

STA White Paper: Increased use of timber

“We will work with key stakeholders to develop a policy roadmap to increase the use of timber in construction in England and will create a cross-government and industry working group tasked with identifying key actions to safely increase timber use and reduce embodied carbon.”

Build Back Greener HM Govt. Net Zero strategy October 2021



A stark warning

In August 2021, the Intergovernmental Panel on Climate Change (IPCC) published its latest assessment of the state of the climate. And its findings make difficult reading: “It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.”

The IPCC report goes on to consider five possible scenarios and the climate model projections of each. While the detail varies across each outcome, the research showed that global surface temperatures will continue to rise until at least the mid-century under every scenario, at that:

Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO₂ and other greenhouse gas emissions occur in the coming decades.

“We call on all sovereign governments to ramp up their Nationally Determined Contributions and 2030 emissions reduction targets to limit planetary warming in line with the remaining global 1.5°C carbon budget.”

COP 26 Communiqué.

That significant and immediate action is required is now beyond question.

HM Government net zero strategy October 2021

The UK has positioned itself as a world leader in the fight against climate change, becoming the first major economy to legislate a Net Zero target by 2050, with an interim target of 78% reduction by 2035. Achieving these ambitious goals will require decarbonisation across every aspect of UK industry.

The government's Industrial Decarbonisation Strategy, published in March 2021, made it clear that work must start today to create the foundations on which a green industrial revolution can be built.

This paper highlights the key role that timber will play in enabling the construction industry to meet the challenges of industrial decarbonisation and deliver Net Zero by 2050.

Net zero in the construction industry

The energy use lifecycle of a building can be broken down into four main areas:

1. Initial embodied carbon (associated with the production of materials and their incorporation into the structure – also referred to as Upfront Carbon).
2. Recurring embodied carbon (maintenance and replacement of the building fabric).
3. Operational carbon (heating, cooling, lighting etc.).
4. End-of-life embodied carbon (associated with the deconstruction and reuse/disposal of materials)

The UK's built environment is estimated to be responsible for nearly half of the UK's carbon emissions, and initial embodied carbon can account for as much as 30% of this (a figure that will only increase as buildings become ever more energy efficient). This presents a serious hurdle in terms of reaching Net Zero, but also represents a huge opportunity: the larger the challenge, the greater the potential for reduction.

And today, there is growing recognition that the use of renewable timber in place of mineral-based materials such as steel and concrete can deliver significant reductions in greenhouse gas (GHG) emissions.

One paper, 'Carbon, fossil fuel and biodiversity mitigation with wood and forests' (Oliver et al, 2014), estimates that global CO₂ emissions could be reduced by as much as 31% by substituting wood for concrete and steel in building and bridge construction.

The figures suggested in 'Wood buildings as a climate solution', published in Science Direct (Himes & Busby, Nov 2020) are even more dramatic: “Substituting wood for conventional buildings materials reduces emissions by 69%.”



This consensus has been recognised by HM Government:

Reducing emissions

“Individual measures with the most potential in reducing emissions are using more construction materials with low embodied carbon (such as timber)”

HM Government Industrial Decarbonisation Strategy, March 2021

Mitigating climate change

“... using wood in construction to displace high-carbon materials such as cement and steel is one of the most effective ways to use limited biomass resources to mitigate climate change.”

Climate Change Committee, UK housing: Fit for the future? (2019).

Embodied carbon

“Some of the materials which have been favoured in the past by developers – like steel and concrete – are those with the highest level of embedded carbon and are often the materials that are least likely to win fans.”

Michael Gove, Secretary of State for Levelling Up, Housing and Communities, Oct 2021

Working with key construction stakeholders, including the Green Construction Board, Construction Leadership Council, Home Builders Federation, and Federation of Master Builders to develop a policy roadmap on use of timber.

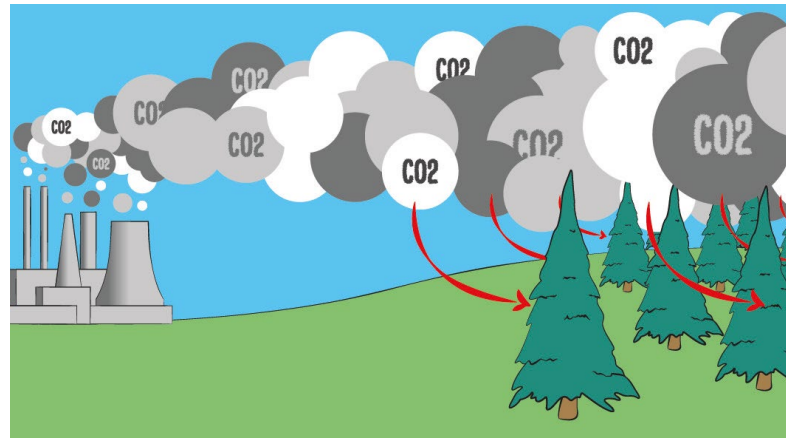
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Timber and carbon sequestration

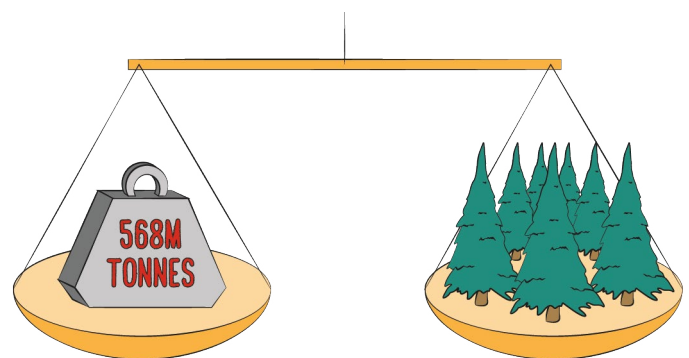
Felled trees store carbon within them and timber has the lowest embodied carbon of any mainstream building materials. Guided by market analysis, fire safety and structural considerations, key opportunities for the safe growth of timber use will be in low-rise buildings using traditional and certain modern methods of construction, and in a wide range of commercial and non-residential settings. We will promote the safe use of timber in construction through several measures.

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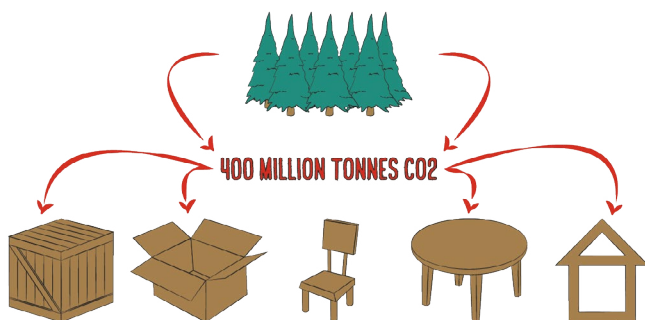
Atmospheric carbon is captured and stored in the biomass of the world's forests and this process – photosynthesis – is most efficient in young growth trees. While the global 'carbon pool' is declining due to deforestation, sustainable management and harvesting has seen Europe's forests (including the UK) grow and the amount of CO₂ sequestered increase by approx. 568 million tonnes per year, with the current carbon sink estimated at 135 billion tonnes CO₂. (Forest Europe Report 2020).



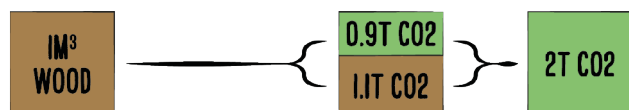
- **Trees absorb and store CO₂ as they grow.**
- **Concrete and steel emit CO₂ when produced.**



Growth in Europe's forests is capturing an extra 568 million tonnes of atmospheric carbon dioxide a year.



There are currently 400 million tonnes of CO₂ stored in Harvested Wood Products (HWP) in the UK, much of this is timber in buildings (Forestry Commission Facts & Figures Report 2020)



0.9 tonnes of CO₂ is stored within a m³ of wood.

This is less CO₂ emissions than the production of an equivalent amount of fossil fuel intensive materials, such as steel, concrete or plastics where, generally, 1.1 tonnes of CO₂ is used.

This amount, coupled to the 0.9 tonnes of CO₂ stored within the wood, means that every m³ of wood substituting for fossil fuel-intensive materials saves a total of roughly 2 tonnes of CO₂.

Construction timber in the UK results in over 1 Mt (1 megatonne) of additional CO₂ being stored per year in new homes, with potential to increase to **3 MtCO₂ per year by 2050**

Biomass in a Low-Carbon Economy; Committee on Climate Change: London, 2018.

Build **270,000 new houses** using **timber frame** and you:

Increase carbon sequestered in UK homes to **3 Mt**

Spear, S., Hill, C., Norton, A., Price, C., 'Wood in Construction in the UK: An Analysis of Carbon Abatement Potential'. Commissioned by the UK Committee on Climate Change, (2019).

The importance of commercial forestry

Contrary to accepted opinion that decarbonisation is best served by planting native broadleaves or re-wilding, a study published in Nature Communications has shown that newly planted commercial forestry can deliver almost 3x greater climate change mitigation.

269%

Newly planted commercial forest can achieve 269% greater climate change mitigation vs newly planted semi-natural forest.

The research, one of the most rigorous studies of its kind worldwide, looked at carbon flows in the whole system – soil, trees, forestry operations and the harvested wood product value chain, including carbon emissions avoided by using wood instead of concrete and steel in construction.

The study also highlighted the importance of acting now.

20%

A forest planted today will achieve 20% more mitigation by 2050 than one planted in 5 years' time.

Timber and the UK's housebuilding targets

Demand for housing continues to increase and, despite recording a 33-year high of 240k new houses in 2019-20, development still falls short of the government's housing supply target of 300k homes/year by the mid-2020s. Some estimates suggest that as many as 345k homes/year will be needed to tackle the housing crisis.

This need for a substantial increase in the number of new houses must be balanced against the goal of achieving Net Zero, which means that the role of timber in construction will become ever more important.

Timber frame is used in about:

- 9% of new builds in England
- 92% of new builds in Scotland
- 22% of new builds in Wales
- 30% of new builds in Northern Ireland

Figures by National House Building Council

England, by far the largest market, lags well behind the other home nations, but the solution already exists: according to the Structural Timber Association (STA), timber frame manufacturers have the capacity to deliver up to 70,000 timber frame houses per year in the UK.



This presents a major opportunity to reach the government's target while driving down carbon emissions, as well as satisfying DEFRA's England Trees Action Plan to 'work with Homes England and delivery partners to explore ways to increase timber use in the delivery of housing programmes.'

These measures in turn will comply with HM Govt. Net Zero strategy October 2021 to

- Increasing public demand for sustainably sourced timber through procurement policies; and
- Encouraging research into barriers to uptake of timber, including looking at timber strength grades and the fire resistance of engineered timber structures.

Timber and MMC/ offsite construction

Driving an increase in the use of certain modern methods of construction, some forms of which can encourage use of sustainable materials such as timber.

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As well as delivering a significant reduction in carbon emissions vs steel and concrete, the use of wood in construction delivers other benefits, particularly in relation to offsite timber frame construction:

- Quieter to assemble.
- Fewer deliveries/road miles.
- Fast build times, reducing costs.
- Fewer defects.
- Reduced waste.

In the words of the Royal Institute of Chartered Surveyors, timber frame delivers "cost-effectiveness, speed and energy-efficiency advantages from inception to construction."

The uptake of modern methods of construction (MMC) has the potential to deliver cost savings in the region of 30%, resulting from reduced construction times and enhanced build quality.

Once again, timber will play a central role in this, not only in the form of standard timber frame but also:

- Cross-laminated timber (CLT), used in tall timber construction for walls, floor slabs and roofs.
- Glued laminated timber (glulam), a high load-bearing material used for roof and floor beams, columns, bracing etc.
- Laminated veneer lumber (LVL) used for structural elements in both residential and commercial buildings.
- Orientated Strand Boards (OSB) used for sheathing in walls, flooring and roof decking.
- Engineered wood flooring

Timber and the insurance industry

The construction industry has clearly recognised the part that timber will play in achieving net zero, but what of insurers and investors? In many parts of the world – North America, Scandinavia, Central Europe, Australia, where the use of timber in construction is more commonplace – the insurance sector has developed real expertise in terms of insuring buildings based on structural timber and engineered wood solutions. As the market matures, matched with the need to meet investor's ESG requirements, this confidence should extend to UK insurers and brokers.

"The construction industry is seeing significant benefits working with mass timber. It's a sustainable building material that can be prefabricated, requiring fewer workers and less safety concerns."

Gary Kaplan, AXA XL.

Timber and fire safety

Timber, when used correctly, is a safe building system. Engineers and architects are increasing their understanding of this and are proficient in designing schemes that protect the structural integrity of buildings. Taking this knowledge forward, structural timber is a proven safe building system, common with any other building technology.

Rules and regulations clearly state when using any combustible material, measures are taken to protect products using non-combustible material, such as plasterboard. Extensive fire testing carried out by the industry proves this to be true. STA mandate members to follow the STA Site Safe process to mitigate risk of fire during construction, which is a fundamental part of the STA Assure quality assurance programme.

Details of Site Safe and other guidance can be found at www.structuraltimber.co.uk/library

Timber in Construction Group

In response to the government's net zero strategy, a cross-government and industry Timber In Construction Group has been formed to identify key actions to be taken by government, the construction sector, timber sector and academia to safely increase timber use in construction. The working group's primary objectives are to:

- Foster collaboration between sectors to develop policy options to safely increase timber in construction.
- Produce a policy roadmap for timber in construction with a clear implementation plan.

Particular policy areas the group is expected to explore are:

- Encouraging research into barriers to uptake of timber, specifically looking at timber strength grades and the fire resistance of engineered timber structures. This will inform key safety recommendations to increase timber in construction in England.
- Collaboration between industry and government to increase the supply and demand of timber in construction in the England. This will inform recommendations to strengthen the domestic timber market.
- Boosting market confidence for lenders, insurers, and warranty providers for timber in construction, outlining key regulatory recommendations.
- Utilising and encourage research into timber's role in the reduction of embodied carbon in the built environment. This will inform key recommendations about best practices within low carbon construction.

“While the 20th century may have been defined by steel and concrete, in the 21st we must live in greater harmony with nature and create a stronger forestry and timber industry which works together with our planet.”

Foreword, Report for the All-Party Parliamentary

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