Coppice Construction

by George Fereday, Associate Teaching Professor, London Metropolitan University

The case for timber in construction is increasingly compelling. Recent research has shown that building with timber can be 30% faster with up to 90% less waste[1] - this within a general construction sector that accounts for 40% of global carbon emissions and a third of all waste in Europe.

Prefabricated timber homes are cheap, fast to manufacture and install, good for energy efficiency, and low impact in terms transportation - yet only a tiny proportion are made from timber sourced in the UK.

As well as promoting a sustainable green economy, timber and engineered timber building products offer long-term carbon capture and storage, and have the potential for adaptive re-use in the future as part of a circular economy. Sweet Chestnut is a durable, straight growth, dimensionally stable timber well suited to use in buildings. However, very little UK grown Sweet Chestnut roundwood is used in construction. The majority is converted into fencing or simply burnt as biomass.

Home Grown House (HGH) is a research project challenging this status quo by exploring new, value-added uses for coppiced Sweet Chestnut in buildings in the southeast of England. Kent and Sussex have among the highest numbers of new start building projects in the UK alongside the most regional abundance of coppiced Sweet Chestnut.

Yet the UK imports 82% of its wood (production and imports)[2] and rates of woodland management in Britain are low, with only 59% of UK woodlands under active management[3]. Many formerly coppiced woodlands have fallen out of regular harvest cycles making them more prone to pests and diseases, and contain a mixture of small, medium and large diameter trees with few markets.

Through the HGH project we are addressing these issues by designing building components specifically with a range of small, medium and large diameter roundwood in mind. We designed a 'kit of parts' for disassembly and re-use and all cut components were sawn efficiently to reduce waste during milling. This low-waste / high yield philosophy means the components are cheaper than traditional imported alternatives.

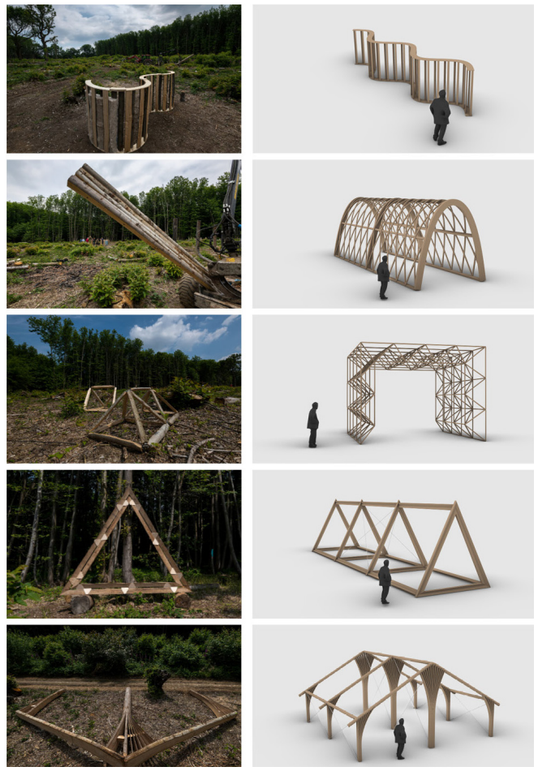
To achieve milling efficiency, we collaborated with industrial partner Wood-Mizer who are market leaders in mobile sawmilling. The company helped test new radial cutting techniques for repeatability, ensuring they could be reproduced on other sawmills elsewhere in the UK.

When coppiced (cut back to just above ground every 15-30 years), the Sweet Chestnut tree re-grows multiple, straight lengths of roundwood from each stump or 'stool'. Coppicing is also naturally regenerative, meaning that there is no need for replanting of saplings, and harvesting in this way encourages higher levels of biodiversity than in other monoculture woodlands, by opening up the woodland floor to sunlight. Coppice forestry also creates skilled rural jobs. By designing in a way that links forestry practices, ecology and construction from the outset, the HGH project has forged new connections that contribute to a holistic, sustainable and local timber supply chain.

The Home Grwon House featured in Timber Trades Journal

Open-air exhibition & research impact

In June 2021 we exhibited five coppice-based buildings systems on the Birling Estate in north Kent as a demonstration of the HGH applied research. During the exhibition, our 'kit of parts' was situated within the coppice woodland from which the material was harvested. Importantly, the timber structures were also exhibited alongside the forestry machinery used to harvest and extract the roundwood. The woodland setting, machinery and coppice prototypes combined to communicate the links between ecological woodland management practices, high quality locally grown timber, and sustainable building design. Stakeholders from across the timber supply chain, higher education and public sector were invited to view the prototypes and feedback their reflections on how they might be improved.



Home Grown House open air exhibition

The Home Grown House project featured on the front cover of the Timber Trades Journal (TTJ Sept/Oct 2021) and was presented at COP26, the UN Climate Change Conference in Glasgow 2021, boosting links between sustainable forestry and green economic development through a process of regenerative design.

The next phase: Home Grown Cabin

The Forestry Commission is currently funding a follow-on project to develop a 'demonstrator' cabin. The cabin components are being made from novel coppiced Sweet Chestnut structural insulating panels. We are using sawn and cleft Sweet Chestnut for the structure and external cladding, and Ash diseased with die-back for interior linings. The cabin project will complete in April 2022.

More information can be found here:
www.londonmet.ac.uk/research/centres-groups-and-units/the-centre-for-creative-arts-cultures-and-engagement/research-projects-and-funding/home-grown-house/

Acknowledgements:
The Home Grown House project was funded by London Metropolitan University through support from HEIF (Higher Education Innovation Fund). The Home Grown Cabin project has been awarded funding from the Forestry Commission through the Woods into Management Forestry Innovation Fund. This project has featured on the Forestry Commission blog as one of two national cases.

Project collaborators:
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Dougal Driver, Grown in Britain
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Harri Lewis, Jack Munro, Mule Studio
David Leviatin, London Timber Frame
Dave Biggs, Wood-Mizer UK.

References:

1 All-Party Parliamentary Group for the Timber Industries. (2019) How the Timber Industries can help solve the housing crisis.
2 Forest Research. (2021) Forestry Statistics. Chapter 3: Trade,
3 Royal Forestry Society. (2019) Bringing Woodland into Management, The missed opportunities in England and Wales.