

Viewpoint



With the emergence of two key government initiatives, **Simon Smith** reflects on the value of UK forests for timber production and the need to overcome the negative image of tree felling.

Grown in Britain – a review of the use of timber in UK construction

Introduction

As one of Europe's least forested nations it is perhaps surprising to see that nearly 11mt of material is harvested from our forests each year; essentially the same amount of steel or cement produced in the UK today¹.

Recent UK Government action has resulted in the Independent Panel on Forestry² and the 'Grown in Britain' initiative to look more closely at this national resource.

This article explores some of the statistics behind UK forests and timber in construction and also examines what options exist now and in the future for UK grown timber supply and construction.

UK forests

Some 13%³ of the UK is covered in forests compared to a European average of 34%⁴. In addition to this, many of the woods receive little active management, resulting in low yield rates (32% of forests are managed to produce wood) compared to Europe's 56%⁵. Culturally in the UK, forests are viewed as places for recreation, not for commercial activities.

Conifer forests account for approximately half of UK forests³ with conifer forests in Scotland providing 34% of the UK's total woodland area. Scotland also boasts the highest replanting/restocking rates (c.0.9%).

Primary UK softwood species are Sitka spruce and Scots pine, with significant other species including larch, Douglas fir, Lodgepole pine and Corsican pine. The balance between UK hardwood species is more even, with oak, birch and ash being the most abundant⁶.

Recent figures from the Forestry Commission¹ highlight close to 11mt of wood extraction from UK forests (about 1kg/m² in terms of productive forest area) with the vast majority being softwood. Compared to UK steel production of 10mt⁷ and UK cement production of 9mt⁸ it can be seen that UK forests are a productive force.

The output from UK forests is distributed between a number of different industries including fencing, fuel, shavings, pulp and paper, wood panels and sawmills - with approximately 60% directed to the latter. Ultimately about 1.2mt (or 1 million m³ of the

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initial 11mt) makes it into UK construction in the form of UK grown sawn softwood (Figure 1).

Recent studies have highlighted a bright future for UK forest productivity⁹. The result of past planting initiatives means that softwood availability could grow from 14.2 million m³ per annum in 2012-16 to 18.4 million m³ per annum in 2027-31 (Figure 2).

Construction industry

The UK construction industry consumes about £40bn of products and materials to create and maintain the built environment in the UK and for export. According to government statistics⁸ the UK imports

about £12bn of construction products and material; a consistently increasing figure that represents about a quarter of the market.

Despite testing times for UK construction, the future predicts significant development. The latest UN population trends predict that the UK population will continue to grow, potentially increasing from 63m to 73m by 2050, overtaking Germany to become Western Europe's largest population¹¹.

Timber in construction

The UK is one of the world's largest importers of wood and wood products, importing some £2bn of wood based materials such as sawn softwood and panel products¹. Whilst nearly self-sufficient in 'low-grade' timber products such as fencing, it relies heavily on imports for sawn softwood and engineered timber. Nearly 80% of sawn softwood used in UK construction is imported. Figures for engineered wood are not reported but manufacture of glulam is not carried out on any significant scale in the UK and all cross laminated timber is imported. Significant quantities (approximately 3 million m³ or 50% of total use) of wood based panels are produced in the UK, primarily from UK grown wood.

Despite our huge appetite for importing timber, the use of timber in UK construction has not reached saturation point. Information suggests that UK sawn softwood use is about 0.14m³ per capita compared to 0.20m³ in Germany and 0.80m³ in Finland⁴.

UK grown sawn softwood used in construction totals about 1 million m³ per

annum (from a total of 4.75 million m³ used annually in the UK) (Figure 3). One of the challenges facing the material, is over-specification in design. Default for many engineers and architects is to specify the higher grade of sawn softwood, C24, which is not readily available as UK grown timber. Nearly all UK timber produced is graded to C16. A simple calculation for a 4m span floor joist shows that a 13% increase in depth enables substitution of C16 in lieu of C24. Further work would be required on cost effectiveness of de-specification but the structural calculation stands. Further narrowing of the performance between C16 and C24 is possible when laminating timbers, whether through glue, mechanical or even stress lamination.

The use of UK hardwood in construction appears to be limited and figures are hard to find. What is known is that of the 0.5mt annually harvested, nearly 75% is used as wood fuel. Sawmills take in about 75,000t which equates to 48,000m³; tiny compared to the 3.4 million m³ of softwood that enters UK sawmills. Research in the use of UK hardwood in construction is much needed.

Grown timber options

For those wanting to support the use of UK grown timber, the options and products are numerous; bespoke hardwood frames, C16 sawn softwood, glulam timber and particle boards are all available in varying quantities. It is also possible to specify UK made I-joists, albeit a hybrid of UK grown web and imported softwood flanges.

Grown timber projects

There is a wide range of projects (both completed and under-construction) that have been built using UK grown timber:

- Future Affordable in Fife uses local C16 Sitka spruce to create closed panel and stacked panel elements that fit together to

form new housing. Pioneering work in the drying of timber to achieve lower moisture contents has been carried out

- Coed y Brenin Visitor Centre Extension in Wales uses local timber (Sitka spruce and Douglas fir) to form Brettstapel panels; stacked solid timber panels held together by hardwood dowels, one of the first uses of this type of construction in the UK
- The UEA Enterprise Centre in Norwich is being developed with the aim of using as much local material as possible and research was carried out in the use of Thetford Forest timber (Grand fir, Douglas fir and Corsican pine) as a structural material for Brettstapel, Larsen trusses and glulam elements
- A previous WoodAward winner, the Stowe Visitor Centre uses Larch elements sourced from Ashridge Forest for the structure to the National Trust's extension of the existing Coach Inn. The barn like structure is a contemporary take on traditional carpentry techniques
- The Living Willow Bridge at the Woodland Trust's Cow Hollow Wood shows what can be done with plantation timber that is only 12 years old. This experimental structure has been planted to avoid timber decay and the first signs of a living structure were witnessed this spring

Timber: the future

A number of UK groups are researching the use of home grown timber for construction. Work at Edinburgh Napier University is providing useful data on Sitka spruce for various applications including cross laminated timber. BRE, Bath University and Cambridge University are all working with wood, looking at a diverse set of study areas from non-metallic connectors to polymer modification.

There is no doubt that the additional 4.2 million m³ of softwood that could come from our forests in future years will need some radical thinking and investment if it is not to end up in low grade applications or burnt as fuel. With such volumes, research in processing as well as structural performance is required. On the immediate horizon the opportunity to use British grown larch in construction should not be forgotten (a significant felling programme is underway to control *Phytophthora ramorum*).

The as yet untapped hardwood resource in UK forests is perhaps of most interest. Overcoming the negative association with felling trees will require work, the advantages of active forest management and productivity needs to be communicated. Projects such as High Speed 2 will controversially see the felling of many trees; what is planned for this valuable resource?

Figure 1 UK forests 2012: production and output

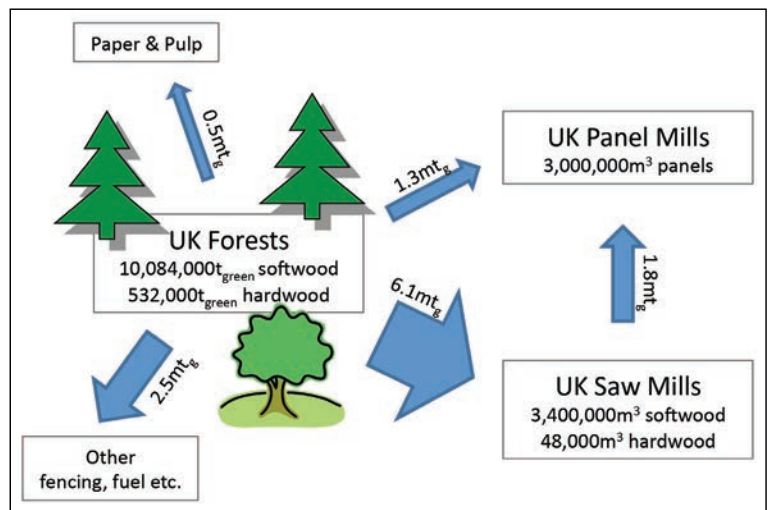


Figure 2 Long term Great Britain softwood availability by tree species¹⁰

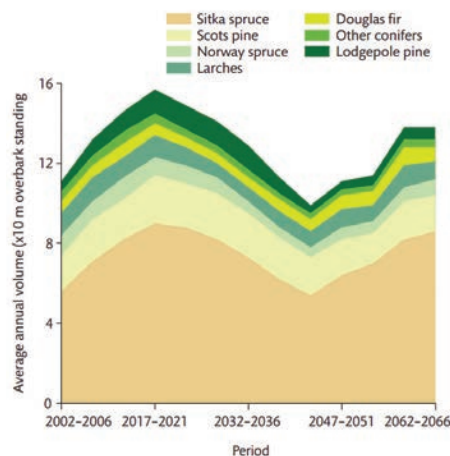
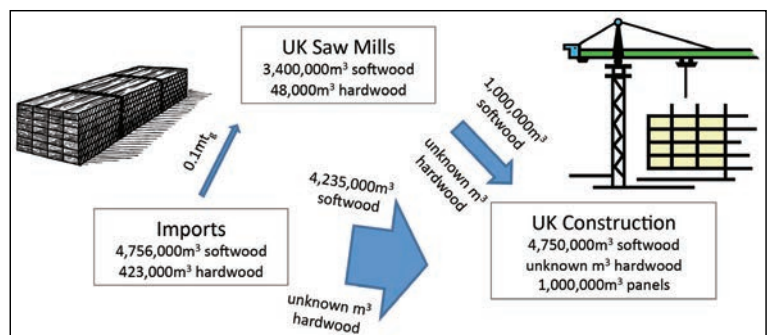


Figure 3 UK construction and timber statistics (2012)



Conclusion

UK forests are a productive force, producing nearly 11mt of materials for a diverse set of industries. This huge annual output is only set to increase as a result of historic planting activity. With strategic and prolonged planting, our treeless landscapes could be transformed to enhance the environment, increase carbon capture and secure timber stocks for the future.

Author biography

Simon Smith is a co-founder of Smith and Wallwork and a chartered structural engineer. Recently he has been focusing on reducing the environmental impact of construction and the materials used. His work in this field extends to collaborative research with Cambridge University. He is a member of the Grown in Britain Construction Panel.

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