Wood pre-treatments: a short review

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Objectives

• Understanding the building/designer point of view in LCA analysis and in design

• Overview on different treatments and their consequences on LCA of buildings

• Overview on treatments and their consequences on the assemblies and design possibilities

• Design improvements to increase the possibility of components reuse after the end-service life of buildings
**Thermal pre-treatments**

*Thermal* pretreatment either in “wet” or “dry” environments is used to modify the composition and the structure of wood. Although a reduction of mechanical properties of thermally modified wood has been observed, thermal treatment of wood is the most commercially developed strategy to modify wood characteristics.

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Chemical pre-treatments can be applied on the external layer of the material, or by means of long lasting impregnation of the components. They are usually administered on wood to prevent performance reduction, improve water resistance, reduce the effects of ultraviolet radiation, or decrease flammability. Treated wood must be non-toxic and recyclable at the end of its service-life.

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Mechanical pre-treatments reduce the moisture content (MC) by compression in a short time. This procedure was systematically studied in terms of effects of compression ratio, compression direction and compression speed on the reduction of MC.

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HOW CAN THIS BE USEFUL FOR DESIGNER/ARCHITECT?
LCA

• End of life scenario
End of life scenario

- Landfill
  - Landfill for later recovery
  - Landfill

- Disassembly
  - Recycling
  - Reuse

- Energy recovery
  - Pyrolysis
  - Incineration
  - Chemical extraction
  - Gasification
End of life scenario

**PROs**
- Does not require ground space for storage
- Treated timber can be extracted in the future for better use
- It's cost effective and quick

**CONS**
- Chemicals can be spread into the ground
- Requires large areas
- Waste burying sites must be recorded
End of life scenario

**PROs**
- New products from waste
- Low energy input for reuse
- No chemicals released in the environment

**CONs**
- High costs
- Need manual disassembly (slow demolition procedure)
- Reuse depends on original treatment
End of life scenario

**PROs**

- Energy recovered
- No emissions (for gasification and pyrolysis)
- No release of fossil carbon in the atmosphere

**CONs**

- High costs
- Chemicals can be released in the atmosphere
- Leachate from landfill sites

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Ongoing and future research:

• Do architects and engineers know how their project will be disassembled? And when?

• Strategies for disassembly related to the durability of treatments of each single component

• A comparative study on costs, treatments and design of elements
Thank you for your attention

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