

# Embodied Carbon

## Waatarua

Ascot Avenue, Remuera, Tāmaki Makaurau

**485**

kgCO<sub>2</sub>e/m<sup>2</sup> upfront, A1–A5

**10%**

below the NZGBC reference building

**16,151 t**

total upfront CO<sub>2</sub>e across the development

Analysis by Nezo · [simplicityliving.nezo-app.com](https://simplicityliving.nezo-app.com)

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# Our number

485

kgCO<sub>2</sub>e / m<sup>2</sup>

upfront embodied carbon, A1–A5

Averaged across all four Waiatarua buildings, per square metre of gross floor area.

A1–A3 · 445

A4 · 12 + A5 · 28

33,300 m<sup>2</sup>

gross floor area modelled

16,151 t

total upfront CO<sub>2</sub>e, whole development

50 years

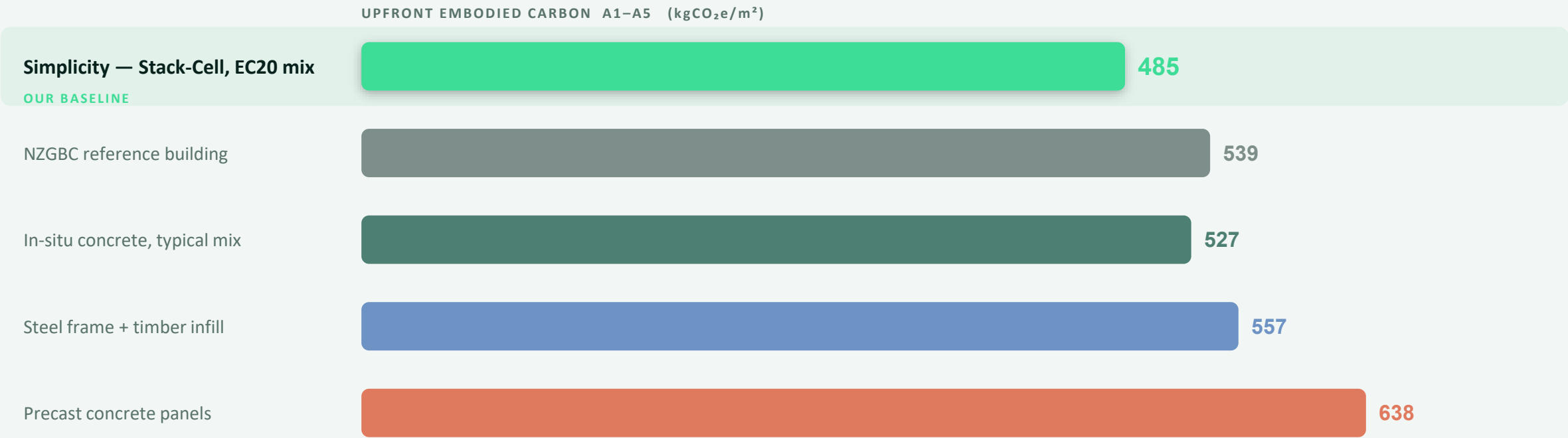
design life assessed

So how does that stack up?

Whole-building A1–A3 from the V-Quest model (Block A: 2,968,752 kgCO<sub>2</sub>e over 6,700 m<sup>2</sup> GFA); A4–A5 per Green Star Embodied Carbon Calculator conventions.

# Compared to how else this could be built

The same building, on the same footprint, modelled five ways.



10% lower vs NZGBC reference building

8% lower vs typical in-situ concrete

13% lower vs steel frame + timber infill

24% lower vs precast concrete

Percentages as published in the Ascot Embodied Carbon Report §1.03–1.4 (V-Quest structural-frame comparison, piles excluded), applied to the whole-building model. The NZGBC reference is a normalised statistical benchmark, not a specific built example.

# But what about timber?

We modelled a New Zealand mass-timber alternative in full. Here is what it said.

## -20%

### upfront embodied carbon

CLT walls and floors with a precast services core would cut upfront carbon meaningfully.

## +40%

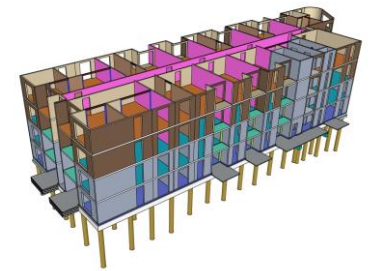
### build cost

Against a typical ESG allowance of 2–3%, a 40% premium is an order of magnitude beyond feasibility.

## -40%

### structural weight

A lighter structure could reduce piling — a real saving, but nowhere near enough to bridge the cost gap.



Plus ~1,069 t of biogenic carbon stored in the timber itself (reported separately under MBIE guidelines).

## We would rather house people.

We actively measure embodied carbon and we implement every reduction we can. But a 40% build-cost increase does not deliver the affordable homes we have promised. Balancing carbon against feasibility is not a compromise we hide — it is the decision, stated plainly.

# Is there a bigger picture?

Everything so far stops at handover. But a building does not stop at handover — it stands for fifty years. It gets repainted, re-roofed, re-clad. Windows are replaced. Eventually it is taken down and the material goes somewhere.

Whole-of-life embodied carbon counts all of that. Not just the making, but the keeping and the ending.

**This is where durability starts paying us back.**

Brick that is washed rather than repainted. Concrete that is not replaced. Every avoided replacement cycle is carbon we never spend.

**A1–A5****Making and building it**

where we started

**B1–B5****Using and maintaining it**

repaints, replacements, refits

**C1–C4****Taking it down**

demolition, transport, landfill

**D****Beyond the boundary**

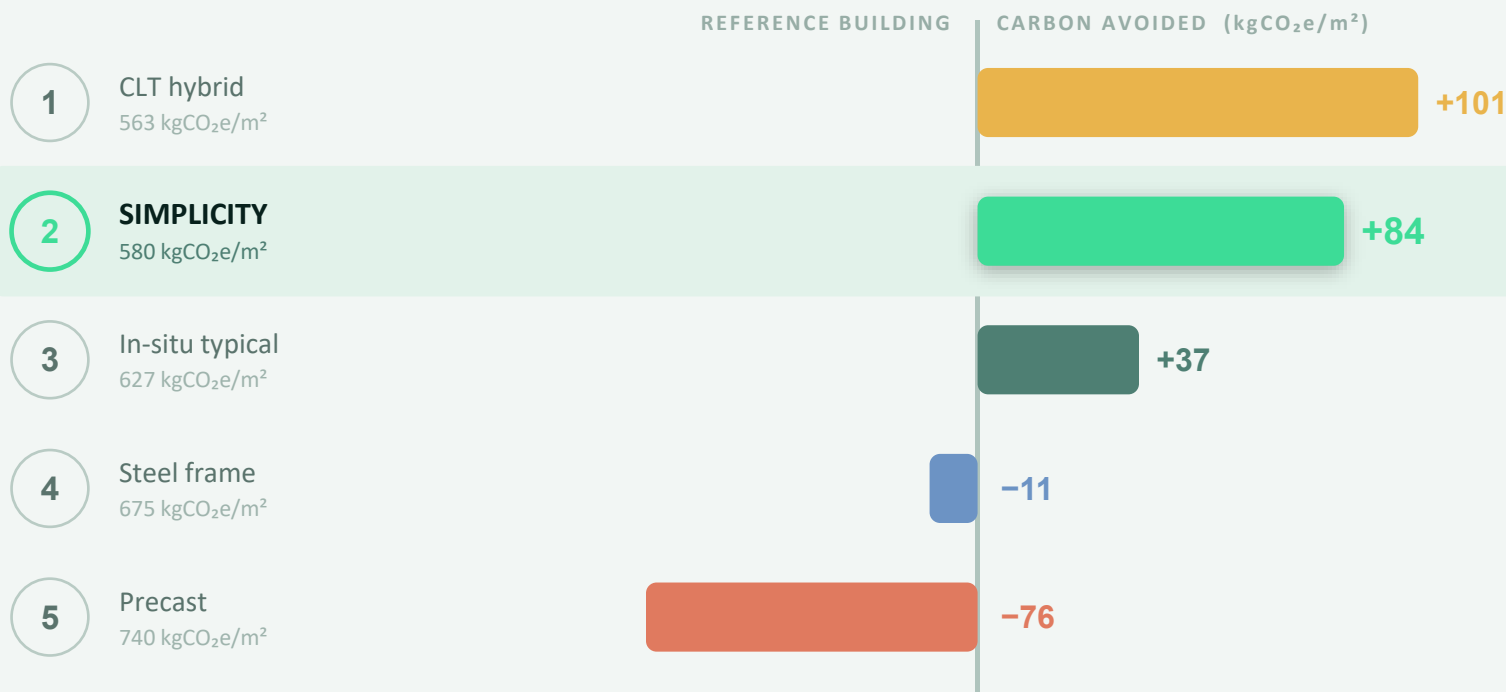
reuse and recovery credits

# Whole-of-life embodied carbon

The same five methodologies, now counted across all fifty years — A1 through C4.

## ROUND 1 of 3

Mass timber still leads — but the gap has closed from 20% to 3%.



The reference building is the start line. Bars to the right are carbon avoided against it; bars to the left fall short of it.

**Durability is already doing the work.** Timber needs replacing and its stored carbon is released at end of life; concrete and brick are simply still there in year fifty.

## IN SUMMARY

# The material premium is real, and it is smaller than it looks.

01

### We measure it honestly

485 kgCO<sub>2</sub>e/m<sup>2</sup> upfront, modelled object by object from the BIM and benchmarked against four alternative methodologies.

03

### We balance it openly

Mass timber would cut a further 20%. It would also add 40% to build cost, which is not compatible with delivering affordable homes.

02

### We design it down

10% below the reference building and 24% below precast, through the Stack-Cell system and a low-carbon cement mix.

04

### Whole-of-life narrows the gap

Counted across fifty years the gap to mass timber closes from 20% to 3%, because durable materials are not replaced.

**Still to substantiate:** Green Star LCA results for Blocks B, C and D; the biogenic end-of-life scenario for the CLT comparison.

# Methodology, sources and status

## Source data

- V-Quest whole-building and structural models, Waiatarua Blocks A–D (VQ-026)
- Ascot Embodied Carbon Report §1.02–1.4 — upfront carbon, cost and mass comparison
- BRANZ LCAQuick v3.6, Ascot A Rev04 — GFA 6,700 m<sup>2</sup>, 50-year design life
- NZGBC Green Star Embodied Carbon Calculator v1.01 r02

## Methodology

- Life-cycle stages per EN 15978 and MBIE Whole-of-Life Embodied Carbon technical methodology
- Reference building per NZGBC Embodied Carbon Methodology v2.0
- Operational energy on EnergyPlus / OpenStudio, heat-pump system held constant
- Grid factor 0.074 kgCO<sub>2</sub>e/kWh (MfE); tariff \$0.30/kWh all-in residential

## Status — to substantiate

- Green Star LCA results for Blocks B, C and D (Block A modelled; B–D in progress)
- Confirmed energy simulation output by unit type
- Final schedule of accommodation to fix the unit mix
- Simplicity site-data record for the A5 calculator inputs
- Simplicity Living's ranking among NZ residential builders

*Figures marked indicative in the deck are modelled placeholders pending the confirmed inputs listed in the third column.*