Facade Sustainability Tools

Embodied & Operational Carbon Impacts

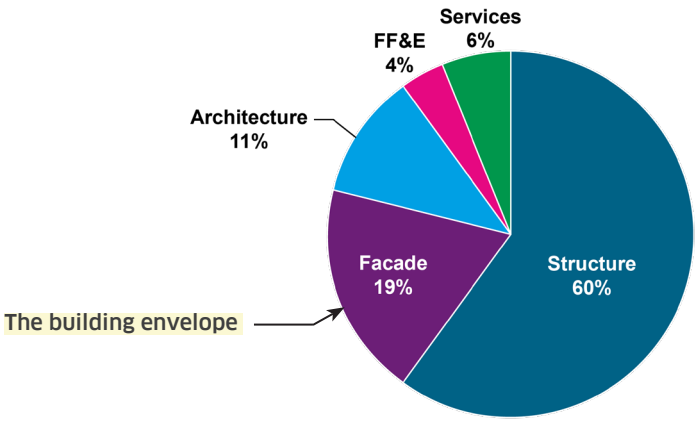
Thermosash

BUILDING ENVELOPE SOLUTIONS™

Project Sustainability Analysis

The driving force behind optimising facade design.

Our Thermosash Sustainability Team can provide expert analysis and optimised solutions to reduce carbon and operational energy throughout the project life cycle.



Upfront carbon by building elements

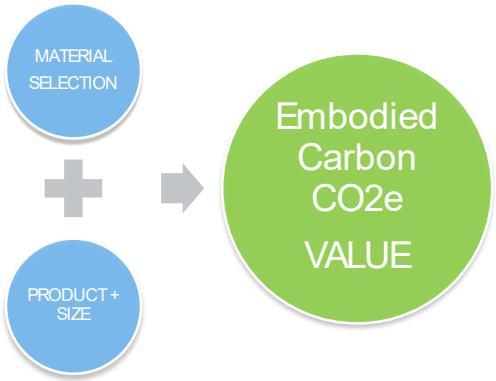
The facade of a building plays a significant role in the embodied and operational carbon impact of a project, as well as the overall operational energy use during its lifetime. Building envelopes that deliver efficient operational performance by decreasing energy costs and improving occupant comfort, as well as utilising lower embodied carbon materials, are no longer optional but essential for meeting compliance and sustainability goals.

Our Project Sustainability Analysis guides project specific decisions such as: material choices, façade systems, solar shading, glass selection, and aesthetics to optimise façades for sustainable high performance, durability and resilience – improving occupant comfort, reducing maintenance costs and ensuring a return on investment.

Embodied Carbon Calculation

Life Cycle Analysis Calculator Tool.

Thermosash designed a tool to help inform Architects & Builders of the impact of their material choices.



The calculator, created by Thermosash and built by Thinkstep ANZ, cross referenced to CWCT* calculation methodology, allows for:

- in-depth analysis of the total carbon footprint of a project specific facade.
- an analysis of the relative benefit of alternative material selections.

The Thermosash calculator provides Life Cycle Assessment (LCA) results for Thermosash products based on EN 15804+A1 and EN 15804+A2, following CWCT* guidelines. The embodied carbon calculation is based on each individual project's bill of materials.

*CWCT – Centre for Window and Cladding Technology

Carbon Payback Period

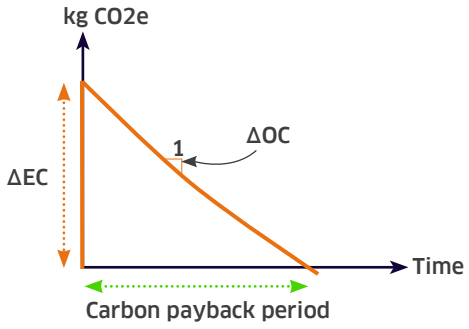
Understanding the operational carbon impacts of embodied carbon decisions.

Thermosash balances embodied and operational carbon, when measured in relationship to each other, to achieve a truly low-carbon design.

We understand that the carbon impact of a building should be measured over the full lifecycle, not just in the construction stage. Sometimes an increase in embodied carbon can deliver greater savings over the life of the building, as proven through carbon payback analysis.

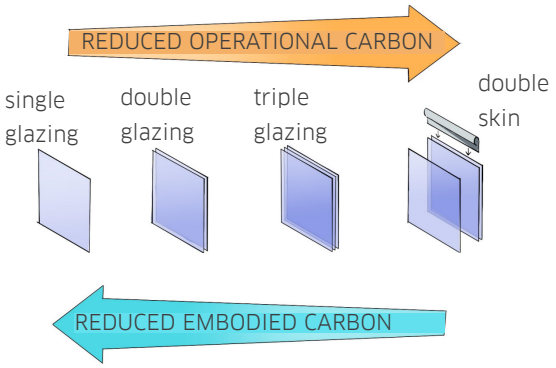
Thermosash aims to calculate the carbon payback period by considering both embodied and operational carbon:

- The embodied carbon is always positive and can be represented as a step value (ΔEC) occurring at or near the start of operation.
- The operational carbon saving is a recurring reduction (ΔOC) in emissions per accounting period.



Two Step Process

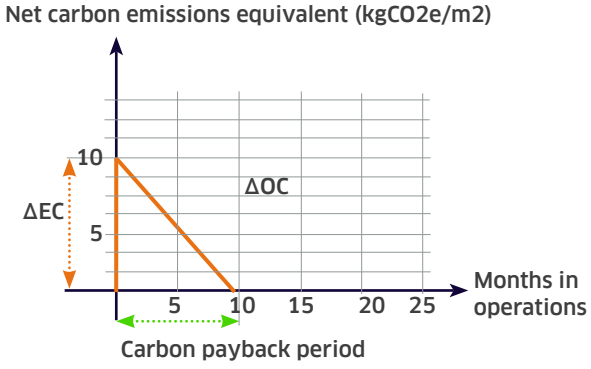
1. Measure the energy use (in kilowatt-hours, kWh, or megawatt-hours, MhW)
2. Apply an emissions factor - based on the type of energy used (e.g., electricity, gas). This factor shows how much CO2 is emitted per unit of energy.



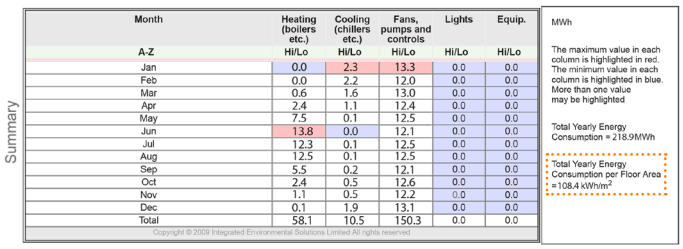
Example: The use of a thermally broken system can be proven to deliver energy saving that exceed the additional embodied carbon of the system, in a very short time.

Thermally Broken: Embodied carbon per m2 (kgCO2e/m2) - Cradle to Grave total **= 194.44**
Non-Thermally Broken: Embodied carbon per m2 (kgCO2e/m2) - Cradle to Grave total **= 184.09**

Example: Calculating operational carbon and carbon payback of the sample thermally broken and non-thermally broken panels:



Difference in embodied carbon and operational carbon between thermally broken and non-thermally broken panels.



Summary	Month	Heating (boilers etc.)	Cooling (chillers etc.)	Fans, pumps and controls	Lights	Equip.
	A-Z	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo
	Jan	0.0	2.3	13.3	0.0	0.0
	Feb	0.0	2.2	12.0	0.0	0.0
	Mar	0.6	1.6	13.0	0.0	0.0
	Apr	2.4	1.1	12.4	0.0	0.0
	May	7.5	0.1	12.5	0.0	0.0
	Jun	13.8	0.0	12.1	0.0	0.0
	Jul	12.3	0.1	12.5	0.0	0.0
	Aug	12.5	0.1	12.5	0.0	0.0
	Sep	5.5	0.2	12.1	0.0	0.0
	Oct	2.4	0.5	12.6	0.0	0.0
	Nov	1.1	0.5	12.2	0.0	0.0
	Dec	0.1	1.9	13.1	0.0	0.0
	Total	58.1	10.5	150.3	0.0	0.0

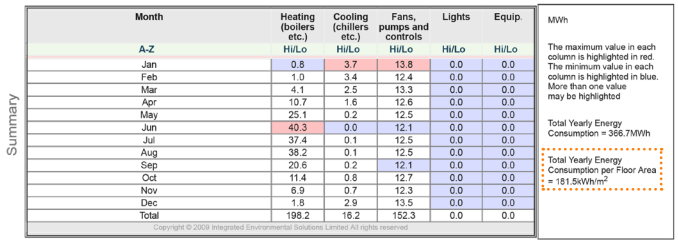
MWh

The maximum value in each column is highlighted in red. The minimum value in each column is highlighted in blue. More than one value may be highlighted

Total Yearly Energy Consumption = 218.9MWh

Total Yearly Energy Consumption per Floor Area = 108.4 kWh/m²

Calculating operational carbon based on thermally broken panels



Summary	Month	Heating (boilers etc.)	Cooling (chillers etc.)	Fans, pumps and controls	Lights	Equip.
	A-Z	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo
	Jan	0.8	3.7	13.8	0.0	0.0
	Feb	1.0	3.4	12.4	0.0	0.0
	Mar	4.1	2.5	13.3	0.0	0.0
	Apr	10.7	1.6	12.6	0.0	0.0
	May	25.1	0.2	12.5	0.0	0.0
	Jun	40.3	0.0	12.1	0.0	0.0
	Jul	37.4	0.1	12.5	0.0	0.0
	Aug	38.2	0.1	12.5	0.0	0.0
	Sep	20.6	0.2	12.1	0.0	0.0
	Oct	11.4	0.8	12.7	0.0	0.0
	Nov	6.9	0.7	12.3	0.0	0.0
	Dec	1.8	2.9	13.5	0.0	0.0
	Total	198.2	16.2	152.3	0.0	0.0

MWh

The maximum value in each column is highlighted in red. The minimum value in each column is highlighted in blue. More than one value may be highlighted

Total Yearly Energy Consumption = 366.7MWh

Total Yearly Energy Consumption per Floor Area = 181.5kWh/m²

Calculating operational carbon based on non-thermally broken panels

Sustainable Façades

Our Initiatives and strategies for sustainable outcomes.

Sustainability is about changing how things are done in the present to create a positive impact upon the future.

Thermosash believe that every building project significantly shapes the landscape, the community, and the lives of the occupants, in the present, and for future generations.

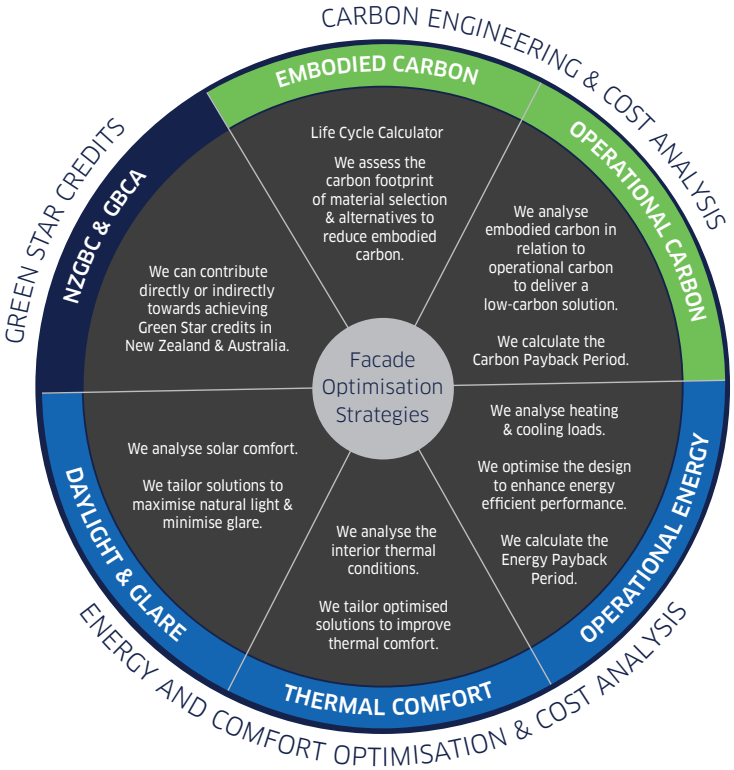
We are experts at making buildings work better for the environment, occupants and owners by delivering resilient high performance building envelopes that provide a low carbon footprint, weather-tightness, climate optimised interior spaces, respite from acoustic noise and improved energy efficiency - over the lifetime of the building.

To help our clients achieve sustainable outcomes for their building projects we have implemented a number of initiatives which include the following:

Low-Carbon Extrusions - Thermosash DecarbAL™
At the heart of Thermosash's sustainability journey is a partnership with a local New Zealand owned remelt facility producing extrusions with 80% recycled content and low carbon virgin material, that has resulted in a super low sustainable embodied carbon footprint per kilogram of Aluminium. Our aluminium supplier is audited annually, for up to date figures please contact us.

Low Carbon Glass
Thermosash's commitment to sustainability also extends to our glass selection. With access to worldwide low-carbon glass suppliers, we ensure that our projects benefit from environmentally friendly and high performance glazing options, further reducing the carbon footprint

Project Sustainability Analysis
To achieve optimised high performance outcomes we offer our clients the option of a Project Sustainability Analysis that covers different aspects of the full sustainability cycle. When specifying our facade systems, clients can engage us to implement one or several of our Facade Optimisation Strategies to achieve their project sustainability goals. To gain the most from our strategies, talk to us early on in the design phase of your project.



Thermosash Facade Optimisation Strategies that can be implemented to optimise facade performance to achieve project specific sustainability goals.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