Wernick® GROUP

Embodied carbon emissions of modular and portable building systems

At Wernick Group, we are committed to reducing the environmental impact of the buildings and facilities we provide.

One of the most important ways to understand this impact is by measuring embodied carbon, the greenhouse gas emissions that result from manufacturing, transporting and installing a modular or portable building.

This document brings together the results of a series of Life Cycle Assessments (LCAs) carried out across Wernick's building ranges.

These assessments provide an independent measurement of the embodied carbon in different types of modular buildings and portable units. By establishing these benchmarks, we can identify opportunities to reduce emissions through better design, material choices and manufacturing processes.

The following pages summarise the embodied carbon findings for each range, showing how modular construction and in particular refurbishment and reuse can support lower-carbon, more sustainable building solutions.

AVflex

The AVflex system is Wernick Hire's steel-framed, anti-vandal modular range. Its strength and adaptability make it suitable for a wide variety of building layouts.

An independent Life Cycle Assessment (LCA) measured the embodied carbon, the emissions from producing and transporting the modules:

- End unit: 9.1 tCO_2e
- Middle unit: 7.8 tCO_2e
- 8-bay building: 65 tCO_2e
- Embodied carbon per m²: 270.8 $kgCO_2e/m^2$

The study found that steel is the main contributor to emissions, accounting for over 90% of the total, while site operations added less than 1%.

PSflex

The PSflex system is Wernick Hire's premium anti-vandal modular ranges, designed with a steel-framed shell for strength and durability. These units can be combined to create a variety of larger building layouts.

An independent Life Cycle Assessment (LCA) measured the embodied carbon, the emissions from producing and transporting the modules:

- End unit: 20.8 tCO_2e
- Middle unit: 14.5 tCO_2e
- 8-bay building: 128.6 tCO_2e
- Embodied carbon per m²: 535.8 $kgCO_2e/m^2$

The assessment found that steel used in the frame, base, walls and roof is the dominant source of emissions, contributing over 90% of the total. Construction site operations, by contrast, accounted for less than 1%.

Refurbished Rapidplan

Wernick Refurbished Buildings gives pre-owned modular buildings a new life through an industry-leading refurbishment process, extending their use while maintaining high-quality standards.

An academic Life Cycle Assessment (LCA) compared the embodied carbon of a refurbished Rapidplan modular building with that of a newly built equivalent. The results showed significant reductions in emissions:

- End unit: 5 tCO_2e – 42% less embodied carbon than new
- Middle unit: 4 tCO_2e - 48% less embodied carbon than new
- 8-bay building: 34 tCO_2e - 46% less embodied carbon than new
- Embodied carbon per m^2: 141.7 kg CO_2e/m^2

The main savings come from reusing the original steel frame, avoiding the high emissions associated with new steel production.

These findings highlight the carbon benefits of refurbishment and demonstrate how reusing existing materials supports a circular, lower-carbon approach to modular construction.

PMflex

The PMflex system is a modular building solution commonly used in education, offering flexible layouts and high-quality finishes.

A recent Life Cycle Assessment (LCA), measured the embodied carbon:

- End unit: 12.2 tCO_2e
- Middle unit: 11 tCO_2e
- 8-bay building: 90.4 tCO_2e
- Embodied carbon per m^2: 376.6 $kgCO_2e/m^2$

The study found that external wall panels were the largest contributor to emissions, followed by structural steel and timber components. Transport and on-site construction had a smaller impact.

These results provide a baseline for PMflex buildings and highlight opportunities for reducing carbon, such as using higher recycled content steel, simplifying wall panel design and sourcing materials locally.

Rapidplan

The Rapidplan system is a modular building manufactured by Wernick Buildings, designed for flexibility across sectors such as education, retail and commercial use. The modules are produced in a controlled factory environment, transported to site and connected to create complete buildings.

An embodied carbon assessment measured the emissions from producing and transporting the structure:

- End unit: 8.6 tCO_2e
- Middle unit: 7.6 tCO_2e
- 8-bay building: 62.8 tCO_2e

As with other modular systems, steel used in the frame and structure is the largest contributor to emissions. The results provide a benchmark for new-build Rapidplan units and support Wernick's ongoing strategy to reduce embodied carbon in its products as part of the Group's net zero 2040 target.

Sureguard Anti - Vandal and GreenSpace Lite

The Sureguard GreenSpace Lite range combines fire safety with improved energy efficiency, making it a sustainable choice for high-risk environments such as construction sites and urban areas.

An embodied carbon assessment measured emissions from producing and transporting the units:

- Unit total: 16.4 tCO_2e

The units include modern energy-saving features such as PIR lighting, double-glazed windows and non-combustible insulation. Built with galvanised steel panels they offer robust anti-vandal security whilst also reducing running costs and environmental impact.

SW07600 Fusion Pulse

The SW07600 Fusion Pulse is a static welfare accommodation unit, designed to provide secure and comfortable facilities on site. Each unit can seat up to eight people, with additional space for a separate office and drying room.

An embodied carbon assessment measured emissions from producing and transporting the unit:

- Unit total: 13.2 tCO_2e

Powered by solar technology with generator backup, the SW07600 reduces fuel use, noise and servicing needs while maintaining reliable performance.

Features include a canteen, toilet and wash facilities, office space and drying room, making it a versatile welfare solution for contractors and rental companies.

These results establish a benchmark for static welfare accommodation and highlight the role of hybrid solar technology in reducing embodied and operational carbon impacts.

GP360 mobile welfare units

The GP360 range, supplied by Groundhog, provides mobile welfare units designed for ease of use, durability and environmental efficiency. These towable units can be set up in minutes and offer secure, comfortable accommodation for up to six people.

An embodied carbon assessment measured emissions for different models in the range:

- Standard unit: 4.9 tCO_2e
- Fusion Pulse unit: 6.2 tCO_2e
- i-range unit: 7.5 tCO_2e

The GP360 Standard offers a robust welfare solution, while the Fusion Pulse incorporates solar technology with generator backup, reducing fuel use, noise and servicing needs. The i-range builds on this with lithium battery storage and advanced hybrid solar systems, further improving environmental efficiency.

These results provide a benchmark for the carbon footprint of mobile welfare units and highlight how innovations in hybrid and solar technologies can support lower-carbon site accommodation.

The results of these Life Cycle Assessments give Wernick a clear picture of the embodied carbon across our building systems and portable units. The data confirms that steel and other core materials are the main contributors to emissions, but it also highlights the significant carbon savings possible through refurbishment, reuse and the integration of hybrid technologies.

By using this evidence to guide product development, procurement and manufacturing practices, Wernick can

continue to reduce emissions and support customers in meeting their own sustainability goals.

These LCAs form part of our wider commitment to achieving net zero by 2040, ensuring that our buildings not only meet today's needs but also contribute to a more sustainable future.

Disclaimer: Only the shell and core of one end and middle modules of the structures were considered for the LCAs, and other fittings and installations were excluded. The scope of the project was restricted only to the production and construction stages (A1-A5) at the representative manufacturing facilities (UK based). The LCA's were undertaken by a suitably qualified third party and modelling was undertaken using the verified software One Click LCA®. The life-cycle metrics platform One Click LCA® has been awarded third party certification for compliance with several ISO and EN construction LCA standards. OneClick has been verified as compliant with the provisions and requirements with EN 15978, ISO 21931-1 and ISO 21929 standards. Conformity with the referred standards was verified with consideration of the data quality requirements of ISO 14040 and EN 15804, as well as with applicable normative references.

Representation of embodied carbon emissions for each system and service life

Wernick® GROUP

Modular systems and portable units	Embodied CO2 (tCO2e)	Apportioned carbon for service life
AVflex – Gable	9.1	0.91
AVflex - Inter	7.8	0.78
AVflex - 8 bay	65	6.5
PSflex – Gable	20.8	2.08
PSflex - Inter	14.5	1.45
PSflex - 8 bay	128.6	12.86
Refurbished Rapidplan - Gable	5	0.17
Refurbished Rapidplan - Inter	4	0.13
Refurbished Rapidplan - 8 bay	34	1.13
PMflex + - Gable	12.2	1.22
PMflex + - Inter	11	1.1
PMflex + - 8 bay	90.4	9.04
New built Rapidplan - Gable	8.6	0.29
New built Rapidplan - Inter	7.6	0.25
New built Rapidplan - 8 bay	62.8	2.09
Sureguard	16.4	1.64
GP360 standard	4.9	0.49
GP360 Fusion Pulse	6.2	0.62
GP360 i-range	7.5	0.75
SWO7600 Fusion Pulse	13.2	1.32

*Service life of hire units (AVflex, PSflex, Sureguard and welfare units) are considered as 10 years

**Service life for sold units (Rapidplan) is considered as 30 years

*** The LCA of the Rapidplan is based on an academic study and not third-party verified

Disclamer: Only the shell and core of one end and middle modules of the structures were considered for the LCAs, and other fittings and installations were excluded. The scope of the project was restricted only to the production and construction stages (A1-A5) at the representative manufacturing facilities (UK based). The LCA's were undertaken by a suitably qualified third party and modelling was undertaken using the verified software One Click LCA®. The life-cycle metrics platform One Click LCA® has been awarded third party certification for compliance with several ISO and EN construction LCA standards. OneClick has been verified as compliant with the provisions and requirements with EN 15978, ISO 21931-1 and ISO 21929 standards. Conformity with the referred standards was verified with consideration of the data quality requirements of ISO 14040 and EN 15804, as well as with applicable normative references.