

NORDIC BUILDING CODES AND THEIR EFFECTS ON BUILDING OF RESIDENTIAL HOUSES FROM WOOD

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MOTIVATION

Growing urbanization provides new opportunities for building with wood and wood products value chains in residential, public, commercial and leisure building in Nordic countries. Multi-storey buildings with well-planned integration with built environment and transportation services as well public and house yard infrastructure built from wood, together with other materials, are currently in the focus of urban planning, but small-house areas continue to be important as well.

Harmonization of the EU standards aims to remove technical barriers to trade in the field of wooden construction and ensure the free movement of construction products across the EU. National standards and regulation policies set more specified requirements for buildings. Building codes set requirements but provide also opportunities for various business concepts, value chains and material choices for building with wood companies and wood products industries. It is recognized among Nordic countries that harmonization of building codes might be beneficial for promoting building with wood and creating new markets for wood products both from the perspective of public decision makers, builders and building companies as well as manufacturing industries in the supply chain.

In this paper we present first results on benchmarking of the building codes and concepts in Finland, Sweden and Norway that affect building with wood, with some implications to the opportunities for market development among supply chains of wood-based products and general promotion of building with wood.

EXPERIMENTAL

The research project was based on literature reviews, internet search and public statistics as well as semi-structured interviews among selected experts of building with wood, wood products industries, public decision making bodies and RTDI societies in Finland, Sweden and Norway. We chose personal interviews to get detailed and in-depth information about the experience and opinion of construction sector actors, instead of more general data from a larger group of respondents. We wanted to gain knowledge across the full value chain and stakeholders of the construction sector as well as from different levels within corporate hierarchy.

Prior to the actual benchmarking we defined the areas and items of building codes and regulations that may affect the market position of building with wood in multi-storey houses in particular and the opportunities of wood products industries to answer to the needs and requirements of building with wood. We also had to define the following terms for the purpose of the work: 1) Harmonization of building codes for wooden structures, 2) Standardization of design requirements for buildings of wood.

We analyzed the between-country differences in the respective codes and regulations and their effects on the volume and focus of the actual building with wood.

Based on the analysis, we will identify the clear bottlenecks and chances of the codes and regulations from the viewpoint of building with wood in each country. We present some building with wood practices and demonstrations and explore how the building codes and regulations have supported or not supported developing and increasing building with wood. Our final aim is to evaluate the needs and opportunities for Nordic harmonization in the building codes, regulation and their applications, considering the European regulatory systems.

RESULTS & DISCUSSION

Essential building codes and regulations

Buildings are designed to last for a long time, and partly because of this goal, construction companies are hesitant to try new things because they might result in unforeseen challenges (Levander 2010). The construction industry prefers to let someone else try new methods of construction, for example, multi-storey timber frames (Roos et al. 2010). Building codes designed and confirmed by public decision makers and technical and economical requirements set by builders and construction companies are in the core for the outcome of this potential.

Building codes focus on safety and health, such as structural safety, fire safety and acoustics requirements in buildings, indoor air, health effects and well-being items as well as durability against decay, discoloration, molds, mildews and weather (moisture, UV radiation). In addition, energy efficiency (thermal insulation and heat and moisture buffering capacity related to indoor heating and air ventilation) and life cycle items (carbon storage, climate change) seem to grow in importance for building with wood.

Building codes and regulations in Finland, Sweden and Norway

Nordic building codes were shortly explored in the European collaborative research projects Wood2New (H2020) (Wood2New 2017) and the WoodWisdom-Net (WoodWisdom-Net 2015) research project FireInTimber. In these studies little could be concluded on the current situation for the building with wood markets. Most important, the harmonized EU building codes and regulations are the key standards, but they need to be developed and still harmonized.

Building codes and regulations enhance the competition in the construction markets and are even perceived as indirectly supporting the use of wood in multistory buildings. This, however, seems to leave a false impression. In contrast to that perception, it may be asked why and how regulation changes indirectly support a construction material, if no material restrictions are given, i.e. neither steel, concrete or other materials are banned. Instead, the growing usage of wood in construction can rather be ascribed to its suitability or problem solving ability in various aspects, e.g. prefabrication or environmental friendliness. In opposition to the perceived indirect support for wood, it could be stated that all other construction materials have been supported earlier, since wood was ruled-out from

multistory constructions by placing material-related constraints instead of functional requirements in building regulations. Referring back to an enhanced competition on the construction markets, it has however to be stated that the markets for wooden multistory houses are developing relatively slowly but on the other hand due to the engineered material especially CLT and LVL speed up the building with wood market.

Fig. 1 shows general comparison among Nordic countries in forest culture and wood based housing and their current status and requirements. Nordic countries have a long tradition to build house with wood. Flooring and log houses are very common in Finland; Sweden and Norway used more joinery furniture and flooring. The future of high-rise building with wood depends mostly on the development of innovative engineered wood systems such as CLT, LVL etc.. On the other hand harmonization of building codes for wooden buildings is very essential for accelerating progress in construction sector.




Country	Forests culture in 2016	Forest coverage	Culture and heritage 200 years	Requirements and limitations	Key opportunity	Present use and future trends for wood use in interiors	Key innovations & technologies
 Finland	Strong	72%	Flooring Walls (vernacular log houses)	Humidity Acoustic Insulation Maintenance	Health & Wellbeing Environmental credentials	Flooring Fit-out Joinery Growing trend: Multi-storey housing	CLT Advanced education programmes for wood technologies
 Norway	Strong	38%	Flooring Walling Fit-out Joinery Furniture	Humidity Maintenance	Health & Wellbeing Environmental credentials	Flooring Walling Joinery Furniture	CLT
 Sweden	Strong	70%	Flooring Fit-out Joinery Furniture	Humidity Maintenance	Environmental credentials Need for more housing	Flooring Fit-out Joinery Furniture	Easy-to-assemble interior solutions

Figure 1: Demonstrate of the comparison between three Nordic counties in term of forest status and culture of building with wood and requirements.

CONCLUSIONS

Our intention is to identify the most important opportunities and barriers to increase timber construction in Nordic countries from the regulatory point of view. The actual point is to find ways in building with wood to compete with the established solutions while bridging bio-economy and construction. Building codes and regulations will obviously develop in the future to common standards and dimensions as the basis for business concepts in Nordic countries, and create larger business opportunities for the green industries. This requires solid research basis to convince public authorities and business enterprises involved. The codes enacted and interpreted by the authorities constitute a major obstacle to competitive export. However, the construction industry works under the rules of market economy, hence, official codes should not distort the competition between different construction materials.

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