“Environmental and health advantages of wood as a construction material”
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A changing world
Global trends drive for renewable materials

Growing population
Urbanisation
Digitalisation

Income growth
Global warming
Changing lifestyles
Eco awareness
Urbanisation

Challenges for wood materials

- Low maintenance
- Accessibility
- Fire resistance
- Aesthetics
- High durability
- Pollution control

Materials wood products are up against today?

- PVC
- Cement Fibre
- Steel
- High Pressure Laminates
- Masonry and Concrete Products
Factors and Impacts

• Carbon footprint → whole of life impact

• Reduce Fossil → Increase renewable

• Recycling and closed loop solutions

• Pollution → tougher regulations

• Chemical control → eliminate toxic substances

• Sustainable sourcing → Certificate of origin, less durable tropical hardwoods

• LCC life cycle costing
"Everything that’s made with fossil-based materials today can be made from a tree tomorrow”
Wood from sustainably managed forests

• **We know the origin** of all our wood through our third-party certified traceability systems (e.g. FSC, PEFC).

• All the wood we use originates from **sustainable sources** in European forests
  – More trees grow in European forests than is annually harvested.

• We promote **forest certification**
  – 80% of the wood we used in 2015 originated from certified forests.
Forest, wood products and the carbon cycle

Use of carbon neutral wood materials instead of non-renewable materials mitigates climate stress and reduces fossil CO₂ emissions.
Carbon footprint for building products

- Greenhouse gas emissions of extraction and manufacture
- Growing trees sequestrate carbon dioxide from the atmosphere
- Wooden buildings act as carbon storages for long periods of time

Source: VTT Technology 115 and the European ECO2 project, 2013

- Cold Rolled Stainless Steel: 3778 g/kg CO2e emission
- Lightweight concrete block, Europe: 240 g/kg CO2e emission
- Pre-cast Concrete: 121 g/kg CO2e emission
- Shipping dry timber, Finland: 87 g/kg CO2e emission

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Flexibility and modularity has multiple well-being impacts during construction phase

• Health and safety on the construction site
  − Light-weight
  − Easy installation
  − Construction time
  − Dust-free
  − Safety
  − Waste management

• Neighbourhood disturbance reduced
  − Dust-free
  − Less noise
  − Construction time

Building Dockland library in Melbourne, Australia
Benefits of Wood structures in Urban areas → reducing the Urban “heat island” effect

• Wood and natural cellular materials can buffer heat in a better way than concrete and steel thus allowing for quicker cooling at night

• Wooden structures can be used to create light weight shading where trees are not possible

• Urban Heat Island effect can impact on street temperature increase of upto 2-5°C compared to rural environment

• Wood material absorbs sound and allows less reverberation

• Wood softens often cold and harsh non-natural urban environment improving psychological wellbeing

Library at the Dock, Melbourne, Australia
Indoor climate and health impacts

“A uniform indoor climate with minor variations in temperature and relative humidity contributes to establish a healthy and comfortable environment for the occupants.” (Künzel et al)

- Moisture buffering
  - Hygroscopic values

- Anti-bacteria characteristics

- Volatile Organic Compounds

Source: Künzel et al, IBP Report HTB-04/2004/e
Acoustics

- Good acoustic characteristics of wood
  - Reduced reverberation
  - High frequency sound buffering
- Kaija Saariaho about the winner of Finlandia Prize of Architecture in 2015:
  - “I chose a building that pleased me intuitively and corresponds to my aims and values. Visiting the home of one resident, its coziness and outstanding acoustics confirmed this for me. Puukuokka is a building where I enjoyed myself with all my senses.”

Puukuokka, Jyväskylä, Finland, winner of Finlandia Prize of Architecture in 2015
Psychological impacts of natural materials

• Wood connected to: warm, comfortable, relaxing, natural, inviting, positive connection on nature

• Healthy housing with wood includes psychological health
  – School environment findings:
    – Wood brings calmness to the environment
    – Decreased stress levels
  – Old people’s home findings
    – Warmth of wood preferred
    – Increased social activity

• Haptic quality
  – “perceived comfort value”
  – Low electro static and thermal conductivity promotes wood perception as pleasant material
Summary and conclusions

- Wood has positive health and well-being characteristics throughout its life cycle
- Wood is a truly recyclable and renewable material
- Wood has a low carbon footprint through its life cycle
- Light but strong material allowing modularity and flexibility
- Positive psychological impacts likely greater than known today
Thank you!