

## Enhancing resistance against decay and improve fire safety of engineered wood products

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### Abstract

Bio-based building products are considered key in our future socio-economic environment, since they are a very relevant nature-based solution (NbS) to climate change. The statement of President von der Leyen (European commission) to turn the construction sector into a carbon sink is critical in this respect: bio-based materials should be used on a larger and more targeted scale in the future. The long-term use of materials is therefore very important since we need to improve the lifespan of renewable materials to increase its carbon sink potential.

Hence wood is increasingly considered as a main building material. Service life aspects are critical in relation to the EU Construction Products Regulation (CPR). Traditional treatments to protect against fungal decay and the impact of fire are not always performing adequately and often environmental impact has been an important consideration. The option to enhance wood properties using innovative technologies can be combined with better definition of the expectations and requirements. Besides focusing on combined innovative treatments of the wood matrix, also envelope treatments similar to the use of coatings can be envisaged. This all should lead to an increased use of timber and engineered wood products for green building. This paper mainly focusses on the increased use and high potential of CLT (Cross Laminated Timber) and options to use hardwoods and modified wood (like TMT) in relation to moisture dynamics to come to fit-for-purpose material properties even under more hazardous circumstances.

CLT has become a commodity construction product for green building and hence options are explored to cover alongside standard product use also enhanced performance based on material properties and a range of technology tools. Enhanced performance is often related to fire safety and extending service life under conditions with more risk of longer time of wetness, use classes 2 and even 3 according to EN 335. Modern decision support systems can be based on a range of parameters and specific for the functionalities fire safety and service life several technology pathways are feasible leading in future to multi criteria decision making (MCDM) tools for CLT applications. A first one is based on built in or add on component that lead to enhanced performance like the use of plasterboard to increase fire safety. A second technology tool is protection by design that related to service life mainly focusses on avoiding higher moisture content by including barriers to prevent rain impact during construction and leakage and condensation issues during use. When moving towards use class 3, exterior applications, it becomes more relevant to increase the inherent or natural durability against decaying organisms by adding specific treatments in the range of wood preservation and wood modification. Nevertheless, also impacting on the moisture dynamics can be part of the solution, e.g. by means of coatings. Finally, there is the option to combine both fire and decay resistance with often the critical parameter of fixation of active ingredients. This clearly is a technology tool

still to be explored beyond current state of the art, but could bring an extra boost to the use of CLT.