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Wooden buildings in a sustainable bioeconomy

Highrise buildings

Multi-storey skyscrapers such as the Austrian HoHo with a high degree of prefabrication, innovative hybrid materials and on-site modular assembly are still singular, but they demonstrate the future potential on the sector.

As a consequence of earlier projects targeting fire resistance, since 2015 up to six-storey wooden buildings require no further permission.

Stakeholders highlighted the need to include material circularity, product life cycles, GHG and energy intensity in all stages of the life cycle and substitution potential of the material into account for construction projects.

Recommendation
Projects, like the HoHo building, are needed to showcase the results from a mutual cooperation and anticipation of obstacles, with a strong will to overcome them by private investors, companies and public authorities.



Single family houses

The Irish Better Energy Programme supports the energy efficiency upgrades of 1 million homes, businesses and public buildings.

Ireland's residential building stock largely comprises detached, semi-detached and terraced single-family homes. Semi-detached houses are Ireland's second most common dwelling type, accounting for 28% of homes.

As an island, most materials need to be imported. However, Ireland's forests increased to 10% land area. With that timber has the potential to become a local and renewable building material.

Stakeholders highlighted the need for affordable, healthy, comfortable, flexible and durable housing.

Recommendation
As the population is expected to increase, more low-impact, healthy housing is needed. For that innovative and sustainable housing methods are needed. An inventory of the current building stock is a pre-requirement for land use planning.



- **Timber is a renewable product with rather simple and low-energy conversion processes.** A strong European forest resource and forest-based industry reduces long distance transport and related emission, while creating employment in green sectors.
- **Standardization of wood building materials has the potential** to reflect the advantages of wood or other bio-based materials in comparison to non-renewable ones.
- **Hybrid buildings** with wood-concrete composites and a combination of materials is one future pathway for wooden construction in the growing urban areas.
- **Cleaner, faster and cheaper** construction due to prefabrication and transport potential.

Industrial halls

In France, the growing use of Douglas fir in construction provides feasible examples on a larger scale.

Glulam beams are often used as an alternative to steel or concrete for constructing the roof of industrial hall, sports hall or agricultural buildings.

Stakeholders highlighted the need to develop Douglas fir and hardwood plantation policies and use potential examples, a structuration of the French wood-chains and communication to the market on the performance of wood construction and its sustainability assets.

Recommendation
The market share of wood tertiary buildings vary between 5% for industry halls and 32% for agricultural buildings. This practice shows significant growth potential.



Way Forward

Strategies

- Sharing risks through alliances
- Enhanced environmental responsibility along the construction value chain
- Cost competition through standardization and norms

Policies

- Facilitate new business opportunities
- Removal of regulatory hindrances and cost burdens (create level playing field) — e.g. fire regulations
- Direct support (city planning, public procurement)
- Environmental norms
- Neutral fiscal measures (carbon tax)
- New and updated education and R&D programs

In the EU (on average)

8–10% detached wooden houses



≤1% multi-storey building (≥3 storeys)



5% multi-family (max 2 storeys) residential buildings



Multi-storey, multi-purpose buildings

Lithuanian hardwood products for construction and its market dynamics are strong in export. They have a high potential to expand into the domestic building sector. However, knowledge is missing in practical application of the bioeconomy.

The case study results show that when comparing GLT (Glue laminated timber) and RC (Reinforced concrete) frame buildings, environmental, economic and social factors are in favour to GLT frames.

Stakeholders highlighted that Lithuania has available forest resources, labour force and markets for the bioeconomy, yet bureaucracy, poor cooperation between forestry and wood industry hinders its development.

Recommendation
Construction projects in Lithuania (especially for projects with public procurement) should consider economic, environmental and social impacts of the main material used for the construction.



Wood in construction

Substituting more energy intensive materials for wood avoids larger fossil fuel consumption (embodied energy) and consequent CO₂ emissions (embodied carbon) (**substitution**). Trees sequester CO₂ in standing forests through photosynthesis and store the carbon in wood-based products for the duration of the life cycle of the product, thus avoiding short-term emissions from logging (**long-term carbon storage**). Finally, when **bioenergy** is produced in a sustainable way; byproducts of sawmilling and pulping (material efficiency) or other products (e.g., biofuels, biochemicals) is seen as renewable energy source.

Circular bioeconomy

Circular bioeconomy has a viable potential for industry improvements and outstanding contribution to a sustainable future. This hypothesis brings into the spotlight the need of policy, public and industry reinforcement on the use of wood in construction. **Circular use** of wood products gives multiple lifetimes to wood material and thus extends the carbon storage and reduces the need for virgin materials.