SUSTAINABILITY BRIEF

The carbon case for modular construction

A side-by-side comparison of embodied carbon for a 40 m² single-storey extension built using the Vita Modular system versus traditional brick-and-block construction on concrete strip foundations.

PREPARED BY

Vita Modular Ltd

SCOPE

Cradle to practical completion

REFERENCE BUILD

40 m² single-storey extension

Roughly **65% less** embodied carbon than brick & block

EMBODIED CO_2E REDUCTION

~65%

Versus a like-for-like brick & block extension on concrete strip foundations.

CO_2E SAVED PER PROJECT

~9.4t

On a typical 40 m² single-storey extension. Equivalent to ~38,000 km of car travel.

FOUNDATION FOOTPRINT

~85%

Reduction from substituting steel screw piles for poured concrete strip footings.

THE TWO SYSTEMS COMPARED

Vita Modular

STEEL FRAME + SIPS

Foundations	Steel screw piles
Structure	Galvanised steel frame
Walls	SIPs (OSB / PIR / OSB)
Roof	SIPs panel
External finish	Cedar / composite / render
Build location	Hybrid offsite + onsite

Traditional Build

BRICK & BLOCK

Foundations	Concrete strip / trench
Structure	Loadbearing masonry
Walls	Brick + block + cavity
Roof	Cut timber + tiles
External finish	Facing brick
Build location	On-site, wet trades

Embodied carbon by element

Indicative cradle-to-completion CO_2e for a 40 m² extension, modelled from published embodied-carbon coefficients. Concrete foundations and high-mass masonry walls account for the majority of the difference.

ELEMENT	TRADITIONAL	VITA MODULAR	SAVING
Foundations	4,000 kg	600 kg	-3,400 kg
Superstructure (frame & walls)	6,800 kg	2,400 kg	-4,400 kg
Roof structure & covering	1,900 kg	900 kg	-1,000 kg
Insulation	700 kg	500 kg	-200 kg
External finish	1,000 kg	600 kg	-400 kg
Transport & site waste	200 kg	100 kg	-100 kg
Total embodied CO_2e	**14,600 kg**	**5,100 kg**	**-9,500 kg**

Figures rounded to nearest 100 kg. Operational carbon (B6) and end-of-life (C1–C4) excluded.

BEYOND EMBODIED CARBON

> The figures above capture only the **upfront embodied carbon** locked in by manufacturing and installation. SIPs construction typically achieves airtightness around **0.6 m³/(h·m²) at 50 Pa** — comfortably inside the Future Homes Standard envelope and four to six times tighter than equivalent brick-and-block of the same age. Over a 60-year service life, operational savings typically exceed the upfront embodied saving several times over.

Methodology & sources

Figures presented are indicative comparisons drawn from published embodied-carbon data for the constituent materials and systems. They are intended as a guide for prospective clients evaluating modular versus traditional construction, not as a substitute for a project-specific Life Cycle Assessment.

CAVEATS

1. Figures are **indicative** for a typical 40 m² single-storey extension. Real-project carbon varies with foundation depth (ground conditions), glazing area, services specification and finish selection.
2. Foundation values use published ranges: concrete strip footings at **100–125 $kgCO_2e/m^2$** versus steel screw piles delivering **60–85% reductions**, per the Institution of Structural Engineers and RIBA Journal.
3. SIPs and timber-frame superstructure values draw on the **Premier SIP industry EPD** and the **MAKAR n-SIP carbon measurement study**, both reporting 60–82% embodied-carbon reductions versus brick-and-block.
4. Scope covers life-cycle modules **A1–A5** (cradle to practical completion). Operational carbon (B6) and end-of-life (C1–C4) are excluded — both favour SIPs further on a whole-life basis.
5. Carbon stored in the timber components of the SIPs is treated as biogenic and reported separately in formal LCAs. The figures above present the **conservative non-sequestration view**.

KEY SOURCES

- **Institution of Structural Engineers** — Foundations embodied-carbon comparison for low and medium-rise construction.
- **RIBA Journal** — Foundation design to avoid ground disturbance, carbon emissions and biodiversity loss (2023).
- **Inventory of Carbon and Energy (ICE) Database** — Material-level embodied-carbon coefficients for concrete, brick, timber and steel.
- **SIPs Industry Environmental Product Declaration** — Industry-wide EPD for structural insulated panels, aggregated from manufacturing-member data.
- **MAKAR Carbon Measurement Project** — Whole-house carbon study of natural-structural insulated panel construction.
- **Homebuilding & Renovating** — SIPs versus brick-and-block embodied-carbon analysis for self-build extensions.