FUTR HUT – Cluster for innovative materials

The FUTR HUT in The Urban Tech Republic will be an innovation and production site for sustainable raw and construction materials. This is where a site is being developed for collaboration on research, testing, and production with a heavy emphasis on sustainable construction. The objective is the digitalization and optimization of processes to scale and standardize climate-neutral construction to an urban scale, as well as making it affordable and marketable.

Focus on urban timber construction

Timber is an important CO2 storage source and a sustainable construction material. Schumacher Quartier will provide upwards of 5,000 homes for more than 10,000 people and is expected to become a **model residential district for urban timber construction**. The buildings in the very first construction phase will be built using a minimum percentage of timber of 50%. In this phase, different types of construction, both established and experimental, are expected to be implemented and the timber content in the next phases of construction will gradually be increased. Jointly with the State of Brandenburg a cooperation strategy will be pursued with the development of a regional production chain for timber construction and ecological building materials. This means that the timber for building the Schumacher Quartier comes from the region. It is then processed in the Urban Tech Republic, among other places, before being assembled in the residential district. Talks with companies from the timber construction sector are already taking place for this purpose.

Why wood? The city as a CO2 storage space

Berlin TXL is becoming a model international location for sustainable construction. All around the world, cities are facing the challenge of satisfying the increasing demand for residential space in a way that is ecologically compatible. With wood as the material, cities become storers of CO2 and building blocks for climate neutrality. For a cubic meter of wood growth, a tree converts a metric ton of the greenhouse gas carbon dioxide and absorbs as much as 250 to 300 kg of carbon[1]. In buildings the carbon then remains fixed in the form of wood, a renewable material, for the many decades of its useful life.

Unlike concrete or steel, wood does not have to be produced with a high expenditure of energy and no process-related carbon emissions are created. Thus, by building timber-constructed, single-family houses, up to 35 to 56% less greenhouse gases are created in comparison with traditional materials[2].

[1] cf. Fachagentur Nachwachsende Rohstoffe [Agency for Renewable Resources]. Available online at https://baustoffe.fnr.de/bauen/holzbau [last accessed 11.2.2020]
[2] cf. Ruhr-Universität-Bochum (inter alia.), 2017: Treibhausgasbilanzierung von Holzgebäuden [Balancing Greenhouse Gases in Wooden Buildings]. Available online at https://www.ruhr-uni-bochum.de/reb/mam/content/thg_bericht-final.pdf [last accessed 11.2.2020]

Digitalization in timber construction

Timber construction is to a large extent still characterized by manual production. With greater automation and digitalization comes the development of strategies to enable the use of timber for erecting large numbers of multistorey buildings in cities as well:

Reducing costs in production: It is typical with wooden constructions to prefabricate items for a building that can be assembled on the construction site in a short space of time. However, the degree of automation can be significantly increased for the manufacturing of the components, particularly when assembling parts that are either small or heavy, when changing tools on machines, or when bringing in insulating materials and piping. The digital technologies have the potential to further reduce costs for timber construction. Data analysis leads to savings on materials, reduction in machine downtimes, and better documentation of compliance with quality standards, while optimizing the entire manufacturing process in accordance with industrial standards.

In the FUTR HUT collaboration takes center stage

Interconnected stakeholders: Wood is a natural product and comes in many variants and quality grades. In particular, it allows for variable construction that proceeds on different principles of planning and construction than with mineral materials. Thus, efficient timber construction is dependent on a comprehensive exchange of information between all participants. By using digital networking, planners, for example, can become familiar at all planning stages with the properties of the wood and the manufacturing possibilities. The tradespeople involved in the assembly can then better decide among themselves how to meet construction schedule times, which in timber construction are basically short.

Timber construction in Schumacher Quartier

The role of the FUTR HUT in der Urban Tech Republic will not simply to be a site for innovation because it is at the same time the construction management center and manufacturing facility for timber construction in Schumacher Quartier. With upwards of 5,000 homes for more than 10,000 people, it is expected to become a **model district for urban timber construction in cities**.

The buildings in the first construction phase will already be constructed with a minimum timber percentage of 50% and this will be successively increased in the subsequent phases. As development proceeds, big cost reductions will be targeted. In Schumacher Quartier established design principles are being optimized while testing experimental construction methods. The following construction methods for timber are being considered:

- **Panel construction** with inexpensive, interconnected wooden frames
- **Timber frame construction** with beam constructions for open living with transparent façades
- **Solid wood construction** with glued surface structures
- **Hybrid construction** made of wood and with bearing components made of masonry, concrete, or steel

An efficient and safe construction material

Wood is an ideal raw material for a modern bioeconomy because it is a natural high-tech material. High-grade wood is lighter than steel for the same load-bearing capacity. It has a similar compressive strength to that of concrete and can withstand added tensile forces. In modern buildings, because of its high void ratio, wood is also used as an efficient thermal insulator. Nearly zero-energy buildings and passive houses are frequently made from this renewable raw material.

In case of a fire, wood behaves more predictably than other construction materials and is, therefore, rated positively by fire prevention authorities. The state construction laws of the Federal States of Berlin, Hamburg, North Rhine-Westphalia, and Baden-Wuerttemberg now also allow timber construction for multi-story buildings. One task that remains is the further standardization of procedures so that adherence to norms - as is the case with other construction materials - does not have to be demonstrated individually with each project.

Increasing interest in timber construction

In Germany, demand for residential buildings made from wood is increasing from year to year. Around 18.7 % of all new residential buildings were approved[3] as wooden structures. High-quality woods, efficient composites, and modern fasteners make building with wood possible even under highly demanding construction conditions. Even so, the use of wood in multi-story buildings remains less widespread. This is why the Schumacher Quartier is planning to become a model for urban, sustainable construction with wood.

[3] cf. Zentralverband des Deutschen Baugewerbes [Central Association of the German Construction Industry], 2020: Holzbau Deutschland – Lagebericht 2020 [Timber Construction in Germany – Status Report 2020]. Available online at https://www.holzbau-deutschland.de/fileadmin/user_upload/Pressebereich/2020_04_27_Lagebericht_2020/Holzbau_Deutschland_Lagebericht_2020_web_01.pdf