



# Sustainable Façades

Optimisation Strategies

**Thermosash**   
BUILDING ENVELOPE SOLUTIONS™



# Who We Are

Over 50 years of dedication.

Half a century of engineering milestones, and we're just getting started.

## We are Proud of Where We've Come From

Thermosash was founded by five visionary engineers in 1973 and is New Zealand's leading specialist in engineered prefabricated façades. We design, manufacture, and install high-performance window and curtainwall systems for complex commercial projects. Trusted by major clients like universities, airports, and property developers, we offer lightweight, integrated metal and glass cladding solutions tailored to seismic and architectural needs.

As a 100% locally-owned company with manufacturing facilities in Auckland, Wellington, Levin and Christchurch, we deliver innovation, precision, and compliance at every stage. Backed by the Thermosash Group, including Woods Glass and WEC (Window Engineering Consultants), we provide comprehensive building envelope solutions across New Zealand and abroad.

## We Push Boundaries in Façade Engineering

At Thermosash, we thrive on pushing the boundaries of what's possible in façade engineering to meet project imposed engineering challenges. We not only meet standards - we often surpass them. Our team of experts are constantly seeking smarter ways to improve facade performance to create efficient sustainable solutions.

## We have the Strength of the Thermosash Group

We are part of the Thermosash Group of Companies, which includes Thermosash Service and Maintenance, Woods Glass, and WEC. We have the advantage of the collective expertise and knowledge of the Group that enhances our offerings and enables us to deliver comprehensive solutions.

## We Deliver on Performance and Durability

Thermosash prioritises performance and longevity. Our façades undergo rigorous testing, adhering to the highest industry standards. We operate an IANZ-audited testing facility for seismic, weather, and performance validation, ensuring certified quality and resilience.

## We Value a Collaborative Approach

Thermosash is more than a provider, we're a partner. Our collaborative approach involves close consultation with architects, builders, and project managers from project inception. This ensures that our custom-engineered façades align with the project's vision, schedule, and budget.

## We Believe Quality Assurance and Compliance is Key

Our commitment to delivering high-performance, quality unitised façade units extends to our comprehensive inspection and testing plan. This plan is a detailed roadmap that guides our efforts to ensure that every unit meets industry standards and your project's specific requirements.

## We invest in Manufacturing and Engineering

Our vast manufacturing capacity, cutting-edge technology, and in-house engineering enable us to tackle multiple projects concurrently while maintaining precision and quality. Our team's commitment to meticulous engineering ensures that each project, from concept to construction, meets the unique structural and environmental design requirements and is code compliant.

## We Add Sustainable Value

Thermosash integrates advanced digital design, strong local partnerships, and sustainable methodologies:

- We offer project sustainability analysis including embodied and operational carbon, thermal comfort, and energy costs as well as life cycle assessments and Green Star compliance to assist with delivering an optimised facade solution.
- Our BIM capabilities and in-house specialists ensure seamless project coordination, accurate prefabrication, and reduced architectural documentation.
- Our local sustainable supply chain features low-carbon aluminium from a local extruder and eco-friendly powder coaters.
- We use SGS to audit any new international suppliers to ensure safe, traceable and sustainable practices
- Our factories and offices recycle 100% metals, uncontaminated soft plastics, timber, cardboard, paper and 99.5% commercial float glass and IGUs.
- Partnering with Woods Glass, we guide clients in selecting high-performance, cost-effective glazing that meets strict performance and code requirements.
- We are a Certified Toitū Carbon Reduce organisation, with emissions generating-activities quantified to produce an audited total value for operational carbon emissions.



# 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

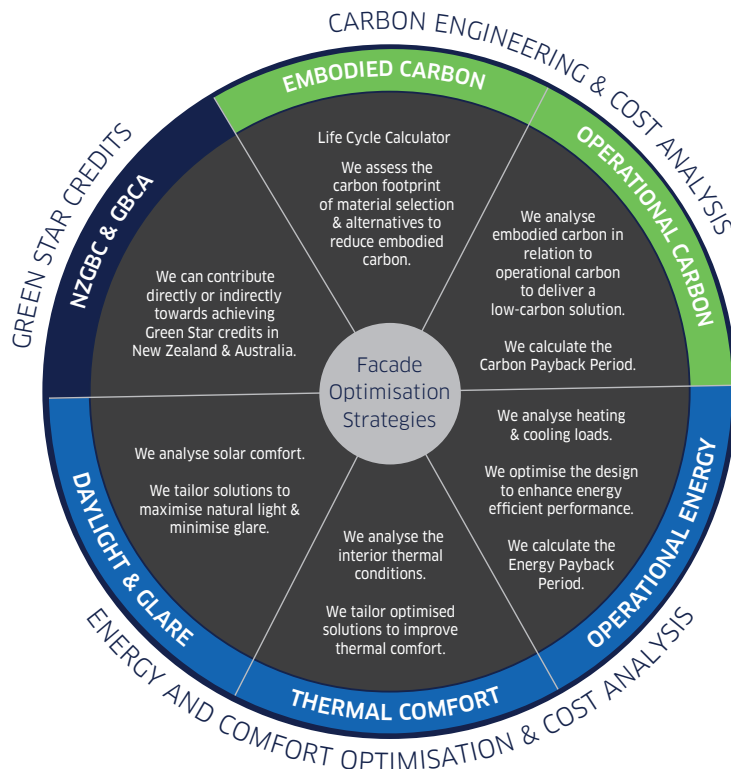
sustainable embodied carbon footprint per kilogram of Aluminium. Our aluminium supplier is audited annually, for up to date figures please contact us.

**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.



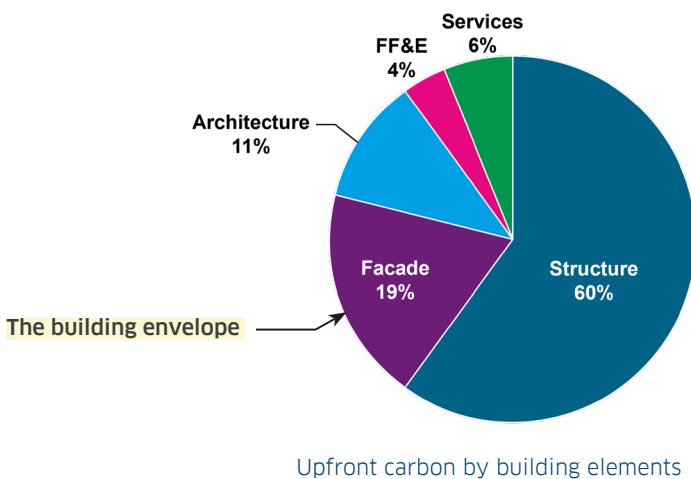
Thermosash Facade Optimisation Strategies that can be implemented to optimise facade performance to achieve project specific sustainability goals.



# 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.**



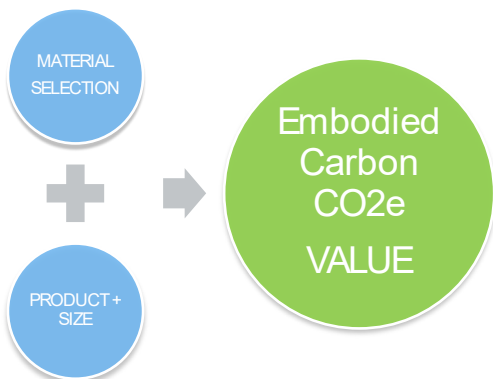
The facade of a building plays a significant role in the embodied and operational carbon impact of a project, as well as the overall operational energy use during its lifetime. Building envelopes that deliver efficient operational performance by decreasing energy costs and improving occupant comfort, 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

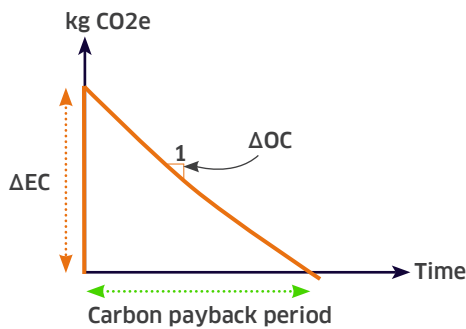
Understanding the operational carbon impacts of embodied carbon decisions.

**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.

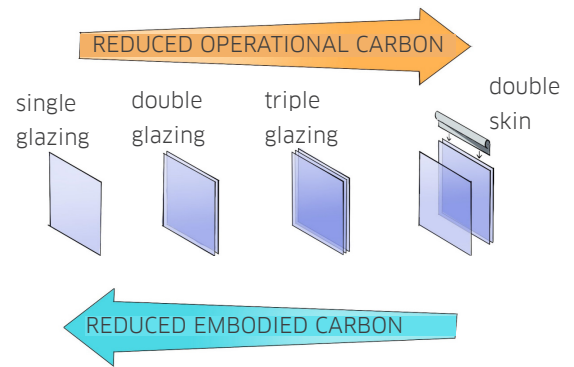
**Thermosash aims to calculate the carbon payback period by considering both embodied and operational carbon:**

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



### Two Step Process

- Measure the energy use (in kilowatt-hours, kWh, or megawatt-hours, MWh)
- 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.



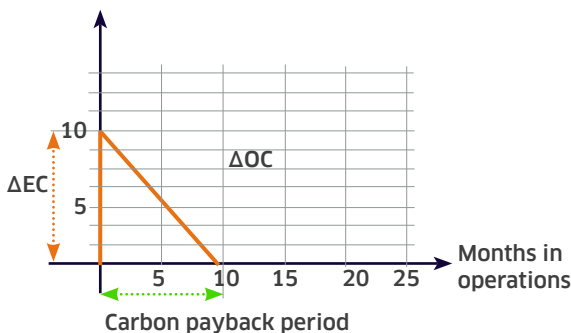
**Example: The use of a thermally broken system can be proven to deliver energy saving that exceed the additional embodied carbon of the system, in a very short time.**

**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:**

Net carbon emissions equivalent (kgCO2e/m2)



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

Month	Heating (boilers etc.)	Cooling (chillers etc.)	Fans, pumps and controls	Lights	Equip.	MWh
	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	
A-Z						
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	

Summary: 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

Month	Heating (boilers etc.)	Cooling (chillers etc.)	Fans, pumps and controls	Lights	Equip.	MWh
	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	Hi/Lo	
A-Z						
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	

Summary: 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 = 356.7MWh. Total Yearly Energy Consumption per Floor Area = 151 kWh/m².

Calculating operational carbon based on non-thermally broken panels



# Optimising Operational Energy

Efficiency through material selection & design enhancement.

**Our Thermosash Sustainability Team has extensive capabilities in modelling the heating and cooling loads of commercial buildings and multi-storey apartments.**

## Enhancing Performance

Optimising operational energy through panel design directly impacts on both operational carbon and long term energy costs. We collaborate with our customers to deliver the most efficiently designed façade possible. By modelling the baseline design, Thermosash can determine material selections and panel design to enhance the performance of the finished building – ensuring that the occupier/tenant is able to enjoy an energy efficient and lower operational energy environment. Our modelling software can be utilised to compare scenarios where slight changes to the façade design are made which further reduce the cooling and/or heating loads.

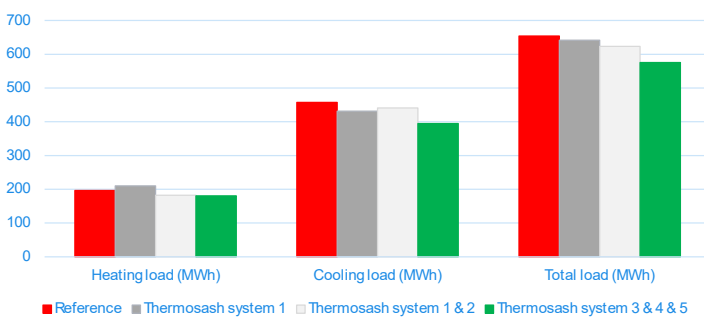
## Comparing heating and cooling loads between a Reference and Thermosash system

	HeatingLoad (MWh)	CoolingLoad (MWh)	Total Load (MWh)	Total yearly loads per m2(kWh/m2)
<b>REFERENCE</b>	196.31	457.59	<b>653.9</b>	18.65
<b>THERMOSASH SYSTEM 1</b>	210.31	431.28	641.59	18.30
<b>THERMOSASH SYSTEM 1 + 2</b>	182.31	441.18	623.49	17.78
<b>THERMOSASH SYSTEM 3 + 4 + 5</b>	180.64	394.87	<b>575.51</b>	16.41

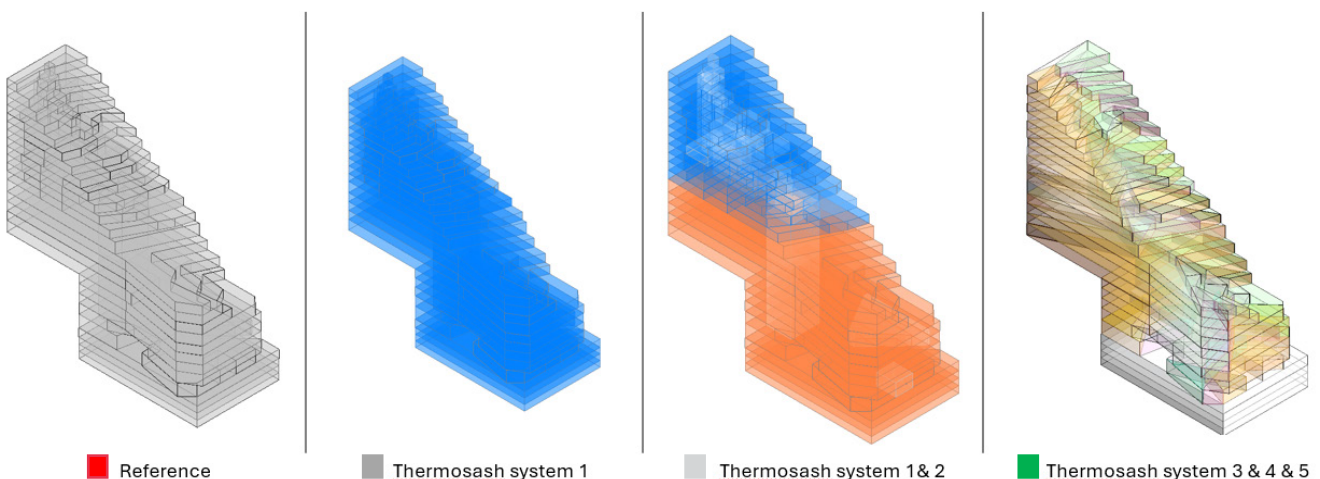
## Example of targeted design

The example modelled here shows the heating and cooling loads of a Reference system compared to a Thermosash system, including possible enhancements, that highlight how the iterative process of targeted design enhancements can incrementally lower the total yearly energy load.

Comparing Scenarios



The data in the table depicted in the bar graph 'Comparing Scenarios' demonstrates that the optimal design option, Thermosash system 3 & 4 & 5 (shown in green), reduces the total loads by approx. 12% compared to the base reference model (shown in red) of this sample project.





# Energy Cost Analysis

Long-term savings potential over the life of the building.

After optimizing the total building loads, Thermosash will analyse the potential energy cost savings over time, for each project.

### An example of cost savings on energy

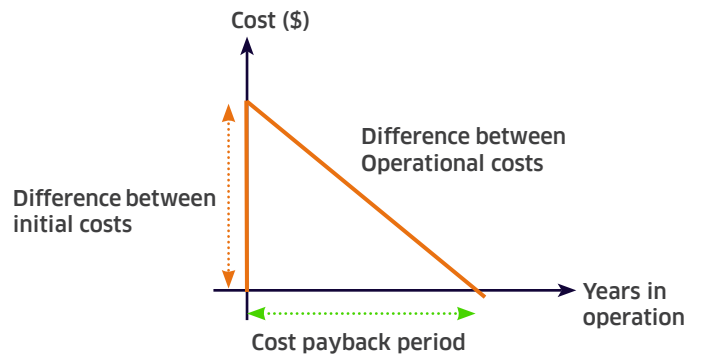
While carbon reduction and environmental sustainability is at the forefront of Thermosash’s values, operational energy reduction is a commercial benefit to building occupiers. An inefficient design is not noticed in the construction phase, but is paid for over the life of the building. Thermosash’s energy efficiency modelling is intended to reduce this ongoing cost.

To highlight the benefit over time, the below example table demonstrates the ongoing savings over 25 years and 50 years comparing a Reference model to different Thermosash systems.

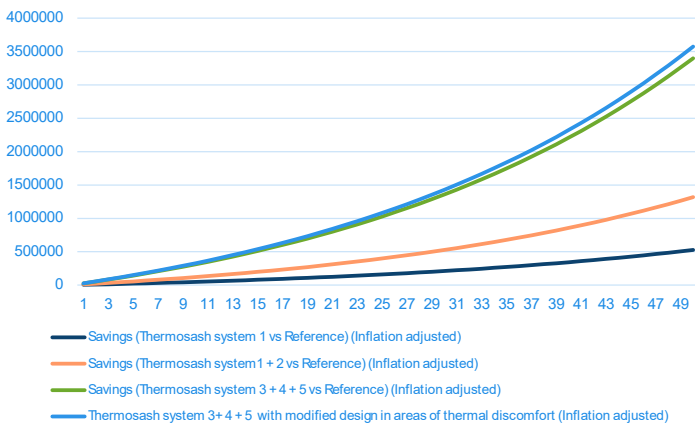
The advantage of selecting our most efficient systems is depicted in the graph which shows a potential savings of around \$3.5 million on energy costs over 50 years, assuming an inflation rate of 3.4%.

### The payback period

Thermosash also calculates the payback period by comparing the difference in initial costs – based on the selected panels – with the difference in operational energy costs over the years in operation, helping clients understand when their investment will pay off.



Cost saving over 50 years with 3.4% inflation



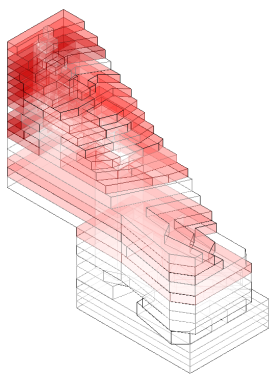
Option	Total load (MWh)	Annual cost (NZD)	Savings (NZD/year)	25-year savings (NZD) (3.4% Inflation adjusted)	50-year savings (NZD) (3.4% Inflation adjusted)
Reference	653.9	215,787	-	-	-
Thermosash system 1	641.59	211,725	4,062	151,188	527,790
Thermosash system 1 + 2	623.49	205,752	10,035	375,668	1,318,817
Thermosash system 3+ 4 + 5	575.51	189,918	25,869	968,427	3,399,750
Thermosash system 3+ 4 + 5 with modified design in areas of thermal discomfort	571.45	188,578	27,208	1,018,554	3,575,723



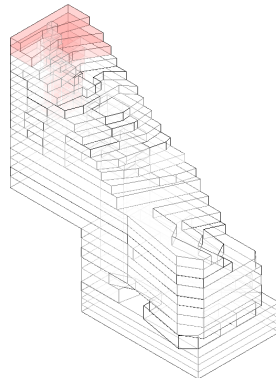
# Thermal Comfort Analysis

Occupant well being is an important aspect of design.

Thermosash analyses the thermal conditions of interior spaces to offer our clients the most effective solutions for improved occupant comfort.



Areas experiencing thermal discomfort in different months based on the reference design



Areas experiencing thermal discomfort in different months based on the optimised design

### Comparing thermal comfort

Analysing thermal comfort and ensuring comfortable interior spaces has a direct impact on occupants' well-being. In recent years, thermal comfort—especially in the context of future changes in climate—has become an increasingly important aspect of design.

Thermosash not only focuses on reducing heating loads through efficient systems tailored for each project, but also analyses the thermal comfort conditions of interior spaces. We aim to offer clients the most effective solutions to improve comfort, such as applying solar shading in thermal discomfort areas. To provide these design options, Thermosash thoroughly analyses the proposed solutions based on total loads, impacts on solar radiation, glare, and other key factors. Then selects a high performance Thermosash solution to optimise thermal comfort.

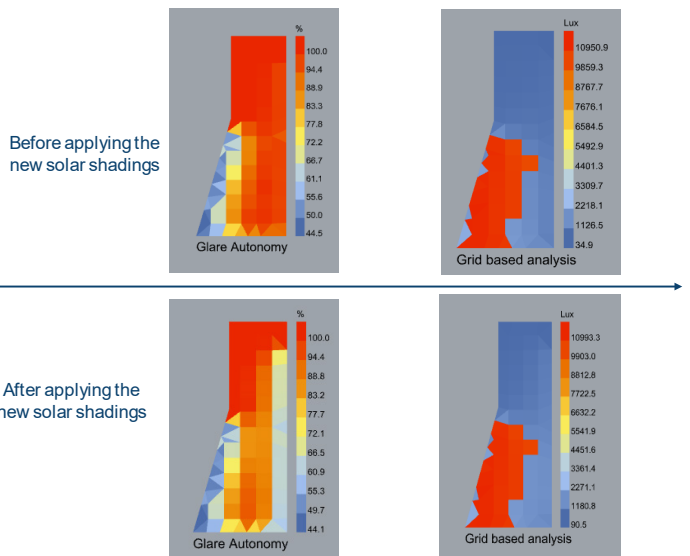
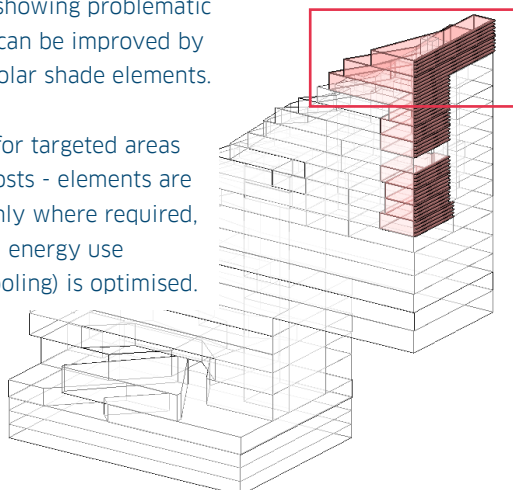
# Daylight & Glare Analysis

Optimising operational energy through solar control.

Thermosash analyses the daylight and glare factors in a project to maximise natural light and minimise visual discomfort.

Modelling showing problematic areas that can be improved by installing solar shade elements.

Designing for targeted areas saves on costs - elements are installed only where required, and overall energy use (heating/cooling) is optimised.





# Green Star Certification

Assisting with project sustainability goals.

Thermosash can make a positive contribution towards achieving Green Star credits.

## NZGBC Green Star Ratings

- 4-star rating requires 15+ points
- 5-star rating requires 35+ points
- 6-star rating requires 70+ point

Thermosash can contribute directly or indirectly to at least:

- 9 credit categories, worth up to 28 points.
- With the potential to add value of up to 35 points.

## GBCA Green Star Ratings

- 4-star rating requires 15+ points
- 5-star rating requires 35+ points
- 6-star rating requires 70+ point

Thermosash can contribute directly or indirectly to at least:

- 9 credit categories, worth up to 25 points.
- With the potential to add value of up to 33 points.

### New Zealand Green Star credit scores

Core Greenstar credit assistance
<ul style="list-style-type: none"> <li>▪ Responsible Envelope – 4 points</li> <li>▪ Responsible Finishes – 2 points</li> <li>▪ Exposure to Toxins – 2 points</li> <li>▪ Climate Change Resilience – 1 point</li> <li>▪ Operations Resilience – 2 points</li> <li>▪ Upfront Carbon Emissions – 8 Points</li> <li>▪ Energy Use – 7 points</li> <li>▪ Thermal Comfort and Amenity Spaces – 2 Points</li> </ul>
Added value contributions
<ul style="list-style-type: none"> <li>▪ Responsible Procurement – 1 point</li> <li>▪ Verification and Handover – 1 point</li> <li>▪ Design for Inclusion – 3 points</li> <li>▪ Clean air – 2 points</li> <li>▪ Light Quality – 4 points</li> <li>▪ Acoustic Comfort – 2 points</li> <li>▪ Connection to Nature – 2 points</li> <li>▪ Heat Resilience – 1 points</li> <li>▪ Grid Resilience – 4 points</li> <li>▪ Other Carbon Emissions – 4 points</li> <li>▪ Life Cycle Impacts – 2 points</li> <li>▪ Contribution to Place – 2 points</li> <li>▪ Procurement and Workforce Inclusion – 3 points</li> </ul>
Other impacts
<ul style="list-style-type: none"> <li>▪ Responsible Construction – 1 point</li> <li>▪ Industry Development – 1 point</li> <li>▪ Inclusive Construction Practices – 1 point</li> </ul>

### Australia Green Star credit scores

Core Greenstar credit assistance
<ul style="list-style-type: none"> <li>▪ Responsible Envelope – 4 points</li> <li>▪ Responsible Finishes – 2 points</li> <li>▪ Exposure to Toxins – 2 points</li> <li>▪ Climate Change Resilience – 1 point</li> <li>▪ Operations Resilience – 2 points</li> <li>▪ Upfront Carbon Emissions – 6 Points</li> <li>▪ Energy Use – 6 points</li> <li>▪ Thermal Comfort and Amenity Spaces – 2 Points</li> </ul>
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**Thermosash Commercial Limited | [www.thermosash.co.nz](http://www.thermosash.co.nz)**

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