



Reducing Embodied Carbon with Wood: Why and How

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Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board. The opinions expressed herein are those of Aurimas Bukauskas (Aocene Consulting LLC), not RMI.

Why?

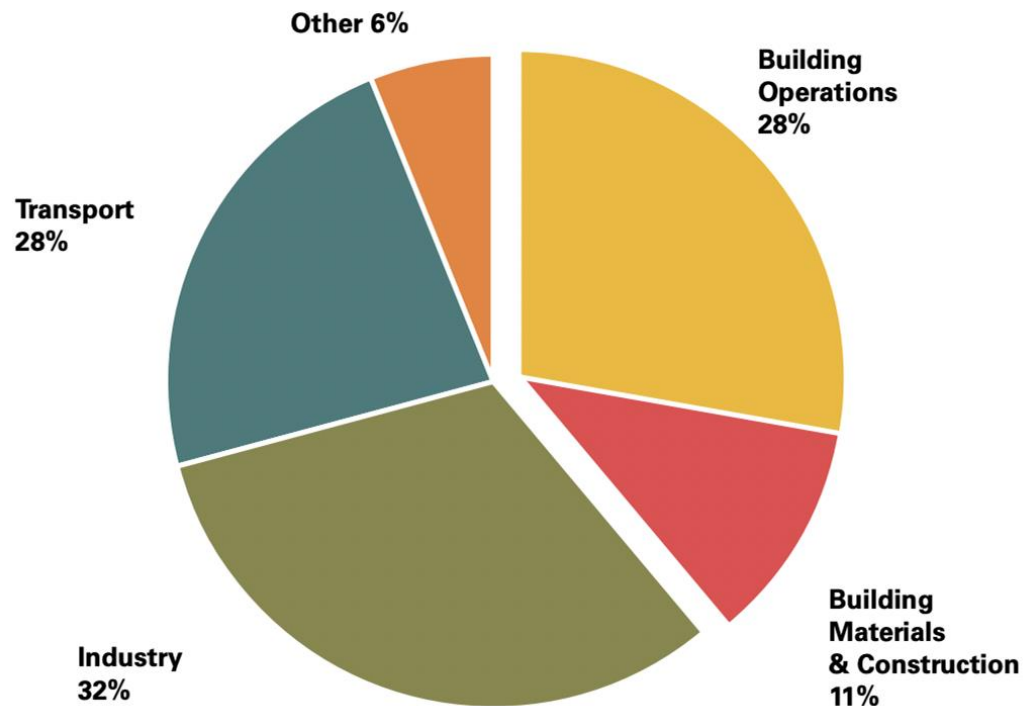
**Why should I care about embodied carbon
as a built environment professional?**

An aerial night view of a densely packed urban landscape, likely Hong Kong, showing a vast number of high-rise buildings illuminated with various lights. The text "2x in 30 Years" is overlaid in the center.

2x in 30 Years

An aerial photograph of Central Park in New York City, showing the dense urban landscape surrounding the park. The park's green spaces, including several baseball fields and a large lake, are visible in the foreground and middle ground. The background is filled with the dense skyline of Manhattan, with numerous skyscrapers and buildings. The text "1 NYC per month" is overlaid in white, bold, sans-serif font across the center of the image.

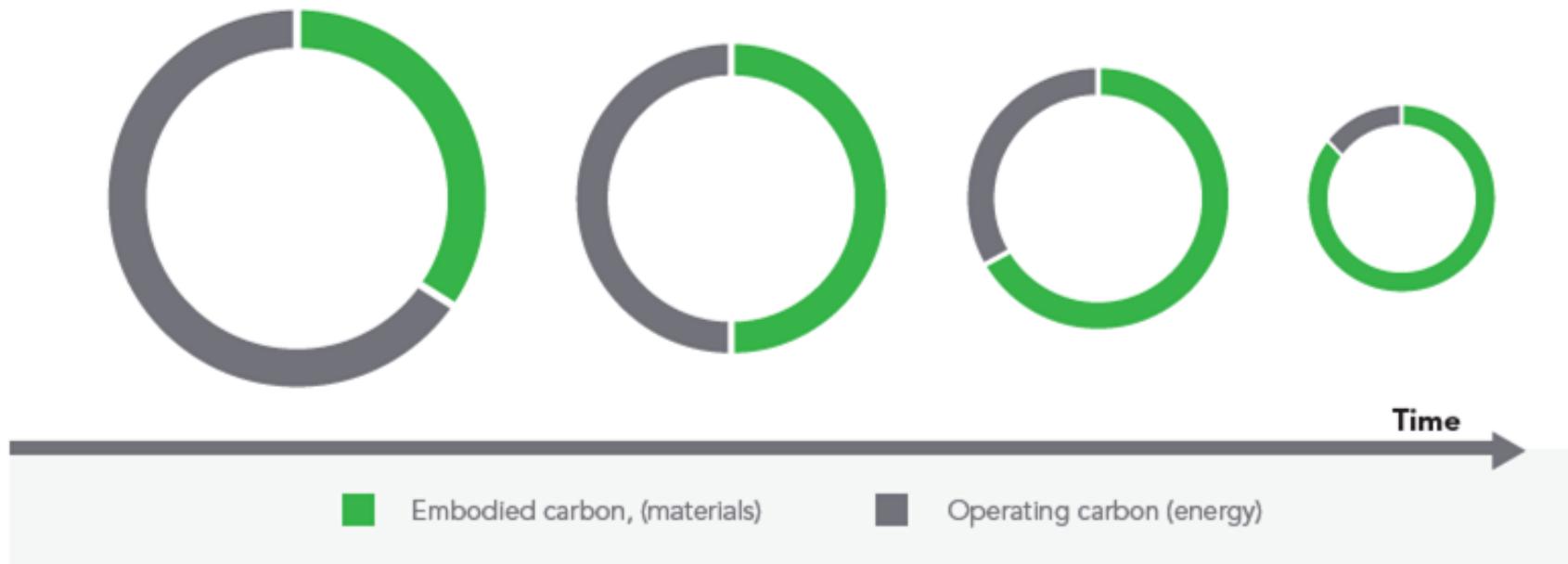
1 NYC per month



Global CO2 Emissions by Sector

Global Alliance for Buildings And Construction, 2018 Global Status Report:

https://wedocs.unep.org/bitstream/handle/20.500.11822/27140/Global_Status_2018.pdf



Personal choices to reduce your contribution to climate change

* Cumulative emissions from descendants; decreases substantially if national emissions decrease.

Average values for developed countries, based on current emissions.

Annual climate savings (tCO₂e)

Upgrade light bulbs

Hang dry clothes

Recycle

Wash clothes in cold water

Replace typical car with hybrid

Eat a plant based diet

Switch electric car to car free

Buy green energy

Avoid one transatlantic flight

Live car free

Have one fewer child

Low Impact

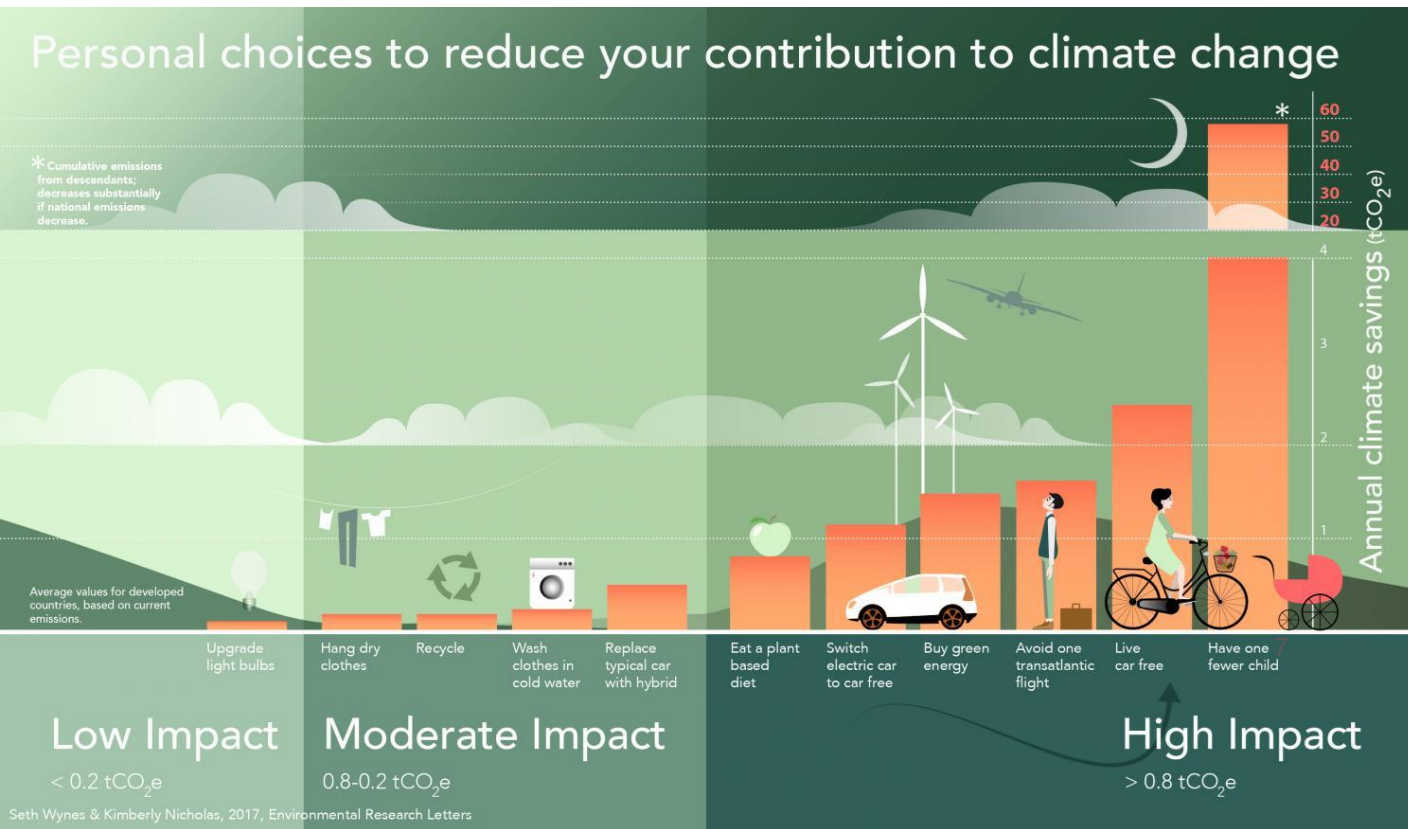
< 0.2 tCO₂e

Moderate Impact

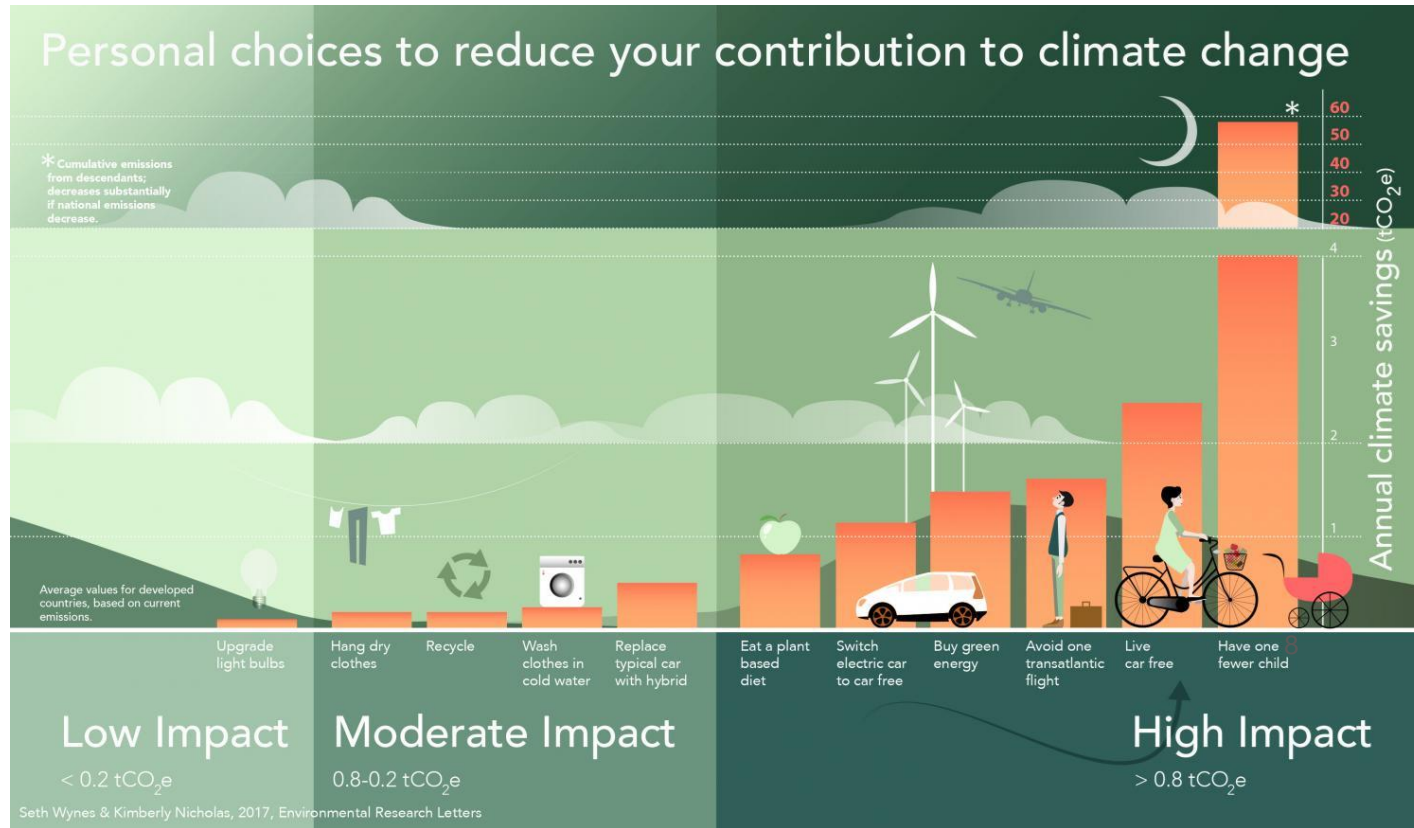
0.8-0.2 tCO₂e

High Impact

> 0.8 tCO₂e



Seth Wynes & Kimberly Nicholas, 2017, Environmental Research Letters



7 tCO₂e

**Save 1%
of EC on
a 19000 ft²
commercial
building.**

*: 398 kg CO₂e / m²
typical EC for
commercial
buildings ([CLF
Embodied Carbon
Benchmark Study,
2017](#))

Why?

The business case for reducing embodied carbon.

1.Capital

Environment
Social
Governance

Capital is Flowing Towards ESG Investments

“nine of ten asset managers surveyed believe that **integrating ESG into their investment strategy will improve overall returns.**”

“...60% [of institutional investors] reported that **ESG investing has already resulted in higher performance yields**, compared to non-ESG equivalents.”

“...three-quarters of investors now consider **ESG to be part of their fiduciary duties.**”

“78%... say they would pay **higher fees for ESG funds.**”

Source: PWC Asset and Wealth Management Revolution Report (2022):

https://www.pwc.com/gx/en/industries/financial-services/asset-management/publications/asset-and-wealth-management-revolution-2022.html?WT.mc_id=CT11-PL1000-DM2-TR2-LS4-ND1-TTA9-CN_gx-fy22-xlos-esg-awm-esg-revolution-pressrelease

ESG Investment Outlook

PWC forecasts ESG fund investment to grow 2-5% annually to 17-29% of all assets under management by 2026.

Investments in North America and Europe could double between 2015 and 2026

Global AuM by region (US\$tn)

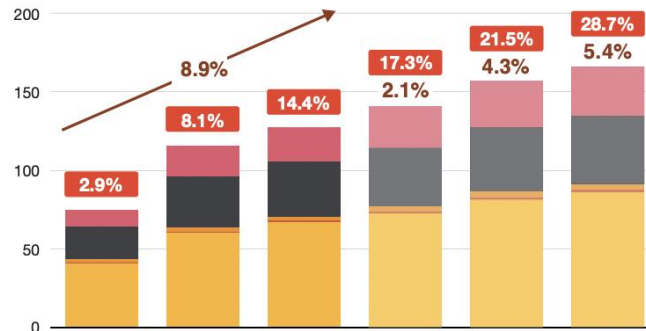
	2015	2020	2021	2026 Low	2026 Base	2026 Best
Asia-Pacific	10.6	20.0	22.0	26.7	29.8	31.3
Europe	20.5	32.1	34.8	37.2	40.8	43.2
Latin America	2.5	2.6	2.7	3.3	3.7	3.9
Middle East & Africa	0.6	0.9	1.0	1.2	1.3	1.4
North America	42.1	60.3	67.0	72.7	81.5	86.1
Total	76.3	115.8	127.5	141.1	157.2	165.9

Key

% of ESG

CAGR

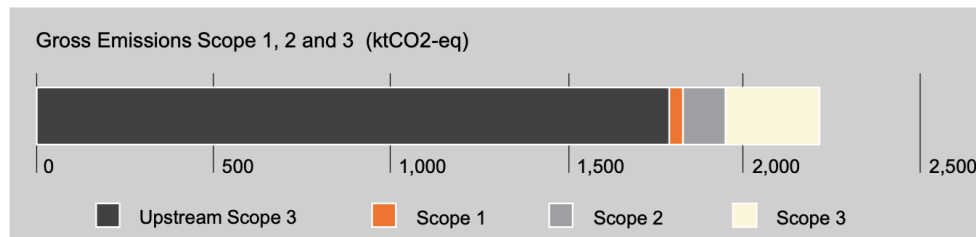
Forecast>



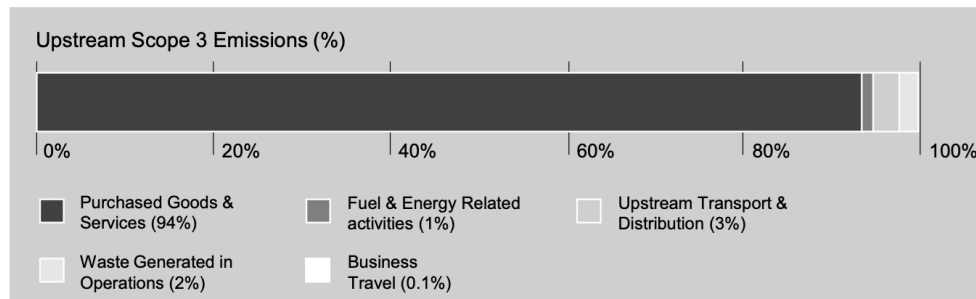
Source: PwC Global ESG and AWM Market Research Centre analysis, Lipper, Preqin, ESG Global

Scope 3 “Purchased Goods and Services” Dominate Total Emissions of CRE’s

In FY21, 15% of our Scope 1, 2 & 3 emissions were from Downstream Scope 3 emissions. 81% were from Upstream Scope 3.



Of the 1,786 kt CO₂-eq Upstream Scope 3 emissions 94% were from Purchased Goods & Services.



Source: LendLease Sustainability Market Briefing 2022 -

<https://www.lendlease.com/contentassets/672a064d1a7548289c8c13784aa087e4/lendlease-sustainability-market-briefing.pdf>

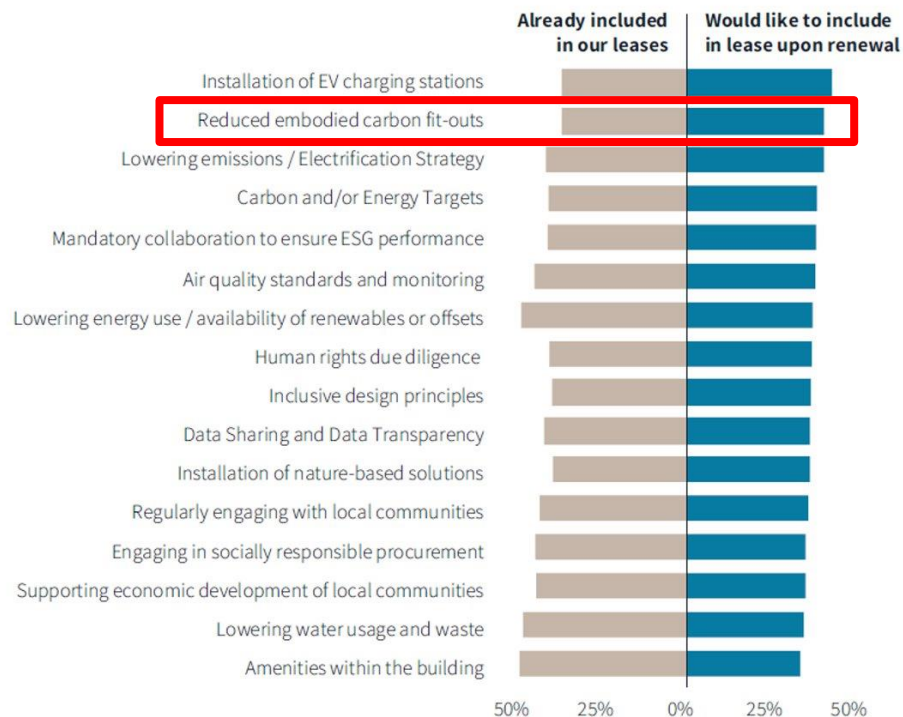
High embodied carbon construction practices pose **transitional climate risks** (*financial risks associated with the transition to a low-carbon economy*) to construction-sector businesses.

Embodied carbon is “***material***” information for investors making capital allocation decisions.

2. Customers

Tenants want low embodied carbon fit-outs

Which of the following areas are typically covered by leases with your landlord(s) today, or would you like to see included in future leases?



Source: JLL Responsible Real Estate Survey 2023

3. Costs

Reducing Embodied Carbon Can Cost Almost Zero

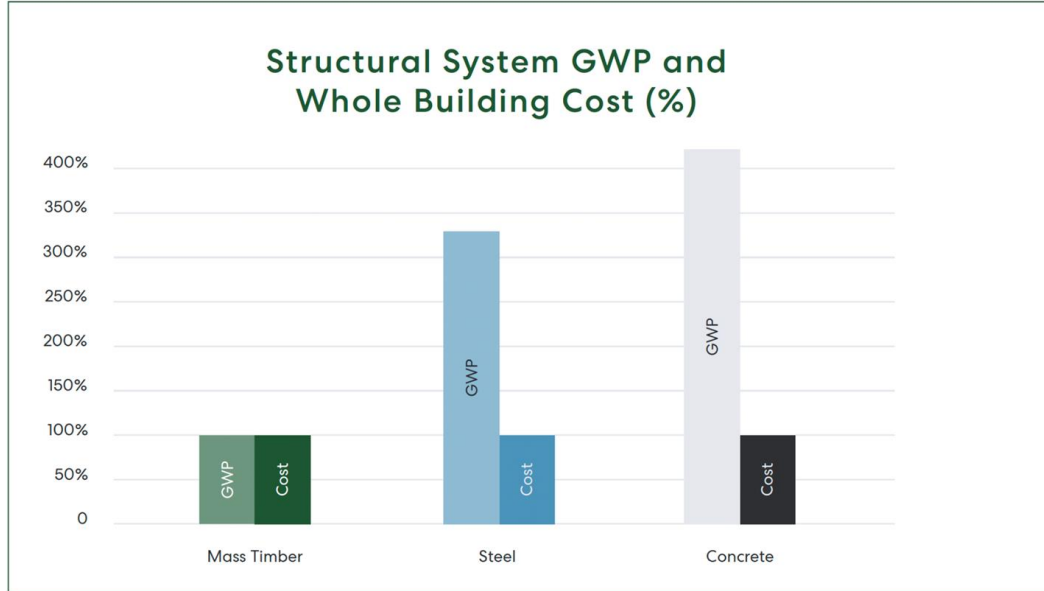


Figure 15. Comparison of the structural system GWP above the level two podium slab and the whole building cost of the three systems.

Platte Fifteen: 65-75% reductions in above-podium structural system embodied carbon at <2% whole-building cost premium by switching to mass timber.

Source: Platte Fifteen Life Cycle Assessment, KL&A, WoodWorks, ThinkWood (2021)t

<https://www.woodworksinnovationnetwork.org/projects/platte-fifteen>

Commit to **measuring, reporting, and reducing**
Scope 3 emissions.

Scope 3 reporting methodologies and boundaries are not yet standardized across CRE, however **detailed guidance and precedents exist.**

Resources:

[LendLease Scope 3 Emissions Protocol](#)

[Climate Disclosure Project Scope 3 Technical Guidance](#)

How?

How can building with wood reduce embodied carbon?

Sink

- Robust forest product markets can help reduce incentives to convert forests to other land uses in future.
- Targeted harvesting (e.g. of wildfire thinnings, species at risk of disease or pests) can improve forest resilience.

Storage

- Wood used in buildings can durably store substantial biogenic carbon for decades while the forest it was harvested from sequesters additional atmospheric carbon.

Substitution

- Structural wood products often have lower embodied carbon per functionally equivalent assembly than conventional structural materials (reinforced concrete, steel)².

Sources:

1. Climate Smart Forest Economy Program (CSFEP) 3S Framework: <https://www.csfep.org/3sframework>
2. <https://onlinelibrary.wiley.com/doi/full/10.1111/jiec.13139>
3. <https://www.mdpi.com/2071-1050/14/7/4271>

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Substitution Benefits of Wood Construction

New Build:

- **Material Replacement:** efficiently designed wood structures can have lower embodied carbon than functionally equivalent reinforced concrete or steel structures¹.

Reuse / Retrofit:

- **Vertical additions:** Due to their relative light weight compared to functionally equivalent reinforced concrete structures^{1,2}, wood structures can be used in vertical additions to existing buildings with minimal upgrades to the existing structure. This can add valuable density to existing developments with lower embodied carbon emissions than new construction.

1. <https://onlinelibrary.wiley.com/doi/full/10.1111/jiec.13139>

2. <https://www.woodworksinnovationnetwork.org/projects/80m>

Wood in LEED v4.1

Building Life-Cycle Impact Reduction

- Building and Material Reuse (1-5 points)
- Whole Building Life-cycle Assessment (1-4 points)

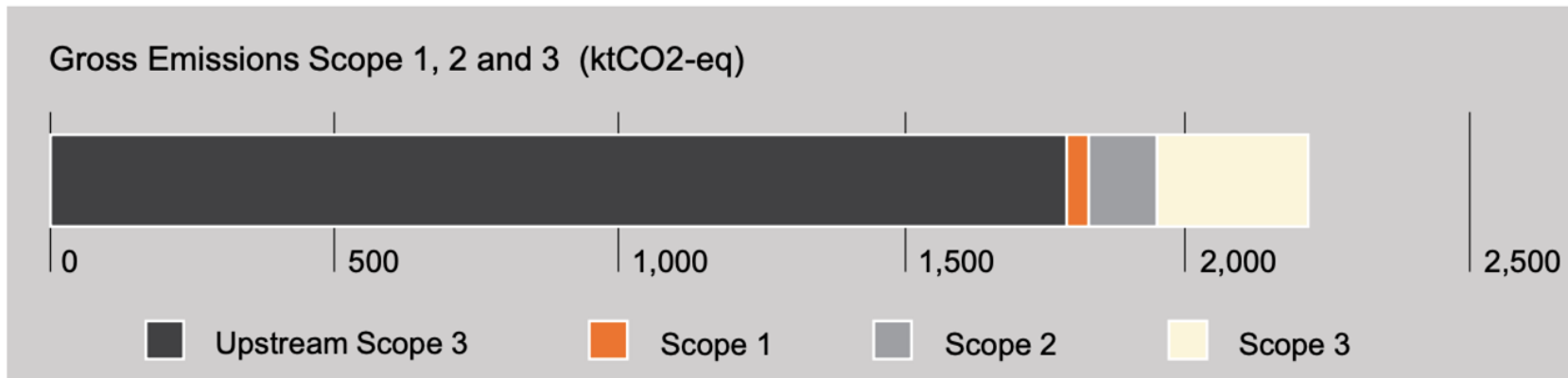
Environmental Product Declarations (1-2 points)

Material Ingredients (1-2 points)

Waste Prevention (1-2 points)

Sourcing of Raw Materials Pilot ACP (1 point)

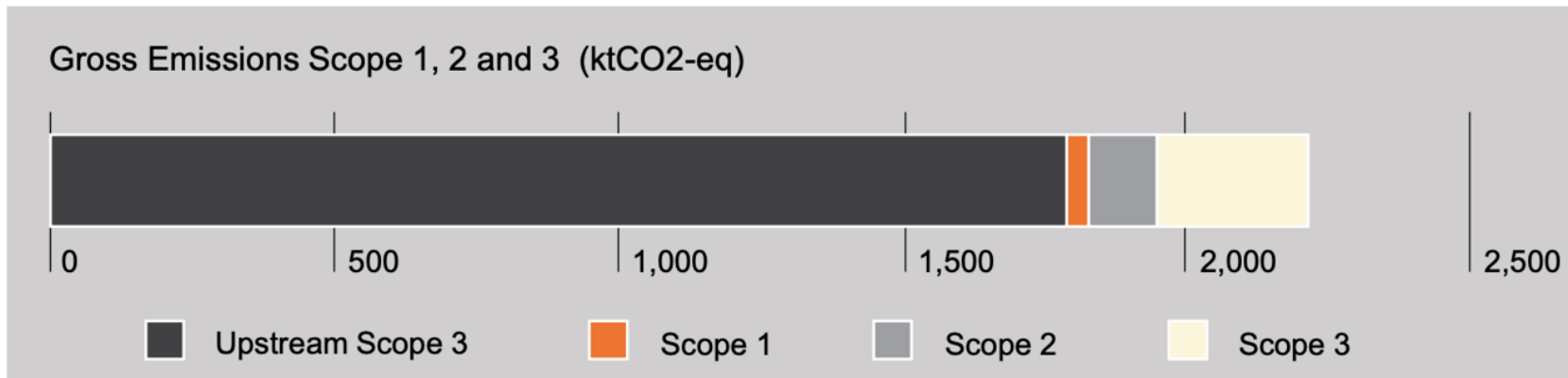
Embodied Carbon is a Liability



Source: LendLease Sustainability Market Briefing 2022 -

<https://www.lendlease.com/contentassets/672a064d1a7548289c8c13784aa087e4/lendlease-sustainability-market-briefing.pdf>

Embodied Carbon is an Opportunity



Source: LendLease Sustainability Market Briefing 2022 -

<https://www.lendlease.com/contentassets/672a064d1a7548289c8c13784aa087e4/lendlease-sustainability-market-briefing.pdf>





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