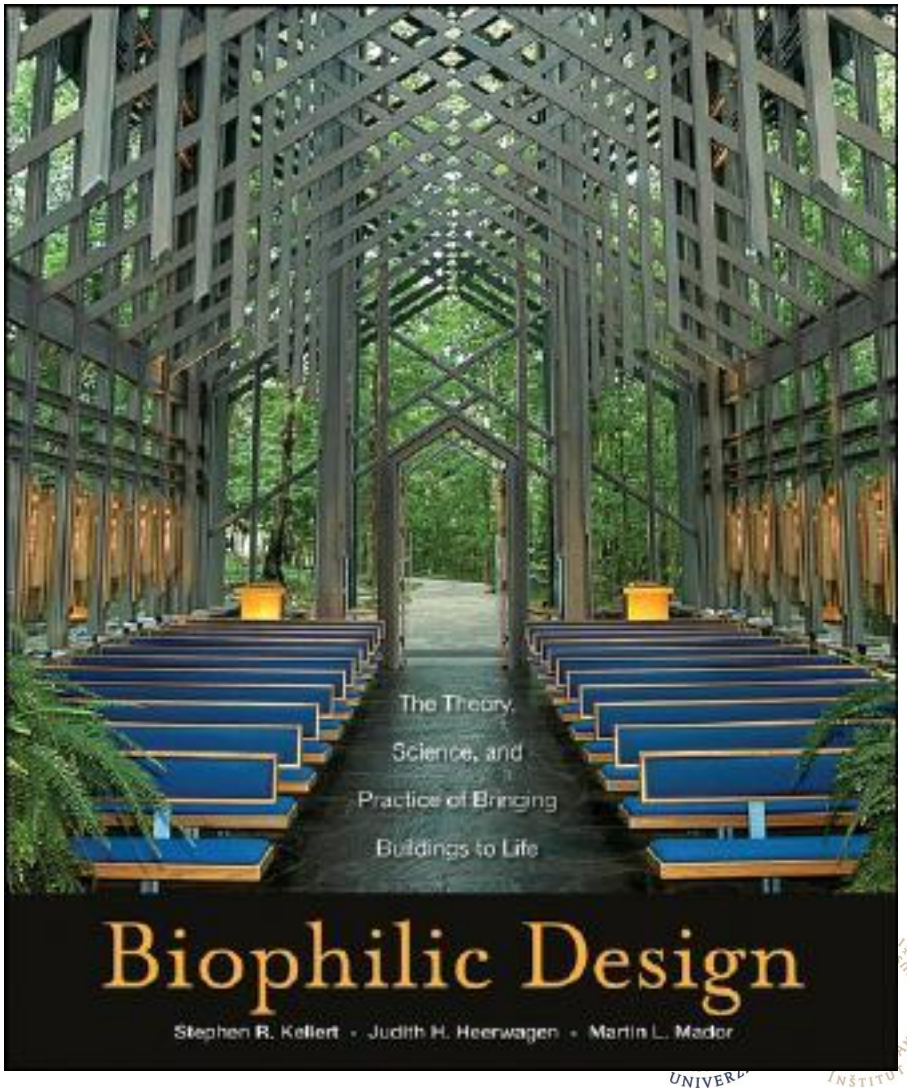
Green building methods for the building



Biophilic design

In sustainable design, we ask, “what is our impact on nature?”

In biophilic design, we ask, “what impact does nature have on us?”
-Jennifer Heerwagen



Biophilic design

Six basic tenets:

1. **Environmental features**
2. **Natural shapes and forms**
3. **Natural patterns and processes**
4. **Light and space**
5. **Place-based relationships**
6. **Evolved human relationships with nature**

What's next?

Evidence based building design decisions

- LCAs and EPDs provide some evidence for environmental impacts, but we need to know and do more
  - Integration of LCA into production processes and product design
  - Utilizing the **full potential of wood** in construction and other products

How do **material choices** affect occupant health in terms of stress and recovery from physical and psychological exertion?

Thank you!

ACKNOWLEDGEMENTS

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A. Kutnar; Brussels, September 24th 2014