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NRP Enterprise Centre - The use of local timber materials

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Briefing Paper 06

The Project

This briefing paper describes the use of timber materials in the development of the new Norwich Research Park Enterprise Centre at the University of East Anglia (UEA). It aims to share the knowledge and challenges at the early stage of this project in the use of timber materials and for appointing local supply chain for this project. The University's aim is for the building to have an ultra low embodied carbon, specified using local sustainable materials incorporating renewables energy incorporated and designed to meet 100 years design life. The project also aims to achieve BREEAM Outstanding and Passivhaus certification. For detailed overview of the NRP Enterprise Centre project, please refer to our Briefing Paper 01: Norwich Research Park Enterprise Centre – an Exemplar Low Carbon Building at the University of East Anglia.



The building is designed to be constructed from a hybrid glulam, Brettstapel and Larsen truss structure, using local timber acquired from the East Anglian region (such as Thetford forest); a rammed chalk lecture theatre; and East Anglian grown hemp insulation throughout. The use of these local materials is to promote activity in the regional timber supply chain and decrease life cycle carbon emissions.

BDP's role in NRP Enterprise Centre



Figure 1 Basic section (picture courtesy of BDP)

BDP provided the structural engineering services for the NRP Enterprise Centre project. Having worked on a range of education and low carbon projects they provided a good starting point for this project. From the early project stages BDP identified some key low carbon structural products and methods that, along with further research and design, could be offered to the local supply chain.

From the early concept design stages BDP needed to demonstrate that the design and specification of the primary and secondary structural elements could be employed to set new standards and to invigorate the local supply chain. By engaging with the local timber industry the NRP Enterprise Centre project will enhance opportunities in the region.

Locally sourced materials

Along with Architype, the architect for the NRP Enterprise Centre, BDP identified local materials that could be used in the construction of the building. These includes chalk, hemp, earth and reed, lime mortar, timber, flint cobblers, straw and thatch products. Both thatch and timber were chosen as products that would benefit from being specified on the project.

Local timber sourcing and supply has the added advantage of minimising carbon contribution through reduced transportation. At present the local supply chain does not deliver structural timber products, but with given incentives, this project could help grow the local market.

BDP reviewed various industry reports including those by BRE and InCrops (2010). Two primary structural frame products were taken through to the concept design stage: 1) Brettstapel panels and 2) Glulam timber frame. Secondary elements includes twin laminate joists, inside out poles, Larson trusses and floor cassettes.



Figure 2 Douglas Fir and Corsican

Local supply chain

An exploratory meeting with local saw mills, suppliers, manufactures and representatives from the Forestry Commission set out to understand the industry and opportunities that may exist. The key findings included the fact that the local industry was set up for a high demand of low value timber, typically fencing, and that there was little incentives to change. Saw mills are risk averse and stick to their known sawing patterns limiting the range of products. For the NRP Enterprise Centre project, the timber process and

procurement programme was highlighted as a risk to the project. Early commitment and saw mill engagement would be required to meet the construction programme. As such a decision was made to engage the market early on in the design process.

Timber Species

Following a local timber supply review with BRE, further information was gathered into what species of timber would benefit from the NRP Enterprise Centre project. The suggested timber species for the main timber frame and Brettstapel were:

- Grand fir – little existing data exists for UK grown material. Testing required.
- Douglas fir – reasonable new data from Bath & Napier Universities.
- Corsican pine – already strong existing markets.

Brettstapel timber construction



Figure 3 Brettstapel by Dainis Dauksta (BRE)

Brettstapel is a laminated timber construction system fabricated from softwood timber posts connected with hardwood timber dowels. This simple method of construction makes no use of glue or nails and can be used to make beautiful, low carbon, healthy buildings that are quick and easy to build.

Brettstapel can be manufactured from low grade untreated small section timber. This specification effectively ensures that locally or UK grown timber can be used in the fabrication of the elements. Structurally the Brettstapel panels act as a load bearing masonry wall by reducing the need, where architecturally acceptable, for beams and columns by directly supporting the floors and roof elements.

Frame Design and Tender

To encourage participation of the local timber supply chain, the design of the frame was developed using lower grade timber, reduced spans to limit section sizes and off site construction to reduce waste. The design intent was to target 50%-70% of the timber from the local area. This information and examples of local timber products were issued as part of a tender package of information along with an outline specification for the Brettstapel and timber frame.

Response from the Industry

Procurement tenders for the timber elements were issued for procurement tenders to eight local timber frame contractors. The response from the industry was positive and there was an excellent level of interest in the project. However, it was found that prices for local frames were around 40% higher than the equivalent frame procured from Europe.

This cost premium became a challenge for the client and design team and tested the client's aspirations for a local timber frame. Furthermore, it is not understood what impact the procurement of the local frame would have on the local economy, if any, as there was no direct skill base at present.

Brettstapel technology and the use of local timber has the potential to create jobs, help reduce the embodied energy of materials used within the particular building and also create efficient and healthy buildings. It is therefore essential that further studies and testing are carried out to help explore this further.

Funding and business support for East of England SMEs

As a condition of this funding, the Centre for the Built Environment (a Centre that draws upon a cluster of expertise within and outside UEA and is responsible for delivery of ERDF outputs and, through Adapt Commercial, the provision of low carbon consultancy services) will provide free business support. This support will be delivered through a series of bespoke CPD accredited seminars, webinars and other support showcasing the design, build and post-occupancy of the building. As part of the ERDF funding, SMEs in the East of England are eligible for up to 12 hours support free of charge. Non SMEs will be charged £30 plus VAT per half day session.

The seminars are CPD accredited and suitable for architects, contractors, planners, M & E consultants and other built environment professionals. The seminars will be delivered by a combination of professionals working on the Exemplar Low Carbon Building, other built environment specialists and CBE consultants and will have a maximum capacity of 15 people per session. Events include topics such as Passivhaus, BREEAM, Sustainable Urban Drainage System (SUDS), Building Information Modelling (BIM), Ventilation and many more. For our latest events, please visit our website: www.adaptcbe.co.uk/CBE/events.



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