InCrops Project

Low carbon supply chains for forest products in the East of England

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1. Executive Summary

1.1. Background

Commissioned by the East of England Development Agency, this report presents the case for a need to deliver a step change within the supply and use of wood in construction in the East of England. Initiating this step change will boost the delivery of low carbon and low impact solutions to meet increasing demand for housing in the region.

The project described in this report links the expertise and knowledge around the wood resource in the East England in the Forestry Commission Estate, private estates and other woodlands with a comprehensive understanding of the end use requirements for wood products.

The work was produced by InCrops Enterprise Hub and an in-house project team of independent BRE experts in materials and construction products, expertise in forestry in the region from Forestry Commission and supply chain specialists from the Norwich Business School. The work was organised as five work packages:

- WP 1: Mapping exercise. Using knowledge of the region and construction industry and wood products a mapping exercise has been conducted
- WP 2: Forest characterization. The woodland resource and its potential has been studied
- WP 3: Supply chain modelling. A series of model supply chains for the East of England
- WP 4: Corsican pine strength testing. Experts in the assessment of timber have generated new strength data
- WP 5: Draft phase II proposal

The project started in earnest with a presentation (see Appendix H) given by InCrops Business Innovation Manager Mark Coleman in March 2010 at the EcoBuild conference in London. His presentation outlined the issues on Red Band Needle Blight and the potential impact on volumes of timber.

In June, a stakeholder event was held in Thetford Forest with representatives from all areas of the East of England timber supply chain (see appendix A). At this event, an overview of the report was given that outlined the current supply chain, current levels of timber, the impact of red band needle blight and innovations in timber. Stakeholders were invited to comment on each of the presentations and to summarise the barriers and opportunities in using East of England timber. The comments guided the team in producing this report.

1.2. Key Findings

The project presented in this report has concluded on a number of key points:

- The UK is the second largest net importer of timber in the world, by value, at US$ 11 billion per annum.

- There is approximately 144,000 hectares of woodland in the East of England, representing 7.6% of the land area. Approximately 26,000 hectares (18%) of this is managed by the Forestry Commission with the majority (82%) owned by other public bodies, charities or private companies and individuals. East of England woodland is very

fragmented and of small block size with a total of 7,767 woods over 2 hectares with a mean wood area of 14.6 hectares.

- The region has a diverse woodland resource with broadleaved woodland the dominant forest type representing 61% of all woodland. Conifer woodland represents 22%, mixed woodland 11% and open space within woodlands and felled areas 6%. Corsican pine is the main conifer species and Oak the main broadleaf species.

- Despite the presence of Red Band Needle Blight (RBNB), this project has shown that the disease does not have a negative effect on the timber properties.

- Woodland and its forest products have a significant role in a low carbon economy. The estimated standing biomass/carbon stocks in the East of England amount to 8.4 million tonnes of carbon (MtC) or 30.7 million tonnes of carbon dioxide equivalent ($MtCO_2e$).This carbon sink can have an impact on carbon reduction targets if we maintain or increase our woodland and we use it in buildings as long service life construction products. In addition, the substitution effect of not using carbon intensive materials outweighs the carbon stored in the products[1].

- UK softwood usage in housing construction in 2007, totalled 6.4 million m^3 of which only 15%, or just below 1 million m^3, was produced in the UK, with 85% imported.

- The value of the market for sawn softwood in construction in the region is estimated to exceed £100 million per annum.

- The East of England either contains or is close to a number of growth zones (Cambridge, Milton Keynes, East Thames corridor) which will be significant users of timber in construction and in energy uses. New build housing need within the East of England over the period 2009 to 2021 is stated as being 349,000 new dwellings. If each of these dwellings uses an average of $2.8m^3$ of sawn softwood the total required over this period for new build would be 977,000 m^3. An estimated 10% of total timber consumption is in new build use with the rest in repairs, maintenance and improvements.

- Estimates from the Forestry Commission and the Private Sector suggest that from 2022 to 2026 there is approximately $365,000m^3$ roundwood softwood available per annum. In 2009 the softwood consumption by the existing sawmills was 146,000 green tonnes (for pine it is reasonable to say that 1 green tonne is equivalent to 1 m^3). Some of this capacity will be imported from other parts of the UK and abroad; some regional timber will be exported.

- There is at least $200,000m^3$ of additional softwood theoretically available by 2022-26 than currently milled. Estimates suggest that 29,000 green tonnes of softwood is used for biomass energy providing the opportunity for the remaining sawn softwood to provide timber for almost 36,000 new houses per annum if those homes were traditional brick and block houses or 10,000 new homes if they were timber framed houses.

- If innovative twin laminates form a structural frame and flooring as detailed in this report are selected then the 36,000 houses could store an additional $194,400tCO_2$. This would also unlock a key substitution effect for replacing the blocks in the structure. A house with $60m^3$ blocks in its walls has a net emission of $12tCO_2$ per house associated with the embodied energy in the blocks. This equates to a saving of $432,000tCO_2$ for 36,000 houses.

[1] Combating climate Change – a Role for UK Forests: www.forestry.gov.uk/readreport

- Although biomass energy demand is likely to increase, conservative estimates of hardwood (broadleaved) timber indicate that there is at least 100,000m^3 of unutilised hardwood timber in the East of England plus a similar volume of wood that could be used sustainably for woodfuel.

- This report has identified a number of barriers and opportunities:

    - Timber technology can add to a limited managed resource in the region. Innovative engineering of wood can utilize more of the standing tree in the construction product; create more construction products per hectare of woodland and store more carbon in our buildings. One of the possible products studied was an innovative inside out beam. This beam uses 85% of the round wood in the final product. A square beam of equivalent performance uses no more than 50% of the round wood in the product. This is not in conflict with existing supply chains.

    - The region can be creative with woodland resource and productivity but it needs a radical change in strategy. For example, if an inside out beam requires a tree of half the maturity of the equivalent square cut beam; in the same time period a hectare yields two times as many beams and possibly up to four times as many beams if planting density can be increased.

    - Co-products from manufacture such as chips for panel products, biomass energy, animal bedding, surfacing and mulch have significant values and can influence whether or not product manufacture is profitable and thereby if the supply chain is viable.

    - Corsican pine from Thetford forest is of sufficient quality to be used in a range of structural construction product end uses. It meets as a minimum machine strength grading “C16” class.

- This report argues that there is increasing pressure on the existing managed woodland resource. There is not enough to meet the ambition for energy use and low impact construction products requiring more unmanaged woodland to be brought into production as well as increasing afforestation. This report recommends that a balanced scorecard approach is used to provide clarity on strategies for the future. Such a balanced scorecard could include:

    i. The percentage of the harvested timber in the resultant final product.

    ii. The products impact on available land use for future forestation.

    iii. The return on invested capital generated by individual products.

    iv. The extent to which the final products can be used to replace high CO_2 emitting traditional alternatives, such as steel, concrete and plastics.

    v. The products CO_2 storage potential per m^3 of source timber, together with the length of time that storage is likely to last.

    vi. The products potential to create additional employment opportunities.