PEFC Project Certification at Kingsgate House, Kings Road

Monday 13th January 2014
Craig Tatton, Managing Director
Willmott Dixon Housing

Welcome Introduction
Programme for the Endorsement of Forest Certification

Project Certification CPD January 2014

Alun Watkins
PEFC UK
National Secretary
About PEFC

- Global, not-for-profit, non-governmental organisation – established in 1999
- Alliance of national forest certification systems with global representation
- 251 million hectares are certified by PEFC-endorsed national schemes
- World's largest forest certification system and provider of sustainably managed wood-based products such as timber and paper
Members; Endorsed Systems;

International Stakeholder Members

- APP Timber
- Building and Wood workers’ International (BWI)
- Confederation of European Forest Owners (CEPF)
- Confederation of European Paper Industries (CEPI)
- Earth Focus Foundation
- European Network of Forest Entrepreneurs (ENFE)
- European Tissue Symposium (ETS)
- International Family Forestry Alliance (IFFA)
- Metsaliitto Group
- StoraEnso

North America
143 million ha

Central and South America
3.2 million ha

Europe
79 million ha

Asia
4.6 million ha

Africa
79 million ha

Oceania
10 million ha

ha — hectares
Chain of Custody Certification

- The timber supply requires a full chain of custody for all who take ownership. PEFC ST 2002:2013
- The Chain of Custody certificate guarantees that the certified products originate from sustainably managed forests
What is PEFC Project Certification?

Project Chain of Custody certification enables a claim to be made about the PEFC certified material used within a defined Project.
UK Government Procurement Policy (CPET)

- Current policy:
  - ‘Legal & Sustainable’ or
  - FLEGT licensed or equivalent
  - or recycled timber

From 2015

- ‘Legal & Sustainable’ only
Increasing numbers of procurement policies specify certification schemes such as PEFC

- CPET
- ODA
- BREEAM
- Sustainable Homes Initiative
- UKCG
- Next Generation

- By procuring certified timber products you are also ensuring compliance with the EUTR.
• More info at www.pefc.co.uk

• Contact Alun Watkins awatkins@pefc.co.uk
Stephen Cherry, Partner
Horden Cherry Lee Architects

Kingsgate House – Project Overview
• 43 Apartments
  31 Social Rented (incl. 4 Wheelchair Accessible) and 12 1 Bed Shared Ownership
• No RSL input before planning
• Complying with Various Space Standards:-
• Code for Sustainable Home Level 4
• 20% Renewable Energy
Kingsgate House, Kings Road
Monday 13th January 2014

Site Context
Challenges – Traffic Noise

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Challenges – Rights of Light

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Challenges – ‘Nimby’

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Proportion and Rhythm

Vertical Rhythm

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Solar Shutters

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Architectural Design

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• Benefit of Re-using Foundations
  - Saves excavation
  - Saves substructure cost
  - Saves Noise, Trucks & Mud

• Benefit of CLT Construction
  - Light Weight Structure
  - Embodied Carbon & Energy
  - Less Vehicles, Waste & Noise
  - Simpler & Faster Site Construction
  - Airtight Envelope
  - Thinner Transfer Slabs
  - Easy to Fix Sundry Items

Challenge was to convince Local Authority/HSE about Fire Protection

Holistic Sustainability Approach - Construction
• Sustainable Cladding Material
  - Trespa is 70% Wood based Fibre
  - Trespa certified by PEFC and FSC
  - Minimal Maintenance
• Acoustic Performance
  - 43 dB reduction
• U-Value (W/m²/°K)
  - Roof 0.10
  - Wall 0.18
  - Floor 0.15
  - Glazing 1.30
• Airtightness
  - 3m³/hr/m² @ 50Pa test pressure

Holistic Sustainability Approach – Envelope

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• 44% reduction in CO2 emissions over a base Part L equivalent building

• PV Cells generates 13,145 kWh of electricity per annum and save 8.2 tonnes of CO2 per annum

• PV Cells and EAHP provides a 20% renewable contribution as required by the local authority

• Insulation and air tightness reduces Heating Energy by 70%

• Exhaust Air Heat Pump reduces Hot Water Energy by 70%

UKPN reduced Electricity Supply requiring limited need for Gas
### Comparing Energy Uses:

<table>
<thead>
<tr>
<th>Object</th>
<th>Energy Use (kwhrs/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airbus A380</td>
<td>2'500'000</td>
</tr>
<tr>
<td>A321</td>
<td>46'560</td>
</tr>
<tr>
<td>Porsche</td>
<td>6'240</td>
</tr>
<tr>
<td>Smart</td>
<td>792</td>
</tr>
<tr>
<td><strong>Kingsgate</strong></td>
<td><strong>250</strong></td>
</tr>
<tr>
<td>Four bed house</td>
<td>75</td>
</tr>
<tr>
<td>Human being at full exercise</td>
<td>7.2</td>
</tr>
<tr>
<td>Micro compact home</td>
<td>5.5</td>
</tr>
<tr>
<td>Low-e m-ch</td>
<td>-14.5</td>
</tr>
<tr>
<td>[26 sqm solar cells]</td>
<td></td>
</tr>
<tr>
<td>Freezer</td>
<td>0.54</td>
</tr>
<tr>
<td>Human being at a computer</td>
<td>3.6</td>
</tr>
<tr>
<td>Human being at rest</td>
<td>1.9</td>
</tr>
<tr>
<td>Laptop</td>
<td>0.21</td>
</tr>
<tr>
<td>Mobile Phone</td>
<td>0.03</td>
</tr>
</tbody>
</table>

**Comparing Energy Uses**

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Monday 13th January 2014
Dr. Hugh Mansfield Williams,
Technical Manager
BM TRADA

The Material – Cross Laminated Timber
Wood from the trees

EU forest cover 2010: 157 million ha (37% cover)

Russian Federation forest cover 2010: 809 million ha, (49% cover)

Timber can be harvested sustainably

As a construction material, timber is light, strong and easy to process

However:

Trees grow to a finite size

Round logs have a small contact area

Inherent variability in a natural material

Logs shrink and split as they dry
Overcoming limitations

Timber was processed to provide flat contact surfaces
Framed and panelled structures were used for large flat areas
As tall as possible
As long as possible - mechanically laminated beams

Five storey block of flats - built around 1600 in Evolène, SW Switzerland
Structural adhesives - new opportunities

Gulam beams, straight and curved

Structural wood based panels – OSB for platform frame housing

Cross laminated timber – solid load bearing walls, floors and roofs

Odate Jukai dome, northern Japan

Span: 178m (long axis); height: 52m

Bridport House is an eight-storey residential tower in Hackney, built entirely of CLT.
Wood for CLT

Timber – typically softwood species from managed forests

Sawn boards are kiln dried to 12% moisture content then strength graded

Strips of wood are finger jointed at the ends to continuous lengths

Width to thickness ratio of strips is at least 4:1 to prevent rolling shear

Tolerance on thickness of strips less than ±0.10 mm to ensure even bonding pressure
And glue for CLT
Made in the UK?

Napier University have studied the potential for manufacturing CLT from home-grown Sitka spruce (with funding from Forestry Commission Scotland, among others)

UK timber production is set to gradually increase over the next fifteen years, particularly in Scotland, up to 18 million m³. There is enough timber available

Sitka spruce is the main resource. Lab scale tests provided CLT material that is similar in performance to products from Central Europe

Commercial drying of Sitka spruce to 12% mc is poorly understood

A detailed business plan is required to create investor confidence
The sky’s the limit?

The potential for CLT tall buildings has captured the imagination of architects.

C.F. Møller, Stockholm
34 storeys, housing association
CLT structure with a concrete core

42 storeys, concrete

Further reading:
The Case for Tall Wood Buildings – Michael Green
Tall Timber Buildings - Techniker

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Steve Cook, Principal Sustainable Development Manager

WD Rethinking

Kingsgate House – The Contractor’s Perspective
Steve Cook, Principal Sustainable Development Manager

WD Rethinking

Kingsgate House – The Contractor’s Perspective
Contents

Experience of CLT
CLT as a construction material
Benefits and performance
Embodied Carbon
Cross Laminated Timber Projects

1. The Re-Thinking School  
   BRE Watford  
   2007

2. St. Agnes Primary School  
   Manchester  
   2009

3. Kendrick School  
   Reading  
   2009

4. City Academy  
   Hackney  
   2010

5. Bewbush Healthy Living Centre  
   Crawley  
   2010

6. Waingels College  
   Wokingham  
   2011

7. Bridport House  
   Hackney  
   2011

8. Sheringham Junior School  
   Newham  
   2011

9. Dersingham Primary School  
   Newham  
   2011

10. Extension to St Agnes  
    Manchester  
    2013

11. Kingsgate House  
    Chelsea & Kensington  
    2014

12. Keynsham town hall  
    Keysham  
    2014
Re-Thinking School - BRE
Waingels College - Wokingham
Exposed Structural Timber

• Water tightness is key to avoid shrinkage movement and staining

• Extensive temporary measures may be required if timber is to remain visible on completion
Keynsham Town Regeneration
CLT as a Construction Material
CLT as a Construction Material
Quiet and Considerate

RC Frame = 200 deliveries (25 operatives)
CLT = 23 deliveries (7 operatives)
Clean and tidy with minimal waste
Fewer materials interfaces
Lift shafts
Staircases
Speed of following trades
External Walls - Brickwork

Statixx® Thor Helical TJ2
European Patent No. 1287560

Embedment Depths

TJ2 Recommended Lengths

<table>
<thead>
<tr>
<th>Gutter Width (mm)</th>
<th>Tie Length (mm)</th>
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<tbody>
<tr>
<td>90</td>
<td>205</td>
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<tr>
<td>75</td>
<td>200</td>
</tr>
<tr>
<td>110</td>
<td>205</td>
</tr>
<tr>
<td>125</td>
<td>200</td>
</tr>
<tr>
<td>150</td>
<td>150</td>
</tr>
</tbody>
</table>
Floor Junctions And Movement
External Walls – Rain screen
COST BENEFIT - Lightweight

- Lightweight = Cost reduction in Substructures
- High Strength = greater spans less loadbearing walls
COST BENEFIT - Programme Saving

CLT start - 20th February 2013
CLT complete - 16th May 2013

CLT Erection 12 weeks
comparison with

RC frame erection 15 weeks

Allowance for external walls and party walls + 2 more weeks.
Therefore a 5 week programme reduction
COST BENEFIT – Better U Values, reduced thermal bridges

<table>
<thead>
<tr>
<th>Element Description</th>
<th>Element Thickness (mm)</th>
<th>Thermal Conductivity (W/mK)</th>
<th>Thermal Resistance (m²K/W)</th>
<th>Vapour Resistivity (MNs/m²)</th>
<th>Mean T (K)</th>
<th>Delta T (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside surface resistance</td>
<td>-</td>
<td>-</td>
<td>0.040</td>
<td>-</td>
<td>282.18</td>
<td>0.06</td>
</tr>
<tr>
<td>BRICKWORK FACING</td>
<td>102.5</td>
<td>0.770</td>
<td>0.133</td>
<td>42.00</td>
<td>282.31</td>
<td>0.20</td>
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<tr>
<td>UNV ASPACE</td>
<td>50.0</td>
<td>-</td>
<td>0.644</td>
<td>-</td>
<td>282.88</td>
<td>0.95</td>
</tr>
<tr>
<td>KOOLTHERM K12 - FIXED BACK TO TIMBER PANEL</td>
<td>100.0</td>
<td>0.020</td>
<td>5.000</td>
<td>-</td>
<td>287.05</td>
<td>7.39</td>
</tr>
<tr>
<td>CROSS LAMINATED TIMBER PANEL</td>
<td>161.0</td>
<td>0.140</td>
<td>1.160</td>
<td>520.00</td>
<td>291.60</td>
<td>1.70</td>
</tr>
<tr>
<td>TIMBER BATTEN CAVITY: UV. 11.4% wall timber - 47mm batten @ 600mm cts + 47mm noggins @ 1200mm cts (+20.0mm)</td>
<td>25.0</td>
<td>-</td>
<td>0.184</td>
<td>-</td>
<td>292.69</td>
<td>0.27</td>
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<tr>
<td>PLASTERBOARD</td>
<td>15.0</td>
<td>0.190</td>
<td>0.079</td>
<td>50.00</td>
<td>292.78</td>
<td>0.12</td>
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<tr>
<td>PLASTERBOARD</td>
<td>15.0</td>
<td>0.190</td>
<td>0.079</td>
<td>50.00</td>
<td>292.90</td>
<td>0.12</td>
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<tr>
<td>Inside surface resistance</td>
<td>-</td>
<td>-</td>
<td>0.120</td>
<td>-</td>
<td>293.06</td>
<td>0.19</td>
</tr>
</tbody>
</table>
COST BENEFIT – Inherently Airtight

Target design air permeability of $3 m^3$
Achieved results at $1.5 m^3$
Average result $2.2 m^3$
## Summary Table of Results:

<table>
<thead>
<tr>
<th></th>
<th>Floor</th>
<th>Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Air Bourne (Dntw+ctr)</td>
<td>Impact (Lntw)</td>
</tr>
<tr>
<td>Require more than</td>
<td>Require less than</td>
<td>Require more than</td>
</tr>
<tr>
<td>≥45dB</td>
<td>≤62dB</td>
<td>≥45dB</td>
</tr>
<tr>
<td>No of Tests</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Average Test Result</td>
<td>56.3</td>
<td>44.3</td>
</tr>
<tr>
<td>(dB)</td>
<td>Target Test Result (ADE 2003) (dB)</td>
<td>45.0</td>
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<tr>
<td>Ave. Improvement over B. Regs (dB)</td>
<td>11.3</td>
<td>17.8</td>
</tr>
<tr>
<td>CFSH Target</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ave. ≥3dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFSH Target</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ave. ≥5dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFSH Target</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ave. ≥8dB</td>
<td></td>
<td></td>
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<tr>
<td>Best Single Result</td>
<td>65</td>
<td>40</td>
</tr>
<tr>
<td>Worst Single Result</td>
<td>52</td>
<td>49</td>
</tr>
<tr>
<td>Range Between Best and Worst</td>
<td>13</td>
<td>9</td>
</tr>
</tbody>
</table>

All test results at least 7dB better than building regulations with the best result 22dB better
Embodied Carbon

Carbon Storage

• Total Timber in CLT frame is 1091.7m³
• Sequestered carbon (@750kg/CO₂/m³) = 819t
• Equivalent to 20 years of operational carbon

Carbon Saved

Similar savings likely through avoiding traditional forms of construction and reuse of existing
Hierarchy of decision making

Economic viability
Aesthetics
Height

FORM OF CONSTRUCTION

Life Cycle Analysis
Availability of supply
Logistics
Local Spend

Ground Conditions

Programme Drivers
Embodyed Carbon

Renewable
Form & Function
Responsibly Sourced

Whole Life Costing
Looking Ahead

**Lower costs**
33%
reduction in the initial cost of construction and the whole life cost of built assets

**Faster delivery**
50%
reduction in the overall time, from inception to completion, for newbuild and refurbished assets

**Lower emissions**
50%
reduction in greenhouse gas emissions in the built environment

**Improvement in exports**
50%
reduction in the trade gap between total exports and total imports for construction products and materials

*Construction 2025*

July 2013
Many Thanks

steve.cook@willmottdixon.co.uk
Alun Watkins, National Secretary
PEFC UK Limited

Alasdair McGregor, Business Development Executive
BM TRADA

Short Film and Presentation
Thank you for joining us, further questions can be taken by any of our speakers afterwards in the forum.

CPD Certificates will be emailed to all delegates following this event.