

**WOOD IN THE CITY –
MULTI STOREY RESIDENTIAL
CLT BUILDINGS**

PHILIPP ZUMBRUNNEN

promo legno

EURBAN

CONTENT

MULTI STOREY RESIDENTIAL CLT BUILDINGS

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- **Mid rise CLT buildings - the UK past and present**
- **Why CLT - The advantages**
- **Benefits and possibilities with CLT**
- **Mid rise CLT buildings – Present and future projects**
- **Conclusion**

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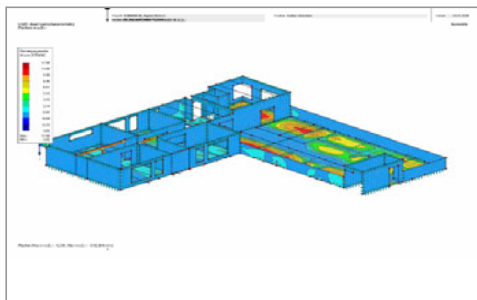
INTEGRATED SUPPLY PARTNER

EURBAN is the UK's leading independent consultant and construction company specializing in the design and delivery of solid timber building structures. With a fully integrated service offering, we are known for our ability to deliver high-quality timber structures on time and on budget.

Our innovative and industry-leading services include specialist timber consultancy, strategic package procurement, value engineering and on-site construction services.

EURBAN

INTEGRATED SUPPLY PARTNER



ENGINEERING

MATERIALS

INSTALLATION

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MID RISE CLT BUILDINGS

THE UK PAST AND PRESENT

2000
Market Entry



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FIRST USE
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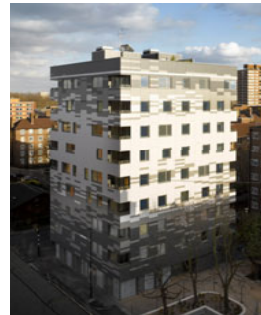
2005
Waterson Street



© Quay2c

5 STOREY
EURBAN

2009
Murray Grove



© Waught Thistleton

9 STOREY
KLH UK

2011
Bridport House



© Ioana Marinescu

8 STOREY
EURBAN

2012
Whitmore Road



© Waught Thistleton

7 STOREY
KLH UK

MID RISE CLT BUILDINGS

WATERSON STREET

- Hackney / London
- 2005
- Installation 6 weeks
- GIFA 1067m²
- 7 office units
- 11 flats

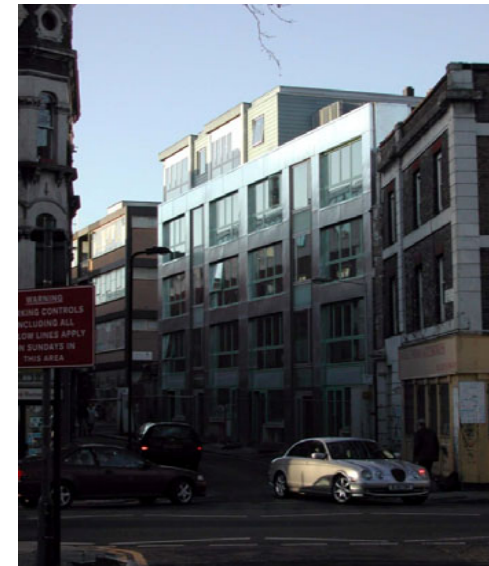


MID RISE CLT BUILDINGS

WATERSON STREET



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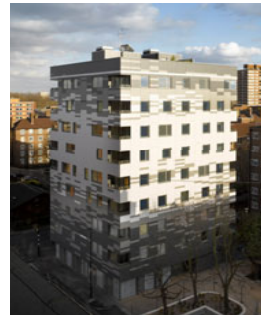
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KLH UK

MID RISE CLT BUILDINGS

BRIDPORT HOUSE

- Hackney, London
- 2010/11
- 16 months construction
- 8 storeys
- 4,154m² GIFA
- 41 residential units



MID RISE CLT BUILDINGS

BRIDPORT HOUSE



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MID RISE CLT BUILDINGS

THE UK PAST AND PRESENT

2000
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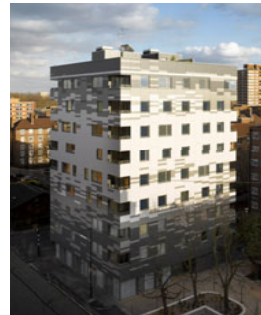
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Whitmore Road



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KLH UK

MID RISE CLT BUILDINGS

THE INTERNATIONAL PAST AND PRESENT

2005
Trondheim



© David Grandorge

5 STOREY
Norway

2006
Mühlweg Wien



© Dietrich Untertrifaller

5 STOREY
Austria

2012
Chibougamau



© Nordic EWP

4 STOREY
Canada

2012
Forte Tower



© Lend Lease

10 STOREY
Australia

2013
Via Cenni



© Tekne

9 STOREY
Italia

WHY CLT

THE ADVANTAGES

- Structural performance => New heights / Complex structures
- Simple details => Quality control / Architectural detailing
- Robust building system => Performance in extreme situations
- Offsite prefabrication => Reduced installation time and noise
- Sustainable material => Reduced environmental impact
- Single material / no composite => Recycling / Reuse

BENEFITS AND POSSIBILITIES WITH CLT

BRIDPORT HOUSE

- Carbon storage /
Carbon storage
- Overall shrinkage
- Installation logistics
on a very tight site



BENEFITS AND POSSIBILITIES WITH CLT

CARBON STORAGE / CARBON REDUCTION

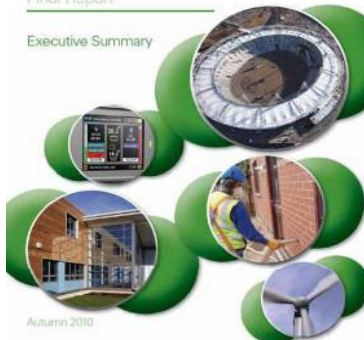


HM Government

Low Carbon Construction
Innovation & Growth Team

Final Report

Executive Summary



Recommendation 2.1: That as soon as a sufficiently rigorous assessment system is in place, the Treasury should introduce into the Green Book a **requirement to conduct a whole-life (embodied + operational) carbon appraisal** and that this is factored into feasibility studies on the basis of a realistic price for carbon.

Recommendation 2.2: That the industry should agree with Government a **standard method of measuring embodied carbon for use as a design tool** and (as Recommendation 2.1 above) for the purposes of scheme appraisal.

BENEFITS AND POSSIBILITIES WITH CLT

CARBON STORAGE / CARBON REDUCTION

- The comparison has been carried out with an in-situ concrete frame based on the superstructure only.
- With the exception of Metsec which requires to be added to the RC frame, we have assumed all other components are the same for both forms of construction.
- The embodied carbon figures are based on the ICE database version 2.0 issued January 2011.
- These only include 'Cradle to Gate' therefore the transportation stage or the site energy required has not been yet considered.
- For the concrete frame it has been assumed 59% recycled content for the reinforcement steel and taken the carbon figures for concrete with 30% fly ash which is current good practice for reducing environmental impact.

BENEFITS AND POSSIBILITIES WITH CLT

CARBON STORAGE / CARBON REDUCTION

Carbon Calculation for CLT	Quantity	Kg mass	Total weight kg	Kg Co ₂ /Kg ⁽¹⁾	Kg of Co ₂	Tonnes of Co ₂
Total Concrete for foundations	394.5m ³	2,400	946,800	0.124	117,403	117t
Total Reinforcement for Foundations	53.25t	1,000	53,250	1.4	91,058	75t
Total Timber for Frame	1576m ³	590	929,840	0.0727	67610	67.6t
Hot Rolled Steel	1.52t	1,000	1,520	1.46	2,219	2t
Total Embodied Carbon			1,931,410		261,783	261.7t
Total Stored CO₂					(1,182,000)	(1182t)

Approx 25% reduction in foundations due to 62% lighter CLT structure
 Applied Stora Enso's figure of 42.9kgCO₂/m³ for the CLT panels
 Used a figure of 750kg of CO₂ per m³ for the sequestered carbon

CLT Frame

Embodied Carbon 262 tonnes of CO₂

BENEFITS AND POSSIBILITIES WITH CLT

CARBON STORAGE / CARBON REDUCTION

Calculation for RC Frame	Quantity	Kg mass	Total weight kg	Kg Co ₂ /Kg ⁽¹⁾	Kg of Co ₂	Tonnes of Co ₂
Total Concrete for foundations	514m ³	2,400	1,233,600	0.124	152,966	153t
Total Steel Rebar for Foundations	71t	1,000	71,000	1.4	99,400	99t
Total Concrete for frame	1416m ³	2,400	3,398,400	0.136	462,182	462t
Total Steel Rebar for Frame	290.1t	1,000	290,100	1.4	406,141	406t
Total Galvanised Steel for Infill Walls	2413.8m ²	6.60	15,931	2.12	33,774	34t
Total Embodied Carbon			5,009,031		1,154,463	1,154t

Embodied Carbon data taken from ICE database version 2.0 January 2011
Embodied Carbon figure for concrete taken based on 30% fly ash content
Assumed recycled content of Steel Reinforcement of 59%

Concrete Frame

Embodied Carbon 1,154 tonnes of CO₂

BENEFITS AND POSSIBILITIES WITH CLT

CARBON STORAGE / CARBON REDUCTION

RC Frame = 1,154 tonnes of CO2

Cross Laminated Timber Frame = 262 tonnes of CO2

The carbon **avoided** through using CLT is **892 tonnes**

The **operational energy** for 41 dwellings is **73.4 tonnes/year**

This is equal to 12 years of 'energy in use'

At 20% renewables this saving is equivalent to 58 years

BENEFITS AND POSSIBILITIES WITH CLT

CARBON STORAGE / CARBON REDUCTION

RC Frame = 1,154 tonnes of CO₂

Cross Laminated Timber Frame = 262 tonnes of CO₂

The volume of timber used at Bridport House 1536m³

The sequestered is carbon is 750kg/CO₂/m³ 1152t

Carbon avoided by not using RC frame 892t

Total avoided and sequestered CO₂ 2044t

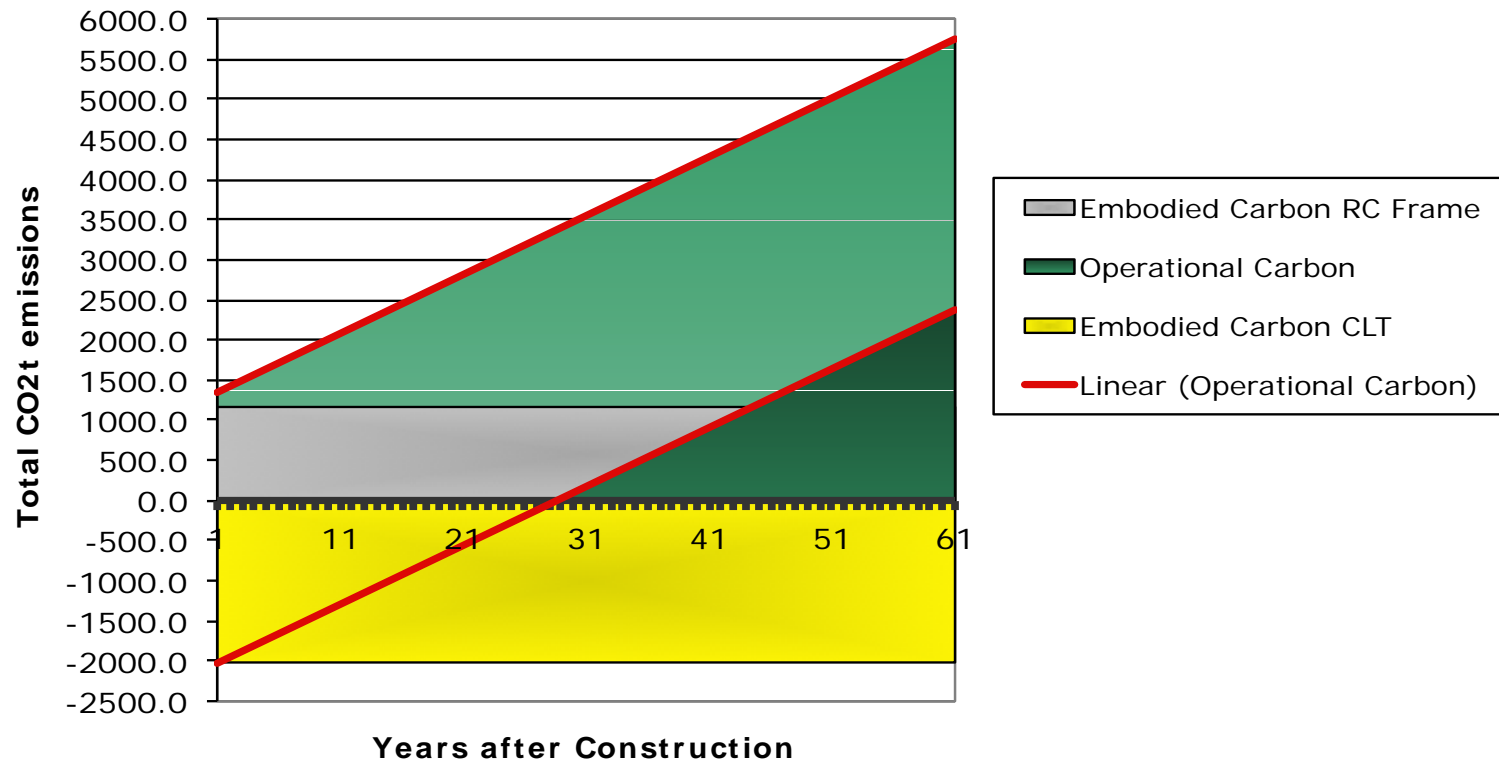
With the operational energy calculated at 73.4 tonnes/year

This is equal to 27 years of 'energy in use' for the 41 dwellings

At 20% renewables this saving is equivalent to 139 years

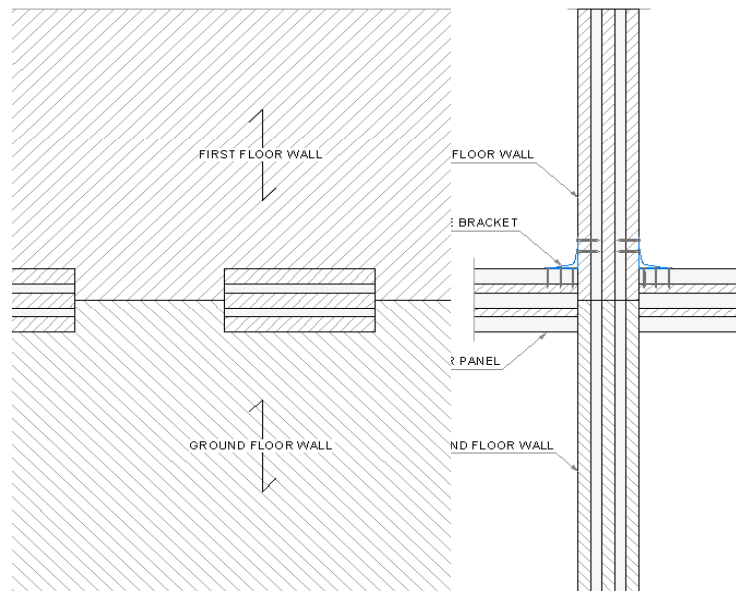
BENEFITS AND POSSIBILITIES WITH CLT

CARBON STORAGE / CARBON REDUCTION



BENEFITS AND POSSIBILITIES WITH CLT

SHRINKAGE



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BENEFITS AND POSSIBILITIES WITH CLT

SHRINKAGE



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BENEFITS AND POSSIBILITIES WITH CLT

SHRINKAGE



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BENEFITS AND POSSIBILITIES WITH CLT

SHRINKAGE



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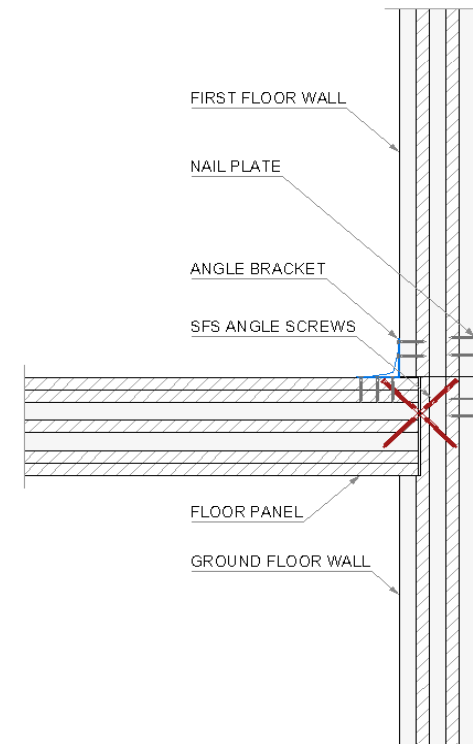
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BENEFITS AND POSSIBILITIES WITH CLT

SHRINKAGE



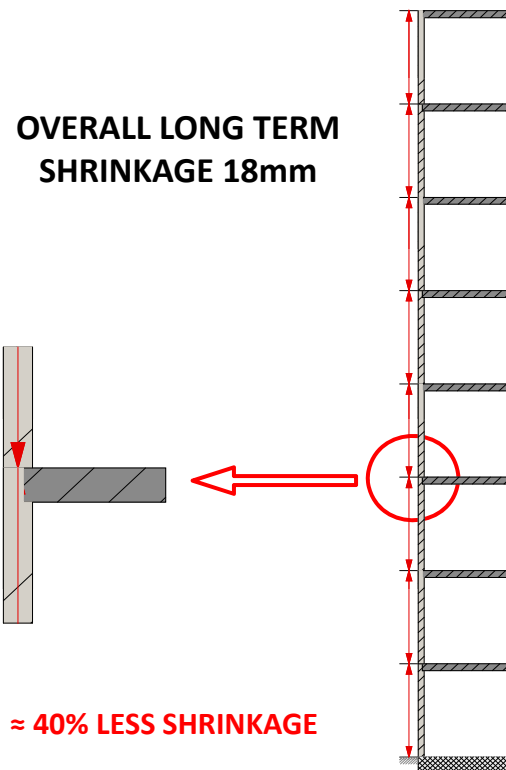
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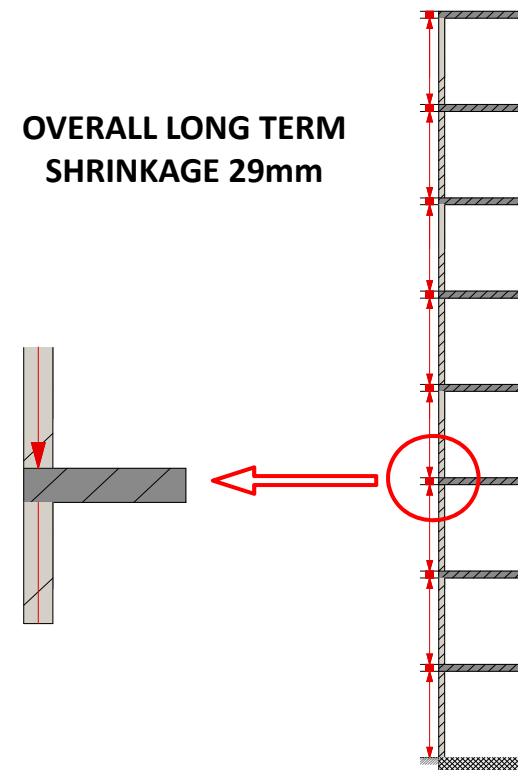
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BENEFITS AND POSSIBILITIES WITH CLT

SHRINKAGE



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BENEFITS AND POSSIBILITIES WITH CLT

INSTALLATION / LOGISTICS



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BENEFITS AND POSSIBILITIES WITH CLT

INSTALLATION / LOGISTICS



Day 30

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BENEFITS AND POSSIBILITIES WITH CLT

INSTALLATION / LOGISTICS



Day 40

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BENEFITS AND POSSIBILITIES WITH CLT

INSTALLATION / LOGISTICS



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MID RISE CLT BUILDINGS

PRESENT AND FUTRE PROJECTS

2013
Kingsgate House



© Horden Cherry Lee Architects

7 STOREY

2014 ???
Coleville Estate



© Karakusevic & Carson

8 STOREY

2016 ???
VTI 2 Building



© Lynch Architects

9 STOREY

???
TWIN TOWERS



© Karakusevic & Carson

16 & 20 STOREY

CONCLUSION

MULTI STOREY RESIDENTIAL CLT BUILDINGS

- Engineered Timber Products opens new markets for timber
- Specially CLT gives new opportunities for the timber industry
- CLT is an attractive alternative to concrete or steel
- 10+ storeys are possible with CLT
- Timber structures are part of the CO₂ reduction strategy
- Solidtimber systems will have an advantage for future recycling
- There is still a lot of potential for the timber industry