

# WOOD – CARBON, HEALTH AND THE CIRCULAR ECONOMY







Established in 1992, we are an Australian not-for-profit and leading environmental behaviour change organisation.

Our mission is to unite government, businesses, schools and individuals through positive environmental actions.

## OUR PURPOSE

Protect the planet's ability to thrive by engaging with businesses, government, schools and the community.

Work with, not against businesses to improve their environmental impact.

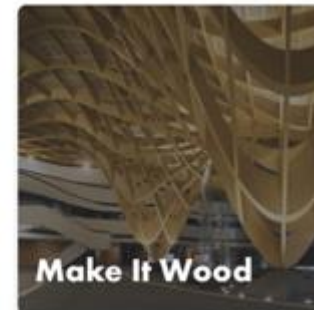
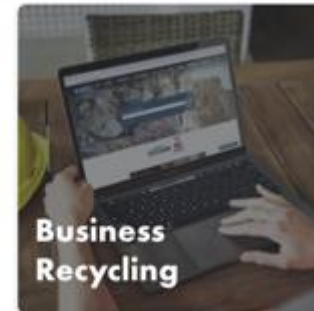
Motivate and assist people to make simple changes to their attitudes and actions.







Positive environmental actions, for everyone.



# NATIONAL TREE DAY

As part of the National Tree Day program over 4 million Australians have planted almost 26 million trees since 1996.

Being in nature is also good for your health and wellbeing. Having a dedicated day to plant a tree (or more) gets us all out and into our beautiful landscapes.





# CARTRIDGES 4 PLANET ARK

The Cartridges 4 Planet Ark (C4PA) program provides an accessible way for the public and workplaces, including schools and councils, to recycle their used printer cartridges.

The program is constantly finding innovative ways to turn old cartridges into new products (e.g. asphalt mix containing recycled printer toner)

Since 2003 the program has recycled over 50 million cartridges.



Planet Ark Power focuses on large-scale urban solar installations on buildings such as warehouses, businesses and schools.

This means the energy is generated right where it is needed and, with the help of *eleXsys* technology, any surplus energy can be exported into the electricity grid.



Ikea Adelaide's 1.2 MW rooftop solar array will be coupled with a 700 kW carpark and 3.45 MWh battery.



# MAKE IT WOOD

The *Make It Wood* campaign aims to increase the use of responsibly sourced (certified) wood as a building material

Provide trusted, credible, research-based advocacy for the timber industry

Commenced in October 2011



*25 King, Brisbane, Qld*





# ENVIRONMENTAL IMPACT OF BUILDING AND CONSTRUCTION

The global building and construction sector accounts for:

- 42 per cent of total energy consumption
- 39 per cent of total CO<sub>2</sub> emissions
- 50 per cent of extracted materials
- 30 per cent of water consumption





# FORESTRY IN AUSTRALIA

Total forested area of **134 million Ha** (17%)

Available multiple-use public native forest = **5.0 million Ha** (3.7%)

Of every 10,000 trees grown, 4 are harvested

Plantation = **2 million Ha** (1.5%) and provides over 87 per cent of total wood production

Plantation commenced in the 1960s as part of government investment in nation building

NB. Plantations were always intended to *complement*, not *replace* existing native forest



# WOOD IS RENEWABLE

Ecological Footprinting:

*‘Living on nature’s interest, not its capital.’*

A typical Aussie frame and truss home uses about 12 cubic metres of radiata pine. This can be regrown in Australian plantations in approx. two and half minutes

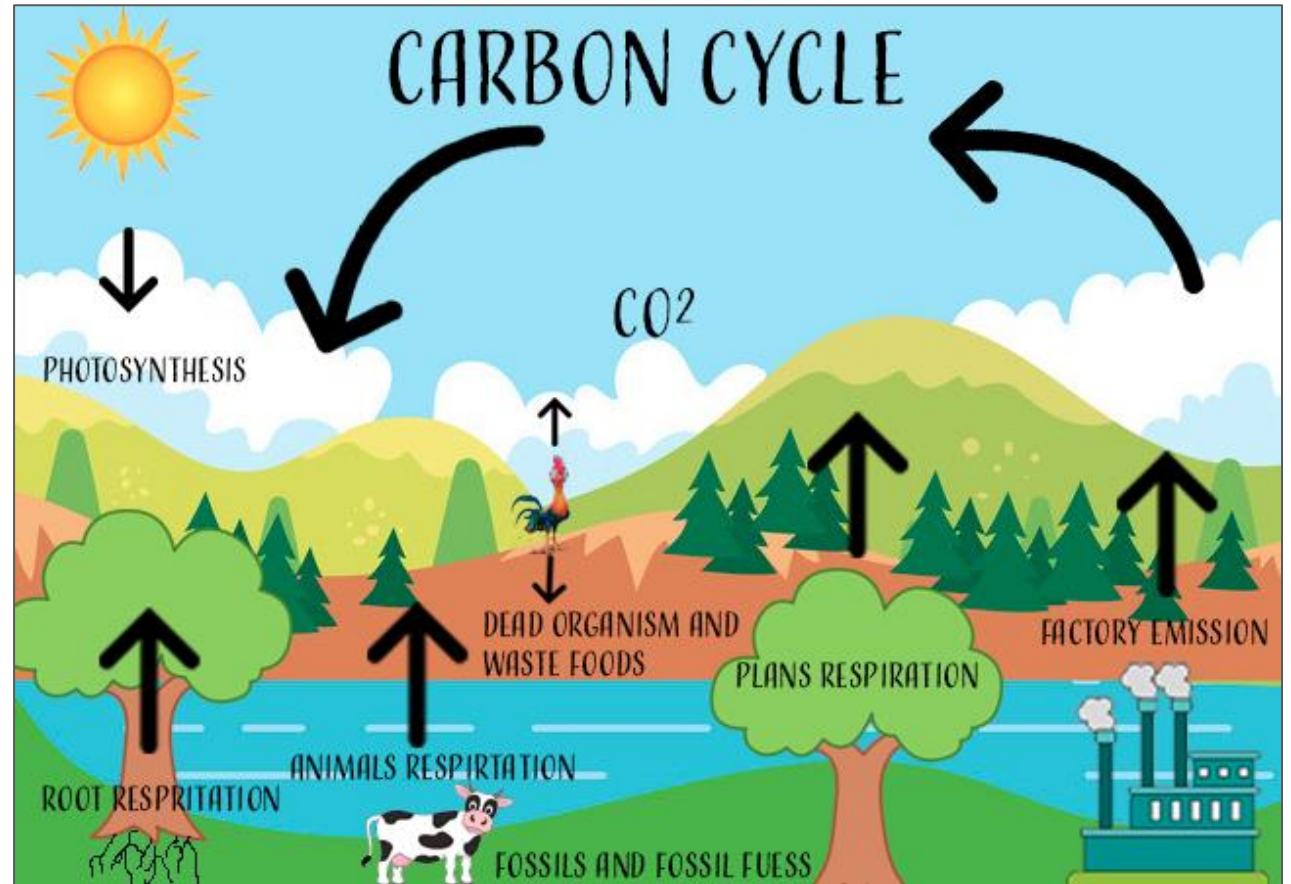




# WOOD STORES CARBON

Trees sequester  $\text{CO}_2$  – ‘*atmospheric carbon*’ – through the process of photosynthesis and store the carbon – ‘*biogenic carbon*’ – in wood-based products.

Approximately half of the dry weight of wood is biogenic carbon, which is stored for as long as the building exists.



# WOOD STORES CARBON

The same frame and truss home (12 cubic metres) will store approx. **2.8 tonnes of biogenic carbon**, which is equivalent to approx. **10 tonnes of CO<sub>2</sub>** that has been sequestered during the growth phase

(Ratio of atomic mass of CO<sub>2</sub> to carbon is  $44/12 = 3.67$ )





# WOOD STORES CARBON

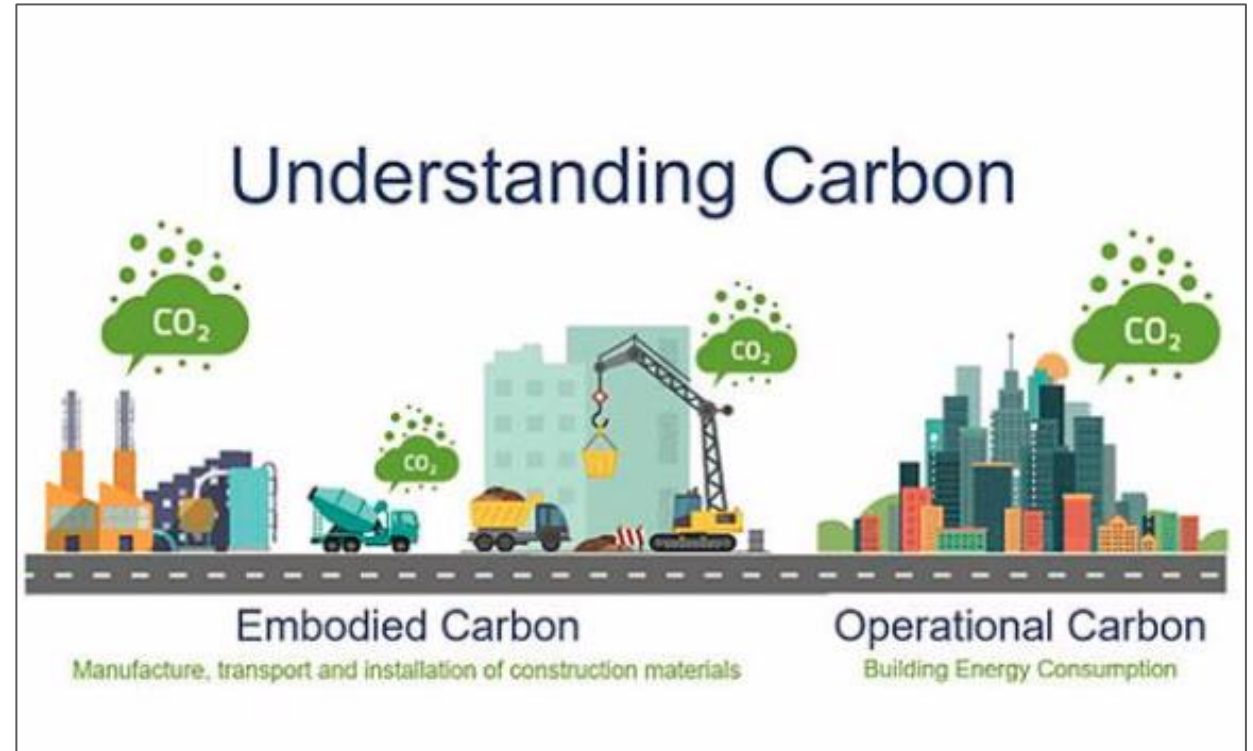
The Urnes Stave Church in Norway.  
Storing biogenic carbon since 1130  
(Nearly 900 years!)



# WOOD HAS LOW EMBODIED CARBON

Embodied carbon is the total impact of all greenhouse gas emissions from a building material during its life cycle

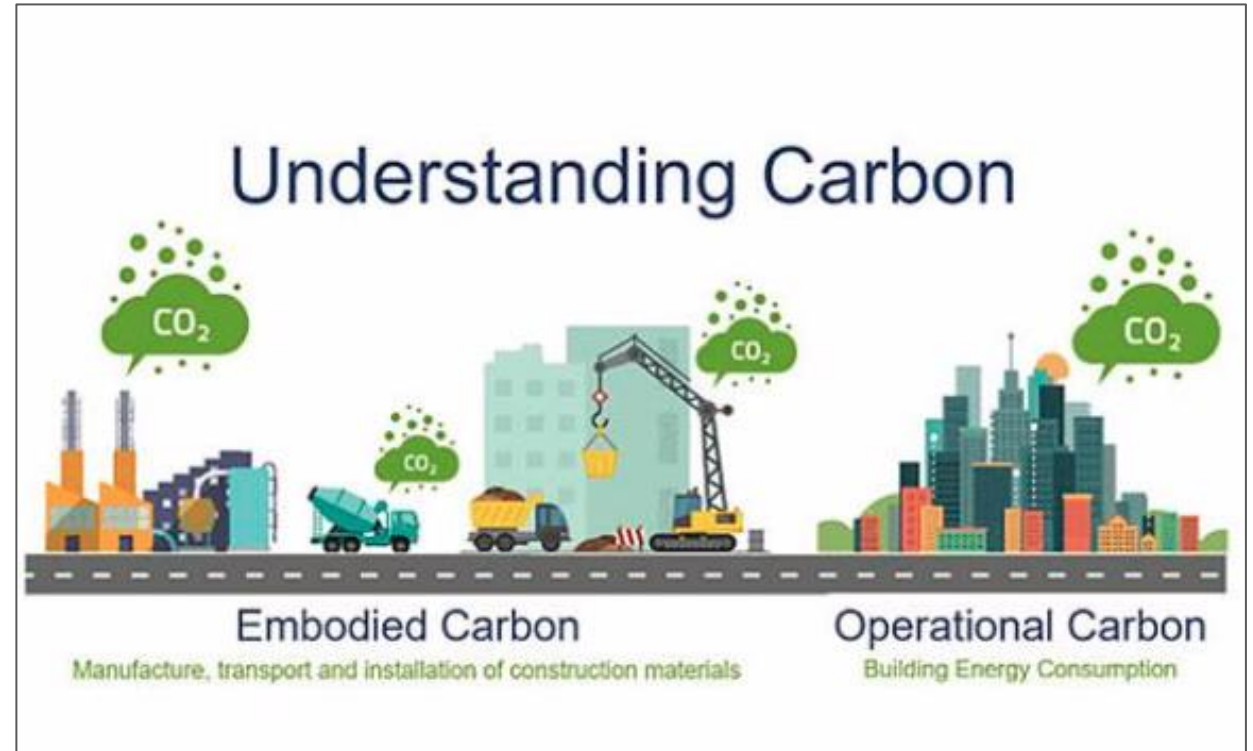
Timber consumes minimal energy in its production, so it can be used as a low-emission substitute for materials that require larger amounts of fossil fuels to be produced, such as concrete and steel





# WOOD HAS LOW EMBODIED CARBON

A report released in December 2021 by the Clean Energy Finance Corporation found that the use of timber in commercial or multi-residential buildings could reduce embodied carbon by up to 75 per cent when compared to similar buildings using traditional concrete and steel



# WOOD HAS LOW EMBODIED CARBON

Extract from LCA completed on  
International House Sydney:

*GWP (kg CO<sub>2</sub>-e) reduced by 56.4%*

*“The overall improvement between the Reference Case and the Design Case is due to the material substitution of CLT and Glulam for traditional concrete and steel construction...”*



International House Sydney

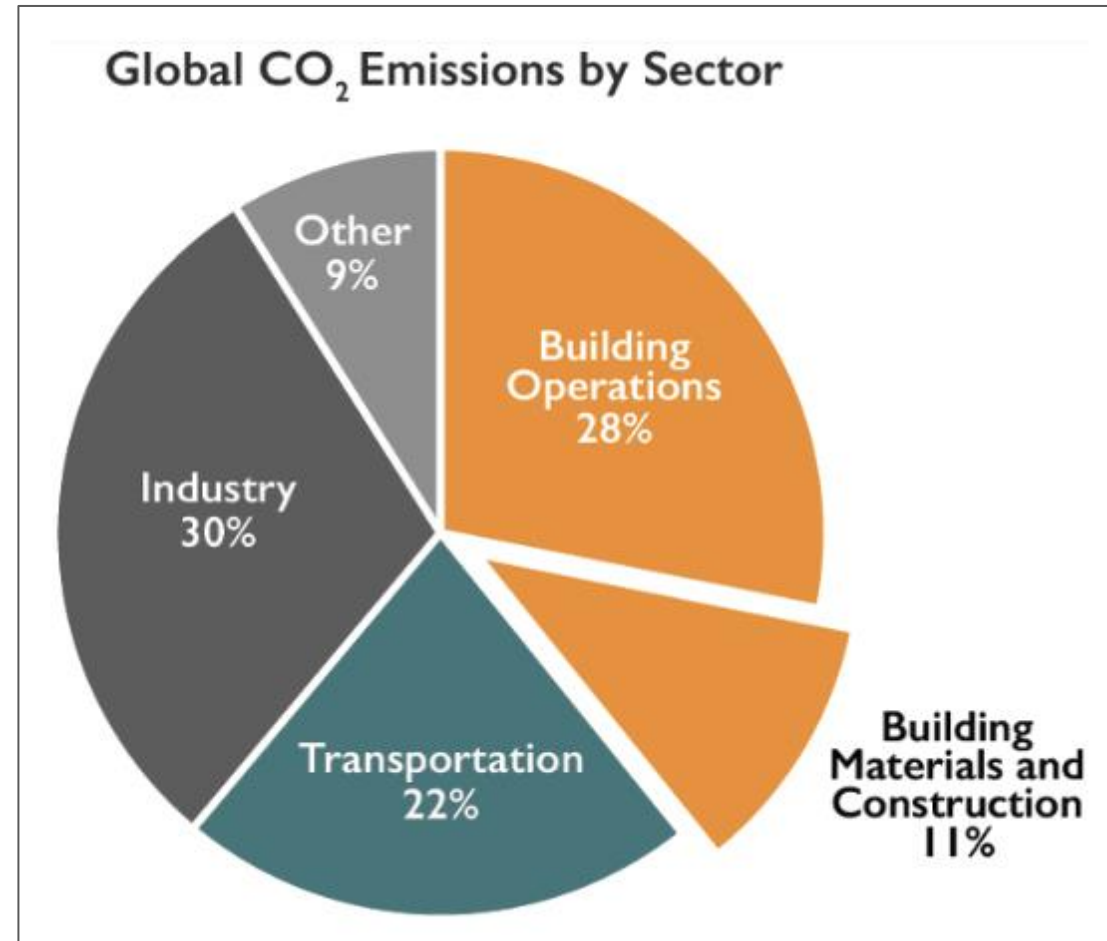




# WOOD HAS LOW EMBODIED CARBON

*“Given the scale of new construction planned globally and the lack of market-ready at-scale decarbonisation strategies for construction material production, embodied carbon could increase relative to many other major contributors like industry, transportation, and building operations.”*

One solution: use more mass timber!



Source: UN Environment Global Status Report 2017



# WOOD CAN BE – AND IS – SOURCED RESPONSIBLY

Certification ensures that wood comes from legally harvested and well managed forests and plantations

This ensures that when a tree is harvested another is planted in its place







**GLOBALLY, WE USE MORE THAN 100 BILLION  
TONNES OF RAW MATERIALS EVERY YEAR**

**THAT'S 13.3 TONNES/PERSON!**

**ONLY 8.6% OF THIS IS REUSED. THE REST IS WASTED**







**EVERY AUSTRALIAN  
=  
2.7 TONNES WASTE PER YEAR**



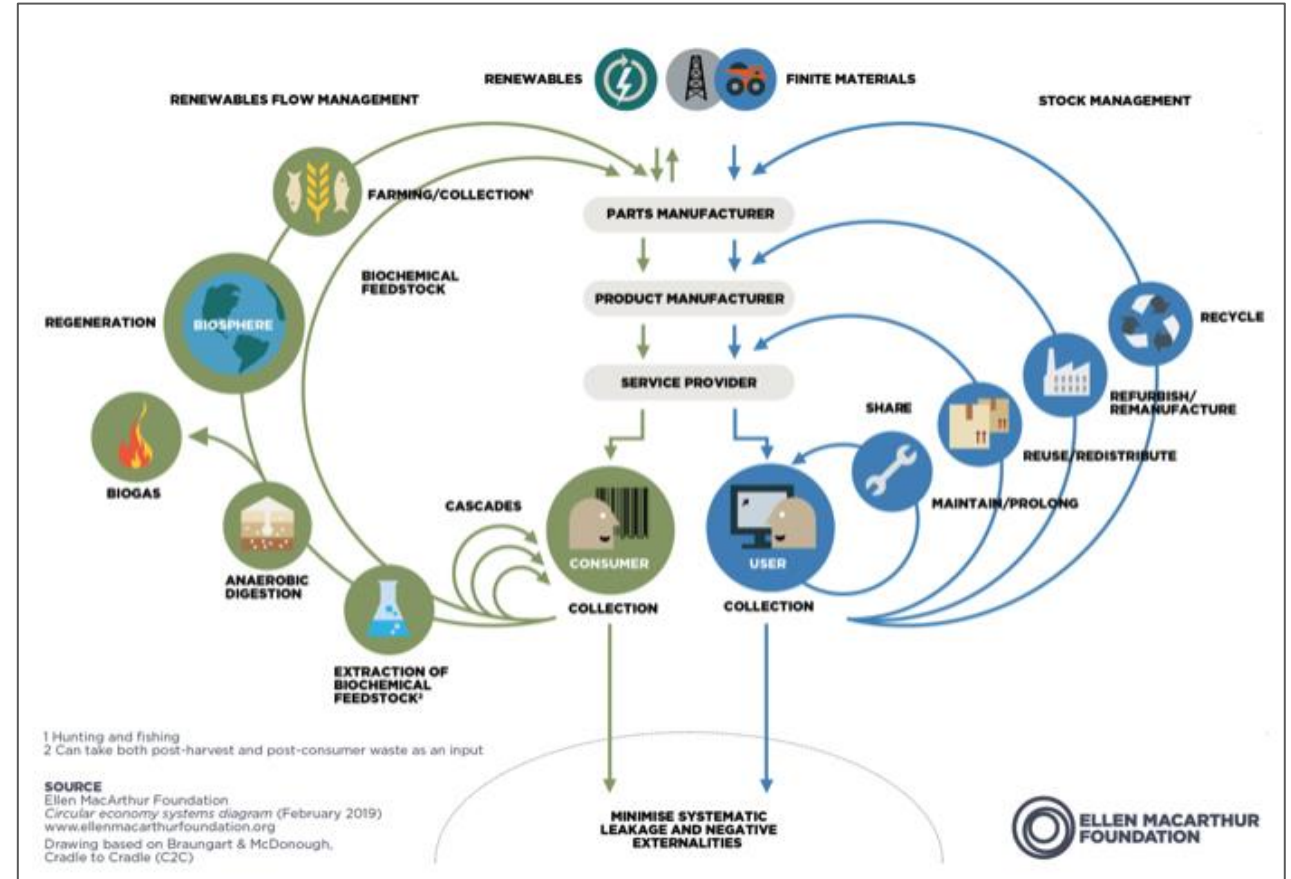
Source: National Waste Policy 2019





# THREE PRINCIPLES OF THE CIRCULAR ECONOMY

1. **Design out waste and pollution** to reduce GHG emissions across the value chain
2. **Keep products and materials in use** to retain embodied carbon in products and materials
3. **Regenerate natural systems** to sequester carbon in soil and products (e.g. wood buildings)

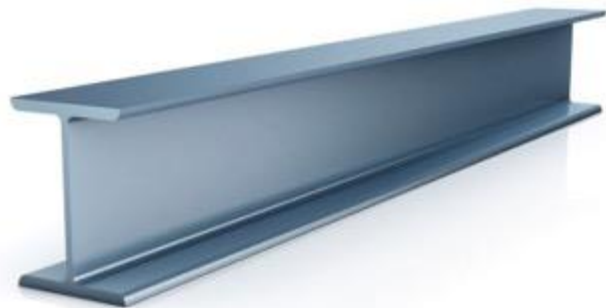


## Technical Nutrients

Generally sourced from finite resources  
that are extracted from the earth

E.g. Metal ores to make steel or oil to  
make plastics

Must be maintained as long as possible  
to reduce impact on finite resources





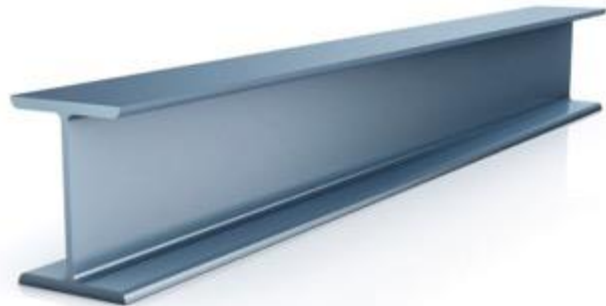
# WOOD IN THE CIRCULAR ECONOMY

## Technical Nutrients

Generally sourced from finite resources that are extracted from the earth

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## Biological Nutrients

Generally sourced from renewable resources such as plants or algae

Timber is a biological nutrient and follows the biological/carbon cycle

**Timber is inherently circular!**



# AMSTERDAM HAS ADOPTED THE CIRCULAR ECONOMY TO GUIDE POLICY DECISIONS





# WOOD IS GOOD FOR HEALTH AND WELLBING

Planet Ark report: *'Wood – Nature Inspired Design'*

Outlines the importance of connecting buildings with the natural world

Shows a positive effect on our health and wellbeing

\* Available at [MakeItWood.org](http://MakeItWood.org)



\* Planet Ark report, March 2017



# A DISCONNECT WITH NATURE

Increasing urbanisation rates have caused a disconnect with nature

We now spend over 90 per cent of our time immersed in man-made environments

Corresponds with reports of increasing levels of obesity and mental health issues





# WHAT IS BIOPHILIC DESIGN?

**Biophilia** is the 'love of life' - our innate human need to connect with nature, resulting in improved health and wellbeing

**Biophilic design** is focused on enabling a human connection to nature in the built environment

Mimics the effect of time spent in nature



*OLA CP School, North Strathfield, NSW*



# RESTORATION THEORY

**Restoration:** *“A process of renewal that replenishes a depleted social, psychological or physical resource”*

Our resources can be depleted by the effort to adapt to man-made environments (e.g. building interior)



Kambri Precinct, ANU, Canberra





# ATTENTION RESTORATION THEORY

We need to be able to replenish our ability to maintain attention, particularly in spaces where high levels of attention are required

(e.g. offices, schools, hospitals, universities)



*JSRASC Senior Learning Centre, Mirrabooka, WA*



# PSYCHO-PHYSIOLOGICAL STRESS RECOVERY THEORY

Natural environments, even views of nature from within a building, will aid recovery from both psychological and physical stress (e.g. recovery from an operation)



*Tempe House, NSW*





## REDUCED STRESS RESPONSE

Empirical evidence of positive physiological effects – lowering of blood pressure and heart rate

Decreasing stress at school by incorporating natural wood in classrooms can have a significant and long-lasting positive impact



*JSRACS Kindergarten, Perth WA*



# INCREASED PRODUCTIVITY AND REDUCED ABSENTEEISM

Office environments shown to have an effect on occupational health

High correlation between the use of wood in office buildings and increased productivity and reduced absenteeism

\* Pollinate report available at [MakeltWood.org](http://MakeltWood.org)



*Fitzpatrick + Partners Offices, Sydney, NSW*





# WHAT IS ENGINEERED TIMBER?

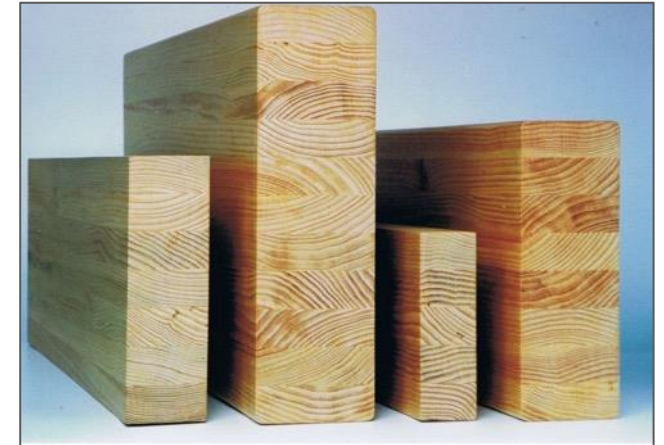
Cross Laminated Timber (CLT)



Laminated Veneer Lumber (LVL)



Glulam





# INSPIRING PROJECTS

Credit Valley Hospital  
Toronto, Canada  
2004

*“We wanted to bring the lines of nature into the built form. When people walk into the building, they feel as if they are part of something, there is a deep-rooted connection.”*



Image courtesy of Tye Farrow & Partners





## INSPIRING PROJECTS

Bainbridge Island House  
Bainbridge Island, WA  
2017

*“The home’s interiors are an ode to nature, featuring a palette of natural materials and a Feng Shui-compliant layout.”*



# INSPIRING PROJECTS

Our Lady of the Assumption Catholic  
Primary School  
North Strathfield, NSW  
2017

*“It’s a very different type of space to traditional schools. We had a big focus on the use of timber and natural materials.”*



Image courtesy of BVN





# INSPIRING PROJECTS

ANU Kambri Precinct  
Canberra, ACT  
2019

*“This precinct is innovation rich. It incorporates a mass timber 450-bed student accommodation and 5-storey collaborative teaching building.”*



Image courtesy of BVN



# INSPIRING PROJECTS

Marrickville Library  
Marrickville, NSW  
2020

*“The use of timber creates a space which is welcoming, warm and homely, creating a building that the community enjoys and wants to occupy.”*



Image courtesy of BVN





# INSPIRING PROJECTS

Atlassian Building  
Haymarket, NSW  
Due for completion in 2025

*“Comprising mass timber and a facade of glass and steel, the building will feature a staggered outdoor garden as well as self-shading to control temperatures.”*



Images courtesy of SHoP and BVN



## INSPIRING PROJECTS

Forest Green Rovers Stadium  
Nailsworth, UK  
(Planning permission now granted)

*“The world’s first football stadium made almost entirely out of wood. Designed by Zaha Hadid Architects, the 5,000-capacity ‘Eco Park’ is set to be the greenest football stadium in the world.”*



*Image courtesy of Zaha Hadid Architects*





# INSPIRING PROJECTS

Maggie's Oldham  
Manchester, UK

*“The use of wood at Maggie’s Oldham is part of a bigger design intention to reverse the norms of hospital architecture... In wood there is hope, humanity, scale and warmth.”*

Architect Alex de Rijke



Image courtesy of dRMM Architects







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