

COST Action FP1004

Final Meeting

15 April – 17 April 2015 – Lisbon, Portugal



*Research innovation –
Wood Building Systems for the Future*

*Peter Wilson
Director, the Wood Studio
Institute for Sustainable Construction
Edinburgh Napier University*

***building future towns & cities with wood
is the urban challenge of the 21st century***



why timber cities, why now?



80% of the world's population of eight billion will live in urban situations by 2050

in the next decade some 75 million multiple family housing units will be required in China alone to accommodate the approximately 300 million people expected to migrate into major urban & adjacent suburban areas

international concerns over rapidly accelerating climate change & the scale & nature of extraction processes demands a paradigm shift in the way we conceive & construct buildings & cities

laminated veneered lumber (lvl) at urban scale



the worlds largest urban timber structure



engineered timber allows us to rethink urban design



*placemaking – the relationship between buildings
& spaces provides a big opportunity for wood*



where it began – honeycomb structure



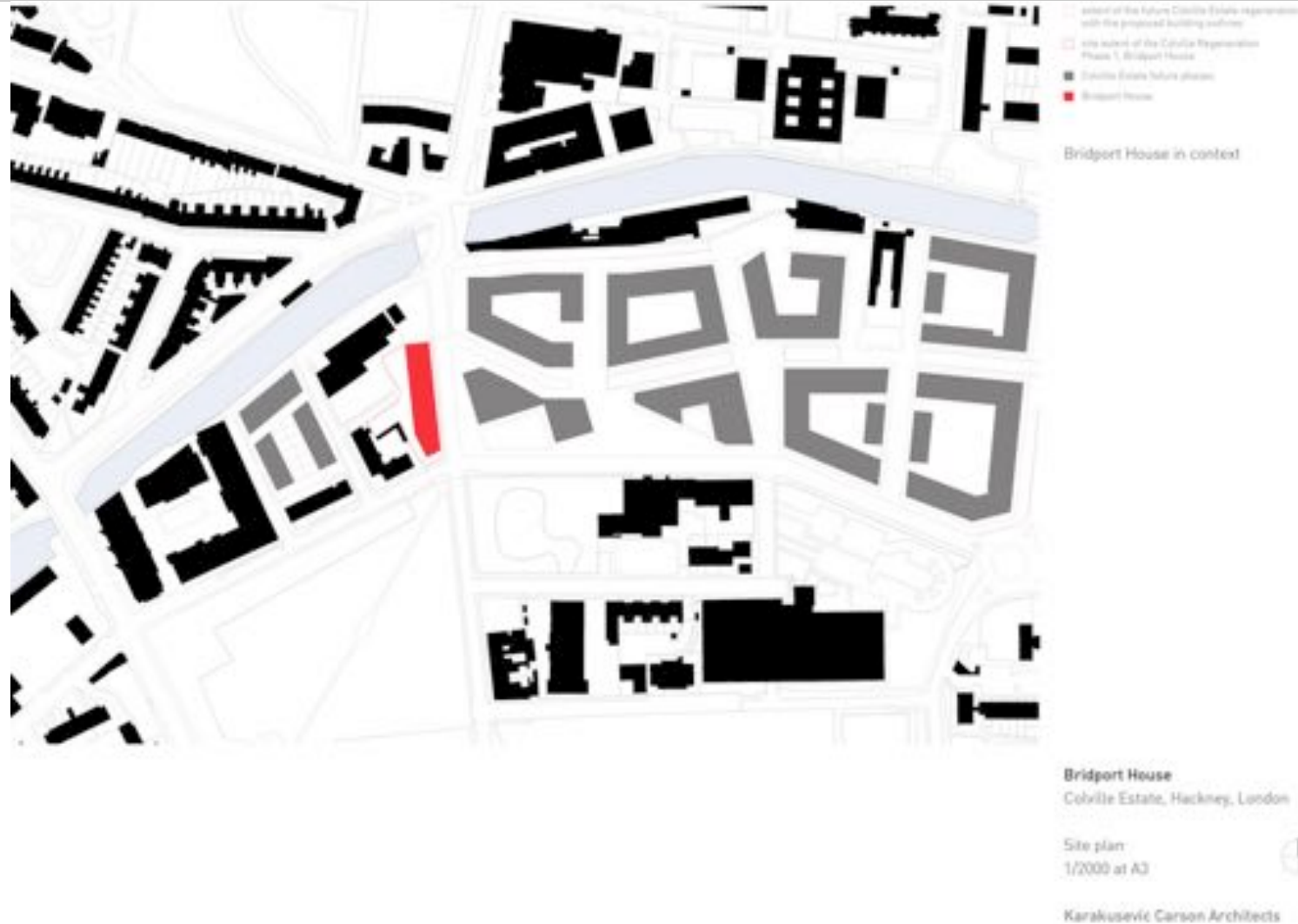
whatmore road – more complex load distribution



large studio spaces



hackney is fast becoming epicentre of CLT



bridport house, hackney

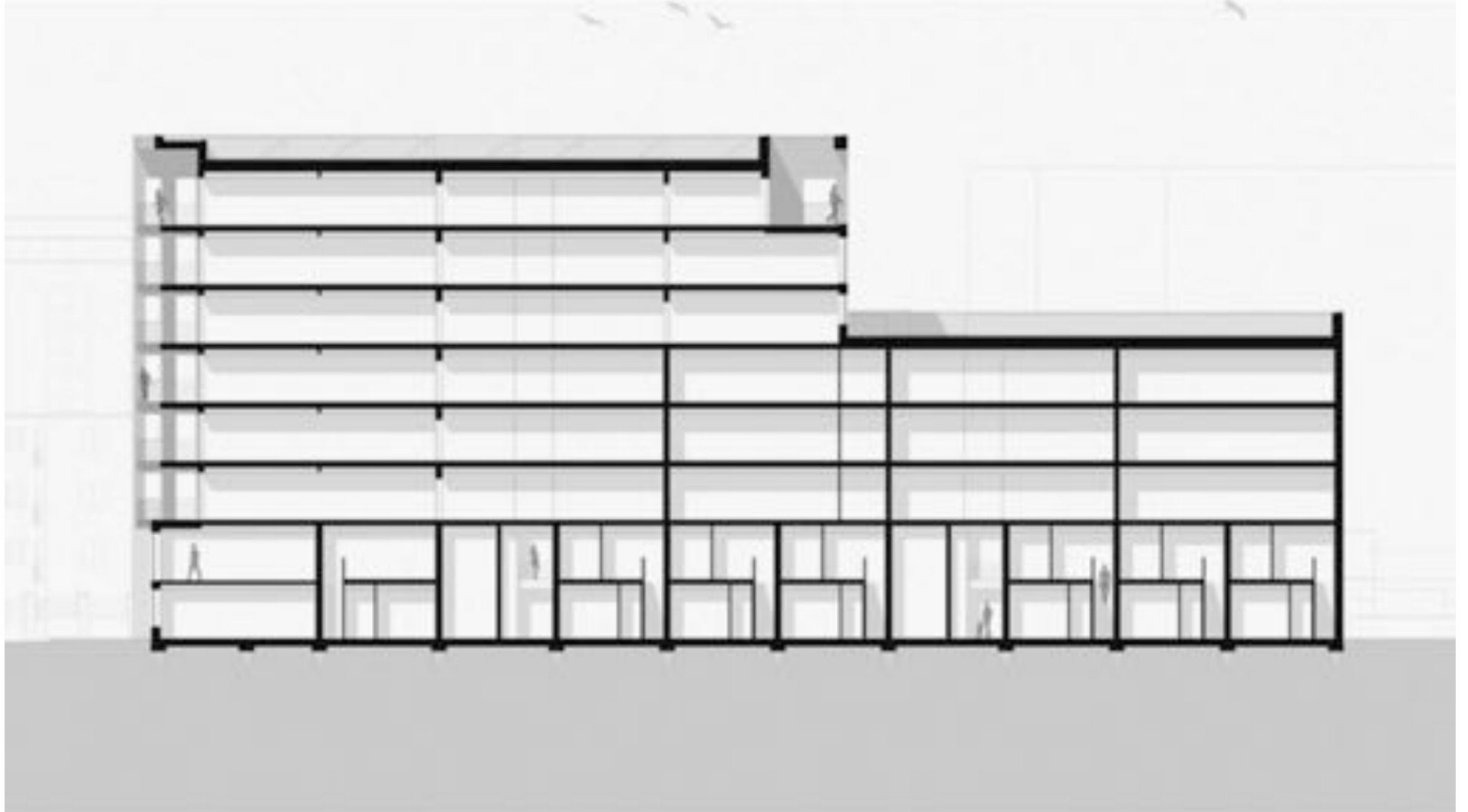


*Karakusevic Carson
Architects*

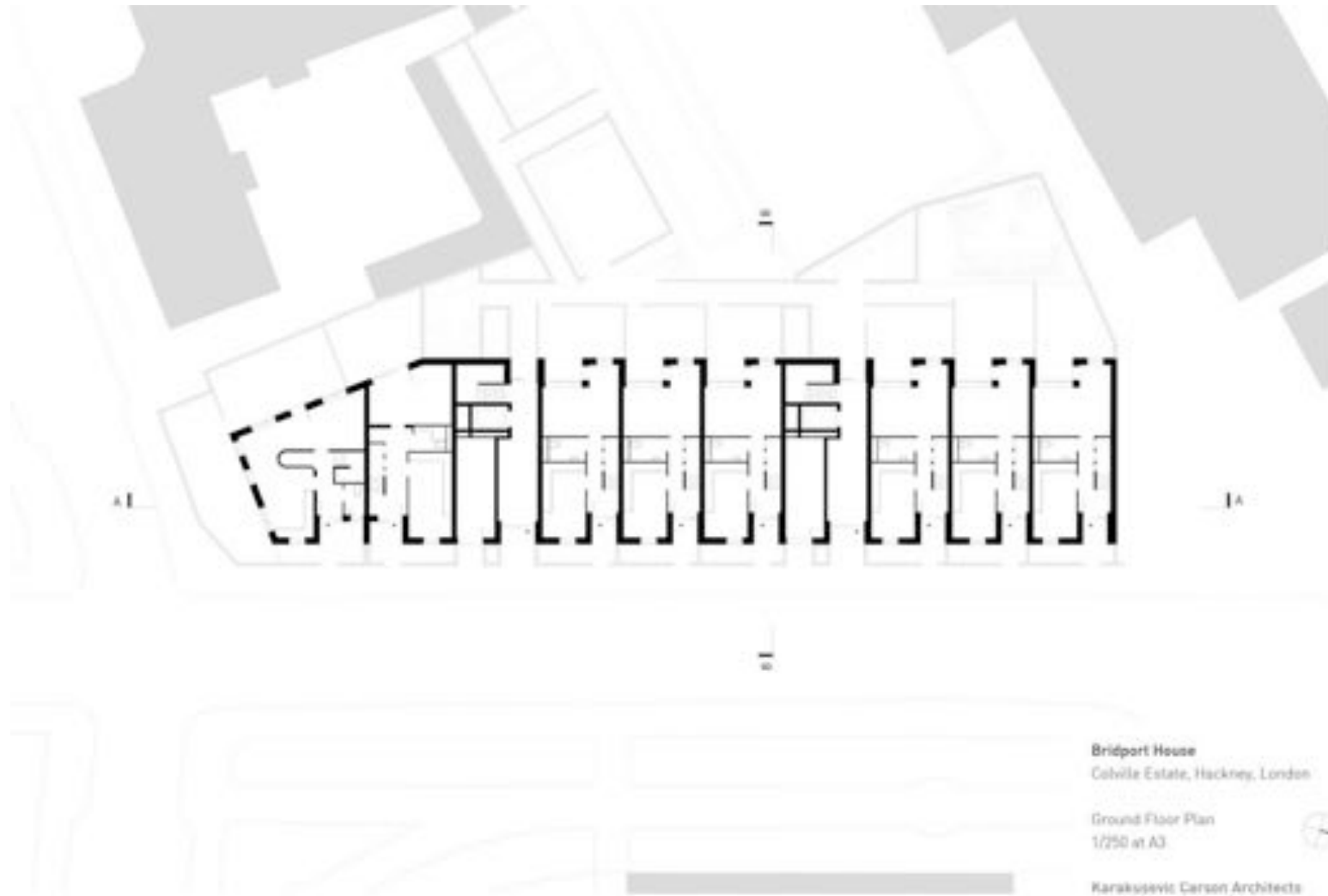
solid timber, brick cladding



simple section – solid timber floor plates



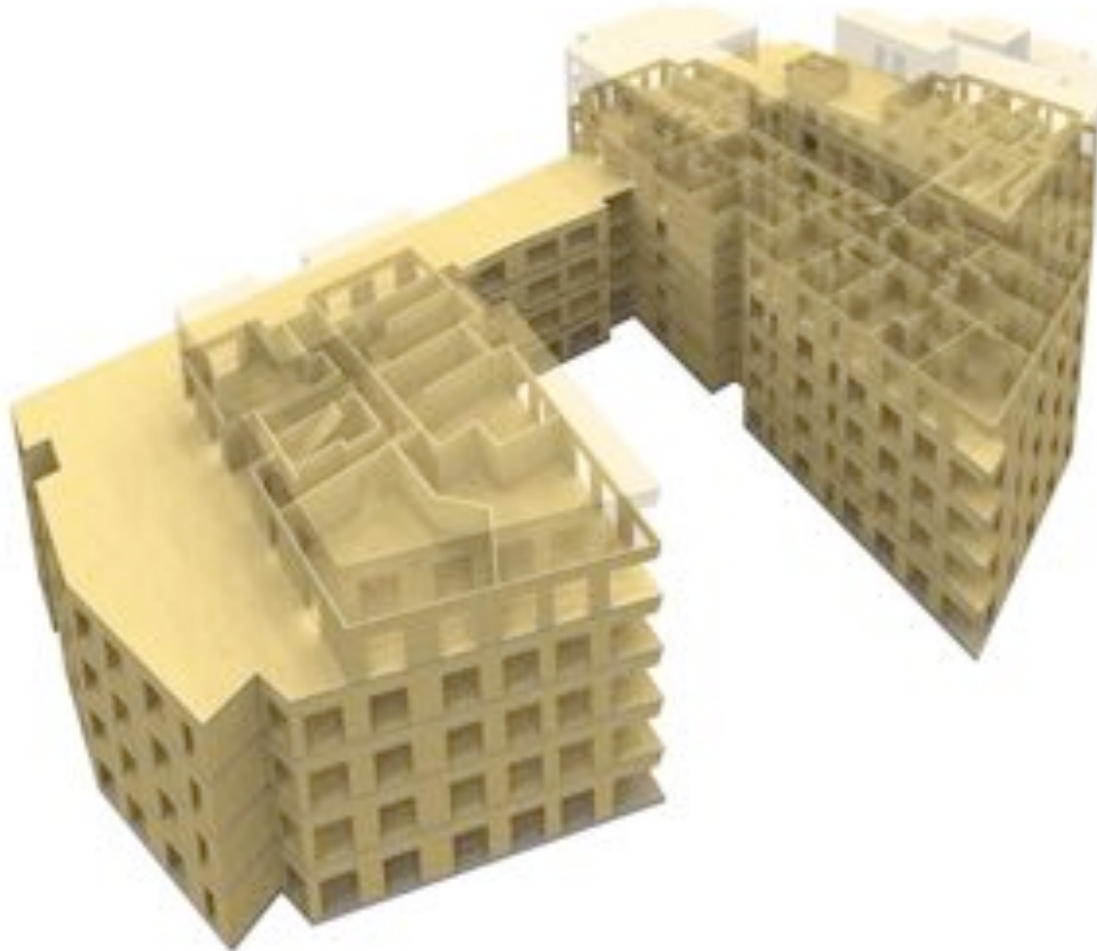
cross wall structure



built over victorian sewers – light foundations

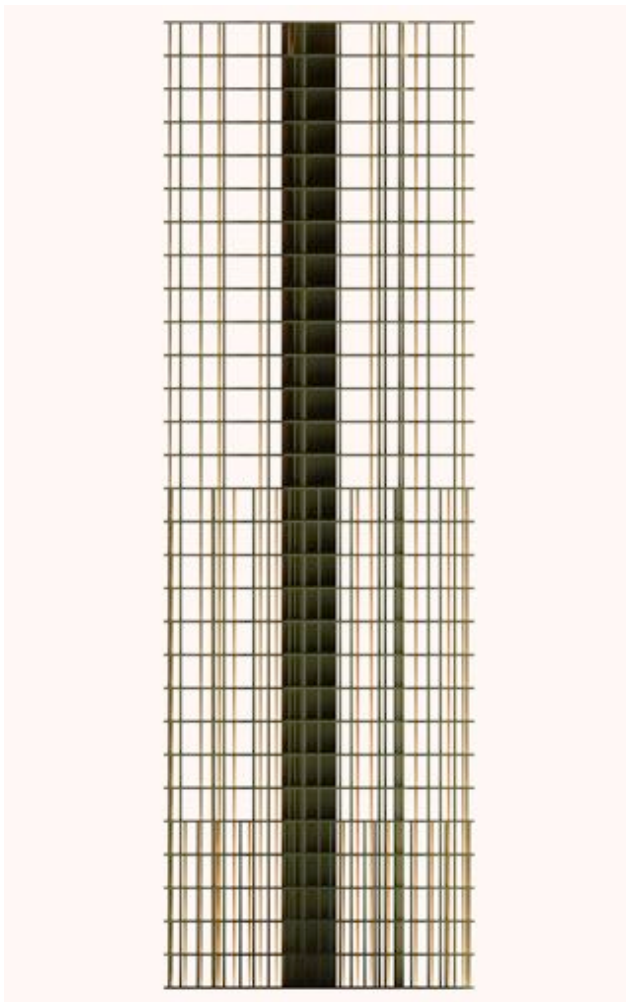


world's largest CLT building starts on site in Hackney



- **10 storeys**
- **16000 m²**
- **3460 m² office space**
- **basement & ground floor of concrete**
- **3852 m³ CLT**
- **building will save 2,400 tonnes of carbon compared to an equivalent block built with a concrete frame**

ever taller timber structures



a rationale for tall timber structures

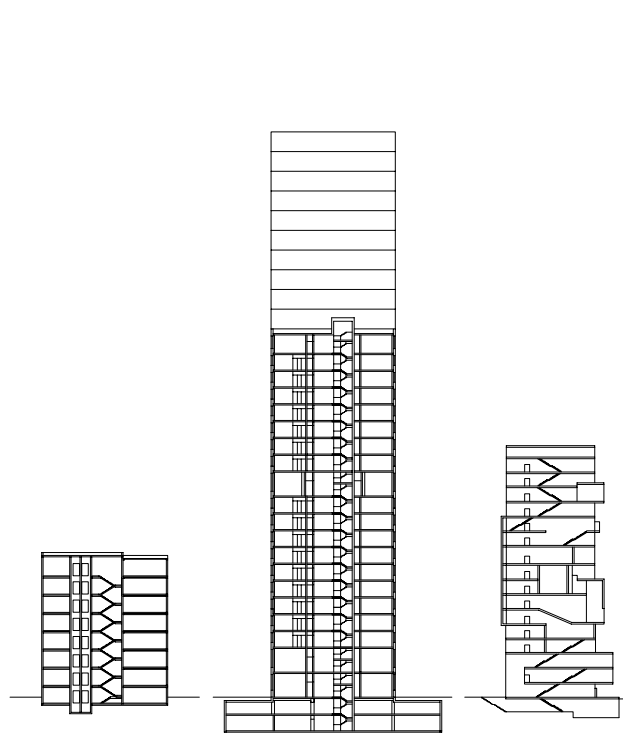


“In British Columbia we grow trees that are 30 storeys tall – why shouldn’t we have timber buildings this high?”

Michael Green, architect



tall wood – michael green architects

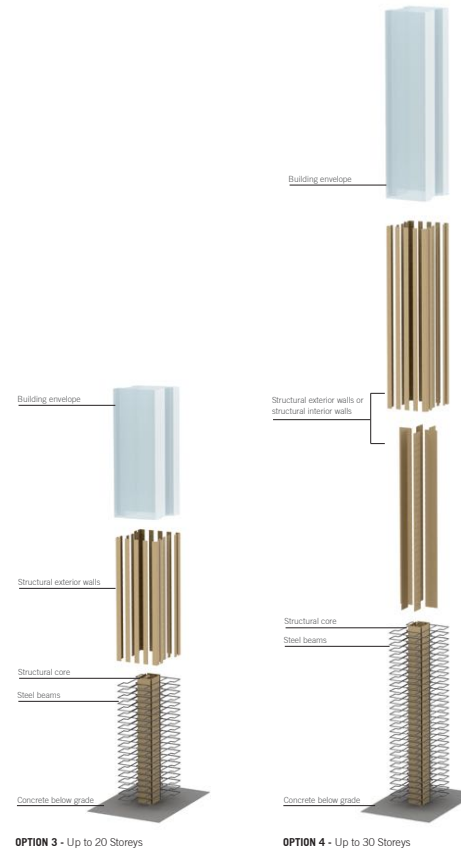


LCT ONE
 Architect: CREE (Creative Renewable Energy and Efficiency),
 Design by Hermann Kaufmann
 Date of completion: Construction Start - Sept. 2011
 Location: Dornbirn, Austria
 Building type: Mixed Use
 Design: 8 storey mixed-use tower
 Structure: Hybrid glulam beams and reinforced concrete slab,
 pre-fab construction

LifeCycle Tower
 Architect: CREE (Creative Renewable Energy and Efficiency)
 Date of completion: Unrealized
 Location: Dornbirn, Austria
 Building type: Mixed Use
 Design: 20-30 storey mixed-use tower
 Structure: Hybrid glulam beams and reinforced concrete slab,
 pre-fab construction

Barentshouse Kirkenes
 Architect: Rosal Fornstad Architects
 Date of completion: 2009 Unrealized
 Location: Kirkenes, Norway
 Building type: Mixed Use
 Design: A centre for cultural and
 innovative interchange between Russia and
 Norway
 Design: 16-17 Storey
 Structure: Wood / N/A

THE CASE FOR Tall Wood BUILDINGS 1.2 | 29



OPTION 3 - Up to 20 Storeys

OPTION 4 - Up to 30 Storeys

THE CASE FOR Tall Wood BUILDINGS 3.4 | 65

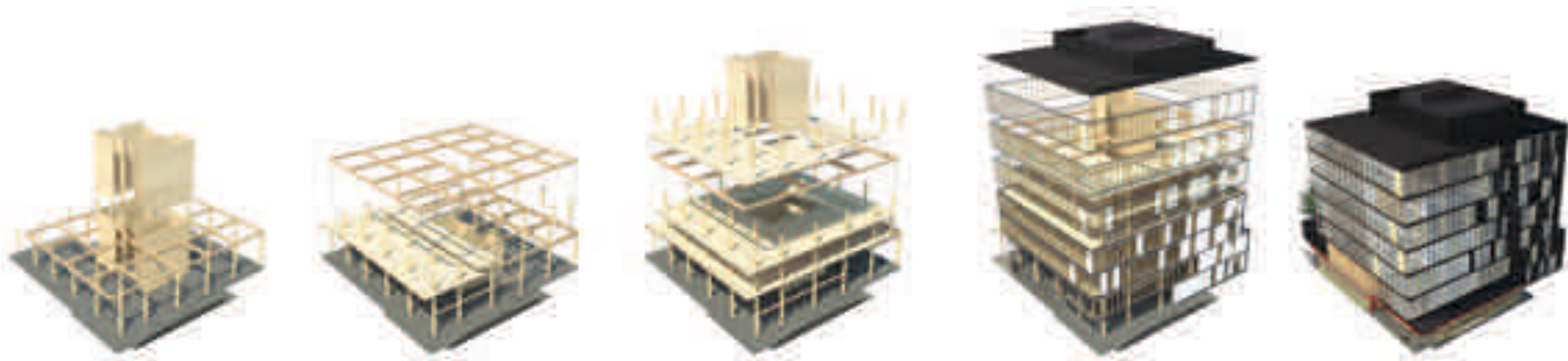
30 storey tower proposed for Vancouver



Wood Innovation Design Centre, Prince George, BC



timber hybrid - timber frame and solid clt panels



service integration & acoustic separation *BIM*



*currently the tallest
timber building in north america*



***some engineers are beginning to rethink
their use of traditional technologies***



***Dewitt Chestnut Apartments, Chicago
by SOM, 1966 –
42 storey steel frame structure***

to develop hybrid solutions using mass timber elements - 'the concrete joined timber frame'



ho-ho tower – 30 storeys proposed for Vienna



34 storey tower planned for Vasterbroplan, Stockholm 2023



concrete core, exposed timber surfaces



energy systems & external spaces now considered



Treet, Bergen



vertical truss and prefabricated modules



components delivered by ship



sketches for tall urban areas



the vertical timber city



***innovation requires new ideas
to be demonstrated & tested***



“before the invention of the internal combustion engine, if you asked people what improvements they wanted in transportation, they would probably have replied - a faster horse”

Henry Ford

every new technology takes time to mature



The metal and glass structure of the Crystal Palace in the Great Exhibition of 1851 was a technological breakthrough, but still mimicked the details of stone construction

exhibitions provide opportunities for innovation



French pavilion, Milan Expo 2015



x-tu architects



parametric modelling



prefabrication of many unique elements



precision & rapid erection & dismantling required





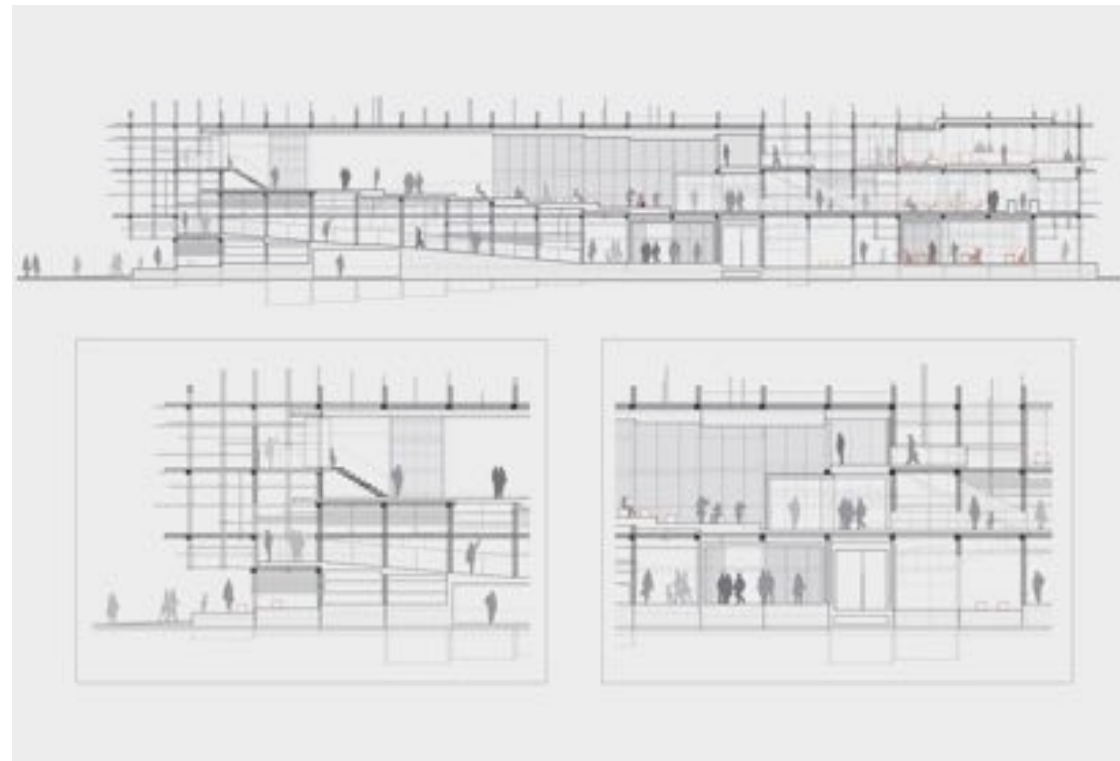
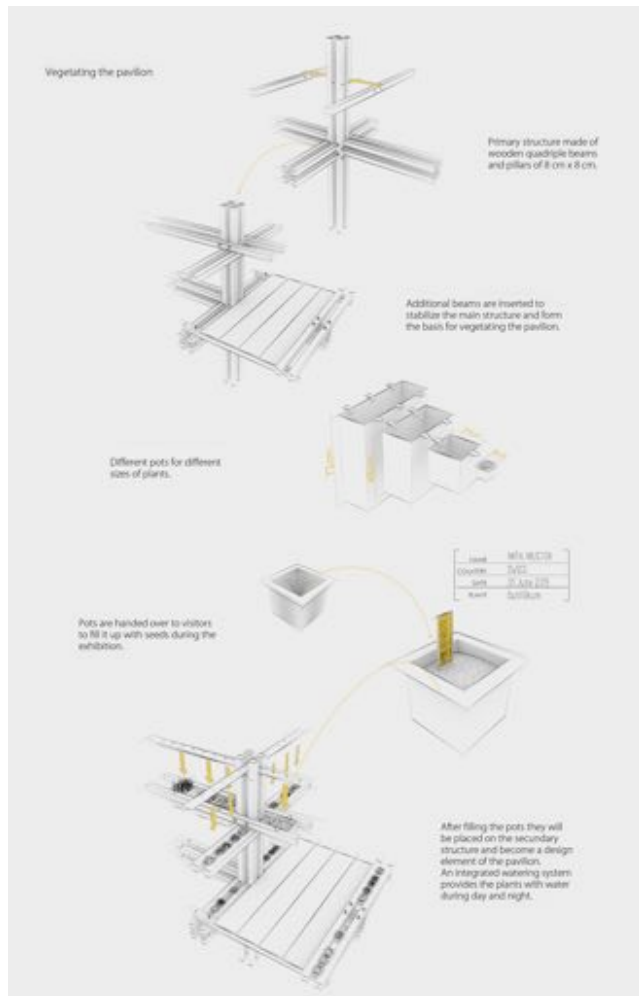
Austrian Pavilion. Milan Expo 2015





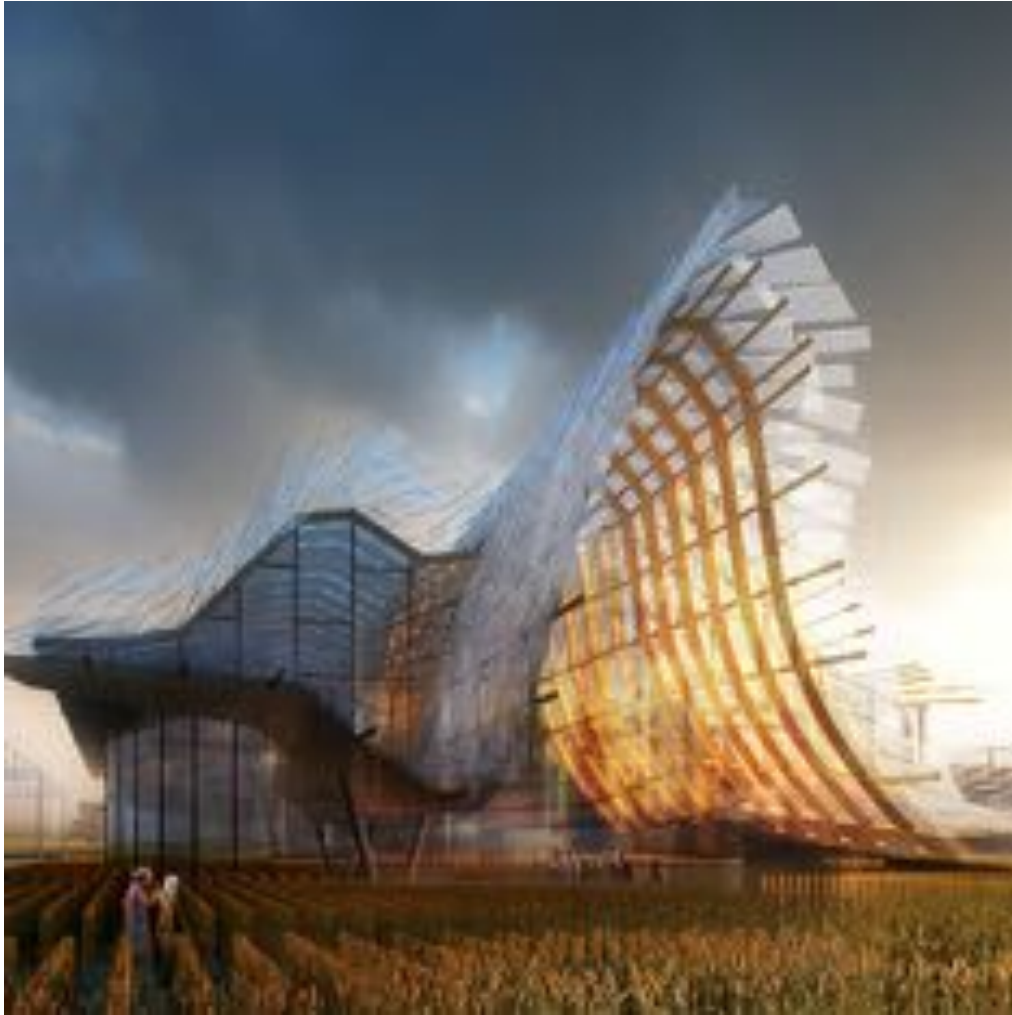








Chinese Pavilion, Milan 2015









centre culturel et touristique du vin, bordeaux



auditorium



architecture/engineering, wine & civilisation



the spaces between buildings – connecting tissue



modified wood provides new possibilities



*engineered potential of modified wood
needs more research & development*



complex engineering – at micro scale





hardwood CLT – challenging connections



energy considerations - negative carbon buildings



solid timber, hygroscopic buildings



autarkic buildings and communities – energy self sufficiency



so much research, so much testing still to do



- ***Academia should be leading on innovation – who else will do it?***
- ***Too much research operates in a vacuum – research without dissemination is arcane***
- ***We need to bring different disciplines together in joint research – fire engineering, energy, acoustics/sound, harmonised design procedures, CLT strength classes, moisture, etc***
- ***We need to rethink r&d alliances to make most effective use of available funds***
- ***We know what the research challenges are – let' stop re-designing the wheel and get on with the big questions***



“Work as if you are living in the first days of a better nation”

attributed to Alasdair Gray



***today, as engineers, work as if you are living in
the first day of a better (timber) world –
it's yours to make happen – so let's do it.***