



---

# HIGH PERFORMANCE HOUSE WITH WARMFRAME™ TECHNOLOGY

---



## ABOUT THIS PUBLICATION

### AUTHORS

Libby Elmore and Andrea Blackmore

### ABSTRACT

This publication was produced by Beacon Pathway as a 'look book' for the High Performance House built initially at the Prefab NZ Home Innovation Village (HIVE).

### REFERENCE

Elmore, L. and Blackmore, A. May 2013. The High Performance House with Warmframe™ technology. Publication PUB/18 for Beacon Pathway Inc.

### RIGHTS

Beacon Pathway Incorporated reserves all rights in the Report. The Report is entitled to the full protection given by the New Zealand Copyright Act 1994 to Beacon Pathway Incorporated.

### DISCLAIMER

The opinions provided in the Report have been provided in good faith and on the basis that every endeavour has been made to be accurate and not misleading and to exercise reasonable care, skill and judgment in providing such opinions. Neither Beacon Pathway Incorporated nor any of its employees, subcontractors, agents or other persons acting on its behalf or under its control accept any responsibility or liability in respect of any opinion provided in this Report.

---

# HIGH PERFORMANCE HOUSE WITH WARMFRAME™ TECHNOLOGY

---

# PROJECT BACKGROUND

The High Performance House brings together an innovative new building system, Warmframe™, with Salmond Architecture's High Performance Houses™ design and other energy and water saving products.

The house showcases the benefits of off-site construction (lower build costs and speed and quality of construction) and excellent performance (warm, healthy, energy and water efficient, low running costs).

### Warmframe™ technology

Warmframe™ combines steel framing, insulation and double glazing into a composite building system. Insulation, cut to measure and installed to a very high standard, is added to dimensionally accurate steel framing. The Warmframe™ system fully insulates steel framing, providing a complete thermal wrap of the home. It incorporates low e, argon-filled double glazed windows and doors with thermally broken aluminium frames. Cladding and coatings can be added in the factory also.

In combination, these products create a building system significantly better insulated than Building Code minimums.

	Building Code minimums	High Performance House
Ceiling	R3.3	R5.0
Floors	R1.3	R2.5
Walls	R2.0	R4.0 / R3.5
Windows	R0.26	R0.43

### Warmframe™ offers the benefits of:

- Off-site construction - With Warmframe™, an entire house can be built in the factory. This has the potential to lower construction (and therefore purchase) costs because of the accuracy and reduced wastage possible in a factory, and because of the speed of offsite fabrication in a controlled and secure environment with no weather delays (no waiting for framing to dry out!). The High Performance House was built off-site over ten weeks including framing, insulation, windows, cladding, lining and coatings. The entire house was then moved to its site at HIVE.
- High performing house – Warmframe™ provides a way to insulate steel framing to a very high standard of thermal performance. The resulting homes should be very warm, healthy and energy-efficient.
- Flexibility of design – Warmframe™ can be applied to any house design – it is a building system, not a particular style of house.

Warmframe™ has been developed in collaboration between partners New Zealand Steel, Frametek-RFS, InsulPro, Fletcher Aluminium, Resene and Beacon Pathway.

### Adaptable design

The High Performance House was designed by Salmond

Architecture using their High Performance Houses™ system. This architecturally designed system uses combinations of pavilions and links to customise homes to meet site, size and budget requirements. Pavilions can be oriented on the site to make the most of the sun or for the best views. They can be added as families grow or as part of a staged building programme.

A range of cladding, roof and fit-out options are available to customise each house. The many varied combinations mean High Performance Houses™ look unique and different for each project.

### Warm, healthy, cost effective living

In addition to good design, high levels of insulation and double glazing, the High Performance House incorporates:

- A photovoltaic energy generation system
- Solar water heating
- A wood pellet burner
- LED and CFL lighting
- Energy and water efficient appliances
- Rainwater tank
- Water efficient toilets, showers and tapware
- Resene Environmental Choice approved paints

Packed with energy and water saving features, this well-designed home will provide good value for years to come. And performing well means reducing operating costs – lower power bills, lower heating bills – and being a healthy comfortable home – warm, dry and wonderful.

### More than just a show home

The High Performance House with Warmframe technology is not just a show home. It is part of a project to push the boundaries in new home design.

The project aims to create a new category of home – a home that has excellent performance (warm, healthy, energy efficient, low water use); a home that costs less to run; and a home that is efficient to build (lowering build costs).

The High Performance House is the first trial of the new Warmframe™ technology. Together with good design, energy and water efficient features, and carefully selected products, it is expected to perform well, now and into the future.

And that's why the High Performance House is more than a show home:

- It's a trial home - testing how well the technologies perform, how efficient the house is, and how affordable and buildable it could be
- It's a monitored home – proving through constant monitoring how warm and dry the house actually is
- It's a demonstration home – showing how warm, comfortable and good value a high performing home can be.

# DESIGN PRINCIPLES

The High Performance House with Warmframe™ technology has been designed with performance in mind.

So what does high performance mean? It means a house which is:

- Adaptable
- Warm, dry and healthy
- Comfortable and spacious
- Efficient and affordable to run
- Resilient
- Future flexible
- Good value

In short, a house you will love to live in.

### Designing for high performance

A lot of thought has gone into the High Performance House to make sure it delivers high performance. The layout of the rooms, the orientation to the sun, new technologies and products – they all combine to meet the design principles behind the house.

How has each design principle been achieved in the High Performance House?

### Adaptable

- Easily adaptable to your site – arrange the pavilions to catch a view, shelter from winds, or make the most of the sun.
- Choose from a range of standard pavilion sizes, roof forms and finishes to meet your needs.
- Exterior walls carry the structure to allow you greater interior flexibility.
- The Warmframe™ building system can be used with almost any designs or plans.

### Warm, dry and healthy

- High levels of insulation (ceiling, walls and floor) to keep the heat in.
- Low e, argon-filled double glazed windows and doors with thermally broken aluminium frames to let the sun's warmth in and keep it there.
- Good solar design lets in the sun in winter and keeps the house cool in summer.
- Wood pellet burner – efficient and economical winter heating for the whole house.
- Bathroom and kitchen ventilation to get rid of moist indoor air – less condensation and mould.
- Low allergen and low VOC products – environmentally certified for better indoor health.

### Comfortable and spacious

- Indoor outdoor flow – plenty of deck area to choose from.
- Large open living area.
- Quiet – sound insulated, internally and externally, for peace and quiet wherever you are.
- Generous storage.

### Affordable to run

- Energy efficient lighting and appliances – keep your power bills down.
- Generate your own energy with a photovoltaic system – watch your power bills go down and get credits from your power company!
- Solar water heating – use the sun's free energy to cut down on water heating bills.
- Water efficient taps, showers and appliances – using less water will reduce any water charges, now and into the future.

### Resilient

- Rainwater tank – collecting and using rainwater means you will always have access to water, even in disasters.
- Strong steel structure and lightweight steel roof - in the wake of the Canterbury earthquakes, engineers have strongly recommended lightweight metal roofing.

### Future flexible

- The High Performance Houses™ pavilion system means you can stage building to suit your budget.
- Allows for changes in family and needs – easy to add extra bedrooms.
- Designed on Lifemark™ principles - simple, commonsense design standards that make it safe and easy for people to continue living in their own home as their needs change.

### Good value

- Cost competitive – off-site construction using Warmframe™ means savings on the build that are passed on to buyers.
- Range of house sizes and budgets to suit all.
- Durable – products and finishes are long lasting for less maintenance and replacement.

---

# PROJECT PARTNERS

The High Performance House with Warmframe™ technology is the result of an extensive collaboration between industry partners.

Together, New Zealand Steel, Frametek-RFS, InsulPro, Fletcher Aluminium, Resene and Beacon Pathway shared a vision: that an innovative solution could provide a new approach to house construction, making the most of off-site construction and resulting in excellent home performance.

As part of a wider programme of research and innovation, the partners sought the answers to these questions:

- How can we make new homes perform well (warm, healthy, resource efficient)?
- How can we reduce the cost of purchase and operation for new homes?
- How can we take time and cost out of traditional construction processes?

Each partner has brought their expertise and knowledge of their own products to the research and development process.

---

# NEW ZEALAND STEEL



New Zealand Steel is the country's sole producer of flat rolled steel products for the building, construction, manufacturing and agricultural industries.

The company includes both steelmaking and mining operations. The ironsand comes from the Waikato North Head mine site and concentration plant, which supplies ironsand to the steel mill at Glenbrook, as well as to customers in North Asia. New Zealand Steel is unique among world steelmakers in its use of ironsand to make iron and steel.

New Zealand Steel's fully integrated steel mill produces a

range of flat steel products for both domestic and export markets. Slabs are rolled into hot and cold rolled products, which are then on-sold or further processed into products like hollow sections, galvanised steel, ZINCALUME® steel and COLORSTEEL® steel. Approximately 650,000 tonnes of steel are produced each year.

Warmframe™ uses Axxis® steel, made by New Zealand Steel, a galvanised, high-tensile steel specifically designed for New Zealand's house-framing market.

[www.axxis.co.nz](http://www.axxis.co.nz)  
[www.nzsteel.co.nz](http://www.nzsteel.co.nz)

# INSULPRO

CREATING BETTER ENVIRONMENTS WITH POLYESTER INSULATION



InsulPro

InsulPro is a New Zealand owned and operated manufacturer of polyester thermal and acoustic insulation. They supply the local New Zealand market and export a range of insulation products for the home or commercial building.

InsulPro products are an integral part of the Warmframe™ system, combining snugly fitting insulation solutions

with steel framing, to provide the best possible thermal performance. Innovations in the installation of insulation around the steel framing have also improved thermal performance.

[www.insulpro.co.nz](http://www.insulpro.co.nz)  
0800 100 007

# RESENE

THE PAINT THE PROFESSIONALS USE



Established in 1946, Resene manufactures colours, coatings, wood stains and paints for exterior and interior house painting plus commercial, industrial and marine painting applications. Innovation has been a cornerstone of Resene's success from environmental sustainability, to new colour technologies, to healthier low and no VOC options.

With Resene's innovative technologies, Warmframe™ is a high quality finished product. Resene's extensive research and development brings some exciting new products to be showcased as part of Warmframe™. These include super

durable paint and coating systems which will reduce maintenance, and VOC-neutralising coatings to make homes healthier. Another innovative technology is CoolColour™ technology which keeps the coating, substrate and surface cooler, helping to minimise heat transference inside, reduce stress on the coating and substrate, and increase the expected lifetime of each compared to a standard version of the same colour.

[www.resene.co.nz](http://www.resene.co.nz)

# FRAMETEK-RFS

STEEL FRAMING SPECIALISTS



Frametek-RFS has 15 years of knowledge and passion for producing rollformed steel profiles. It provides rollforming manufacturing services to customers in New Zealand and Australia.

Warmframe™ uses Axxis® steel made by New Zealand Steel and rollformed by Frametek-RFS. Rollforming is a crucial

part of the Warmframe™ building system. Careful planning and precision cutting to ensure maximum accuracy and best fit are a key part of the success of Warmframe™.

[www.axxis.co.nz](http://www.axxis.co.nz)  
[www.nzsteel framing.co.nz](http://www.nzsteel framing.co.nz)  
[www.frametek.co.nz](http://www.frametek.co.nz)

# FLETCHER ALUMINIUM



Fletcher Aluminium designs, develops and manufactures premium aluminium extrusions for an extensive range of industries; whether it is windows and doors, commercial systems or specialist aluminium extrusion for private supply. The company's investment in world-class technology and design is reflected in a diverse range of high performing products.

High performance double glazing (low e, argon filled glass, thermally broken aluminium frames) is an essential part of Warmframe™. Installing windows and doors off-site means

that greater precision is possible and the entire wall (or even building) can be transported to site already weathertight. Glazing is the weakest point of a thermal envelope once floor, ceiling and walls have been insulated so double glazing is critical to the high performance result of Warmframe™.

Fletcher Aluminium doors and windows are supplied and installed by four franchise brands: Rylock, Fisher, Nebulite and Vistalite.

[www.fletcheraluminium.co.nz](http://www.fletcheraluminium.co.nz)

# BEACON PATHWAY

CREATING HOMES AND NEIGHBOURHOODS THAT WORK WELL INTO THE FUTURE AND DON'T COST THE EARTH



Beacon Pathway is an Incorporated Society committed to transforming New Zealand's homes and neighbourhoods through research and demonstration projects that show how to make homes more resource efficient, healthier to live in, adaptable, resilient and affordable.

Beacon has a great track record in demonstration projects, having completed several 'design+build+monitor' new homes, a ten home sustainable renovation project, and a large scale 650 home renovation project. Beacon takes a collaborative approach to creating change, drawing on an extensive network across the housing industry and

facilitating multi-partner programmes of work.

Beacon facilitated the innovation process in the development of Warmframe™, and project managed the design and construction of the High Performance House.

Beacon's members include: EECA, Christchurch City Council, Certified Builders, New Zealand Steel, Resene, Fletcher Aluminium, and InsulPro Manufacturing.

[www.beaconpathway.co.nz](http://www.beaconpathway.co.nz)

---

## PRODUCT AND SERVICE SUPPLIERS

---



# CONTENTS

.....

Product and services suppliers are listed alphabetically by name of supplier.

## Services

Architect – Salmond Architecture	64
Builder – Dan Saunders of Russell Lilley Construction	18
Interior design – Libby Beattie Interior Design	44

## Warmframe™

Framing – Frametek-RFS / New Zealand Steel	34
Insulation – InsulPro	38
Windows – Fletcher Aluminium	32

## Cladding and Lining

Cedar wall cladding – JSC Timber	42
Internal linings – Winstone Wallboards	76
Roof cladding, spouting and downpipes – Steel & Tube / New Zealand Steel	68
Paint – Resene	62

## Flooring

Engineered timber floor – CHH Woodproducts / PlaceMakers	14
Laminate flooring – Ecodure Oak Flooring Systems	24
Tiles – The Tile Shoppe	70
Carpet tiles – INZIDE Commercial	40

## Photovoltaic System

LG solar panels – NZ Clean Energy Systems	54
Inverter – EnaSolar	26

## Heating

Wood pellet fire – Nature’s Flame	50
Solar water heater – Nature’s Flame	48

## Plumbing and Lighting

Rainwater tank – Devan Tanks	22
Plumbing products – Plumbing World	60
Lighting – INLITE	36

## Kitchen, Laundry, Joinery

Appliances – Fisher & Paykel	30
Kitchen, laundry and wardrobes – Euroform Kitchens and Furniture	28

## Interior Decoration

Dining room table – Tréology	74
Dining room chairs – Thonet New Zealand	72
Coffee and bedside tables – Classique Furniture	16
Sofa – David Shaw Furniture	20
Living room rug – Nick Radford Rugs	52
Living room chairs – Montreux Furniture	46
Window treatment – SP Blinds	66

## Landscaping and Outdoor

Decking – NZ Equipment	56
Outdoor table and chairs – Perfect Pieces	58

# CHH WOOD PRODUCTS / PLACEMAKERS

## ENGINEERED TIMBER FLOORING

CHH Woodproducts manufactures and markets a full range of wood based building products, including timber, plywood, Laminated Veneer Lumber (LVL), particleboard and a range of interior decorative products, supplied from nine major manufacturing operations spread throughout New Zealand. The floor was supplied through PlaceMakers, New Zealand's leading and largest supplier of building materials and hardware.

The engineered timber floor in the High Performance House is made with hyJOIST™ NZ Engineered I-Joists. This composite product uses T&G eco ply covered in an oak laminate covering. Beneath the ply are wooden laminated veneer lumber (LVL) 'I' beams supported on the hyJOIST™ I-joists. Under these are timber piles cast into concrete.

### Why hyJOIST™ NZ Engineered I-Joists?

- Tested engineering values – EWPAA certified
- Manufactured from sustainably grown NZ plantation pine – FSC certified
- Variety of sizes provides greater design flexibility for cost effective floor layouts
- Lightweight – half the weight of equivalent conventional softwood joists
- Easier installation of services within the floor space
- Straight, uniform & dimensionally stable

[www.chhwoodproducts.co.nz](http://www.chhwoodproducts.co.nz)

[www.placemakers.co.nz](http://www.placemakers.co.nz)





# CLASSIQUE FURNITURE

---

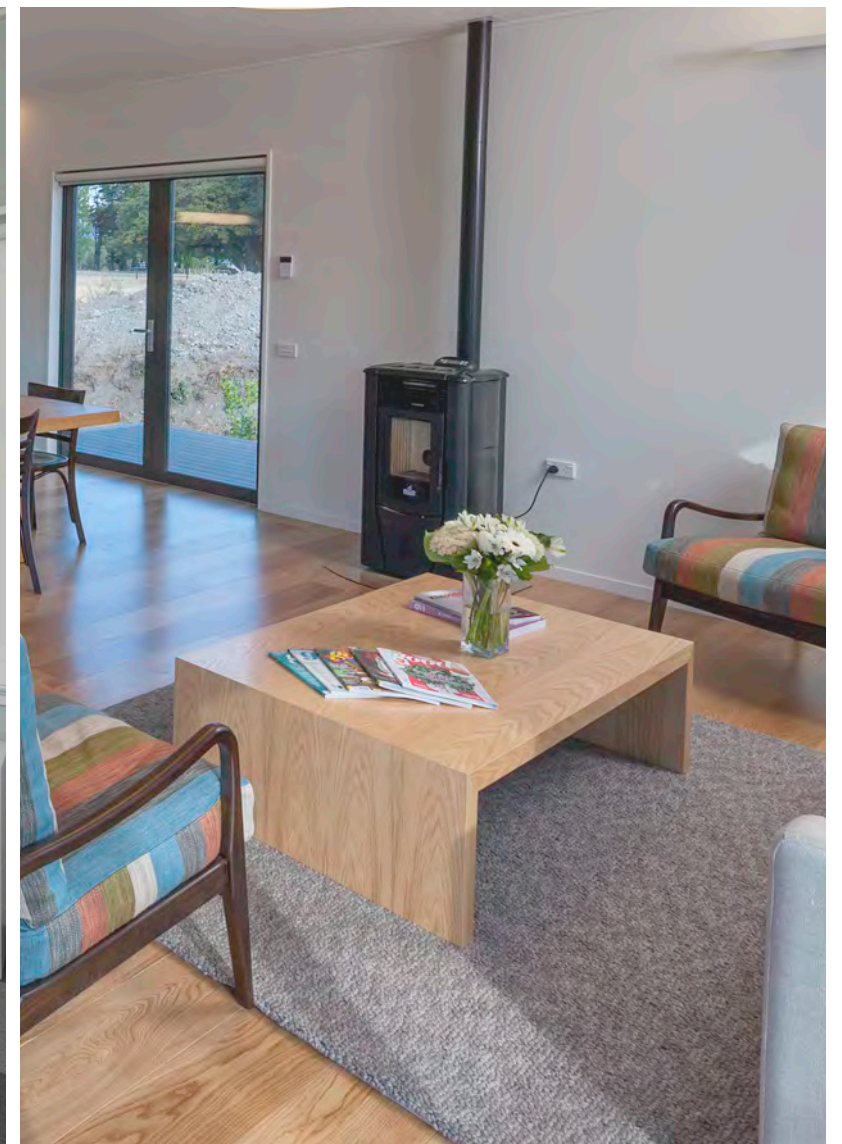
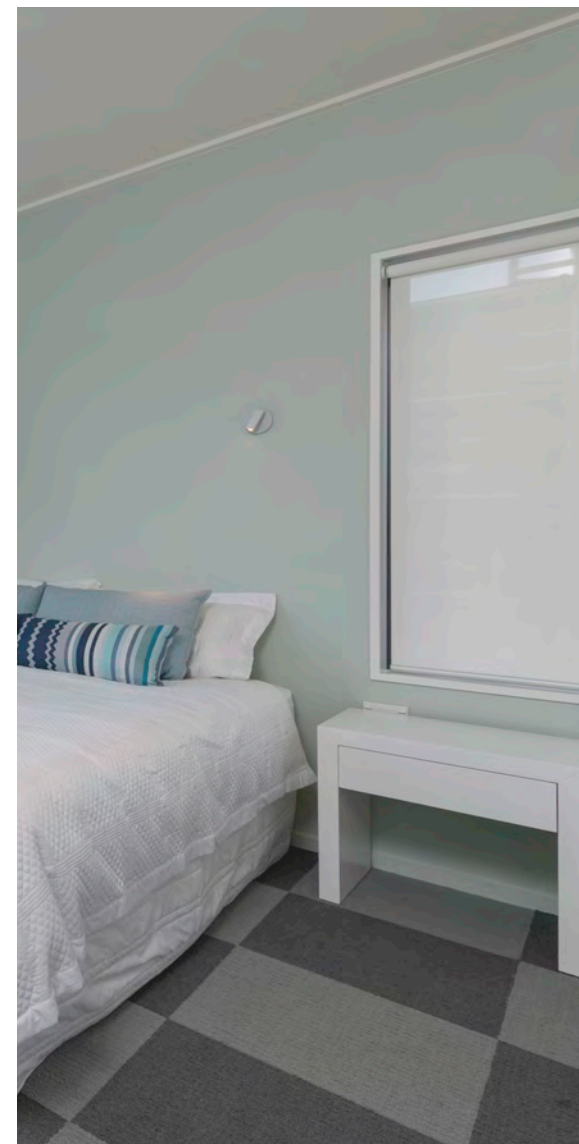
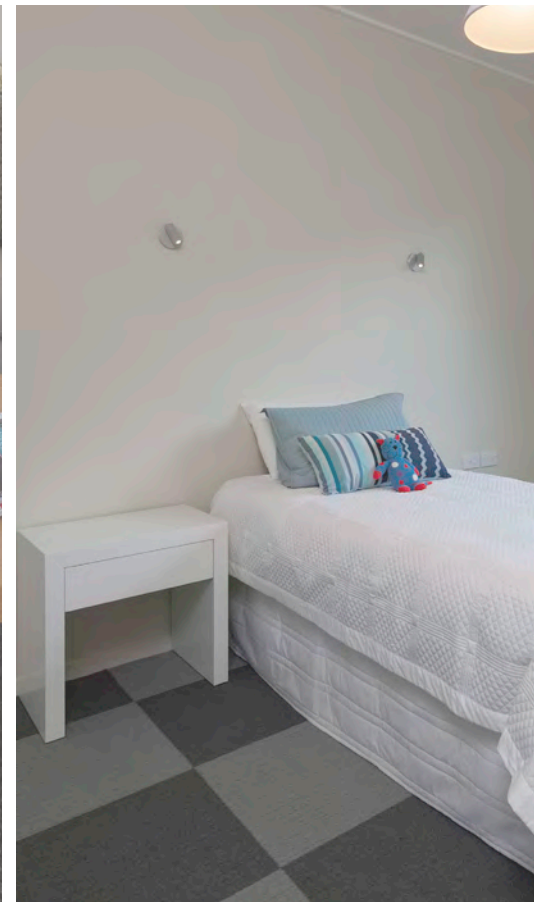
## COFFEE AND BEDSIDE TABLES

Classique Furniture is a local Christchurch business providing stylish dining, occasional and side tables. The prestigious awards received in recent years for Classique Furniture are a culmination of years of experience and a striving for quality by designer/craftsman Graeme Dreaver.

Classique Furniture produces distinctive, stand alone designs that are recognised and admired throughout Australasia. Made from a wide range of solid timbers and MDF with veneered finishes such as specialty imported European Beech, American maple and Sapele Mahogany, each individual piece is hand finished and hand polished by a team of craftsmen. Each design is made to exact standards ensuring it will retain its original lustre and great looks for years to come.

Classique Furniture has provided the Cubo coffee table and bedside tables in the High Performance House.

[www.classiquefurniture.co.nz](http://www.classiquefurniture.co.nz)





# DAN SAUNDERS

RUSSELL LILLEY CONSTRUCTION

## BUILDER

Dan Saunders is a Director of Russell Lilley Construction with 18 years' experience in the building industry. As Registered Building Practitioners, Russell Lilley Construction can provide all building requirements for new quality housing, commercial, maintenance and repairs.

Dan Saunders has experience in steel framing, under the commercial name of Steely Dan Steel Buildings Ltd. This has stood him in good stead for the High Performance House.

[www.russelllilleyconstruction.com](http://www.russelllilleyconstruction.com)  
[www.steelydan.co.nz](http://www.steelydan.co.nz)





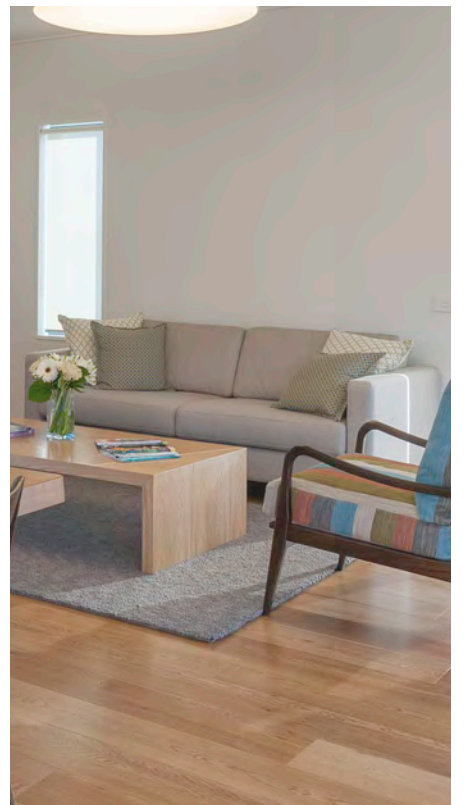
# DAVID SHAW FURNITURE

---

## SOFA

The Charlie sofa in the High Performance House was provided by David Shaw Furniture. With showrooms in Christchurch, Wellington and Auckland, David Shaw has been designing and manufacturing exclusive quality furniture for over 30 years.

[www.davidshaw.co.nz](http://www.davidshaw.co.nz)





# DEVAN TANKS

## RAINWATER TANK

Devan Tanks has been manufacturing water tanks in New Zealand since October 1988. Their core business is the manufacture of water tanks for agricultural, rural lifestylers, domestic market and commercial sectors. Devan also provides septic tanks and wastewater treatment systems for households. Devan tanks are made of rotationally moulded plastic. Sizes range from 600-30000 litres.

Devan tanks has supplied a 1000 litre slimline tank for the High Performance House.

### Why Devan tanks?

- Devan tanks are extensively developed and tested, and come with extended warranties.
- Devan tanks are manufactured from specifically designed polyethylene which will not degrade, and are UV stabilised for New Zealand conditions.
- Tanks are also resistant to algae growth as a result of the polyethylene formulation.
- Devan tanks are strong and durable – computer controlled rotational one-piece moulding reduces stress points and tanks comply with AS/NZS 4766:2006.
- Devan has a Product Stewardship scheme called the Tank Take Away Programme. When customers purchase a large Devan tank, unwanted or badly damaged plastic water tanks will be collected and recycled.

[www.devan.co.nz](http://www.devan.co.nz)





# ECODURE OAK FLOORING SYSTEMS

---

## LAMINATE FLOORING

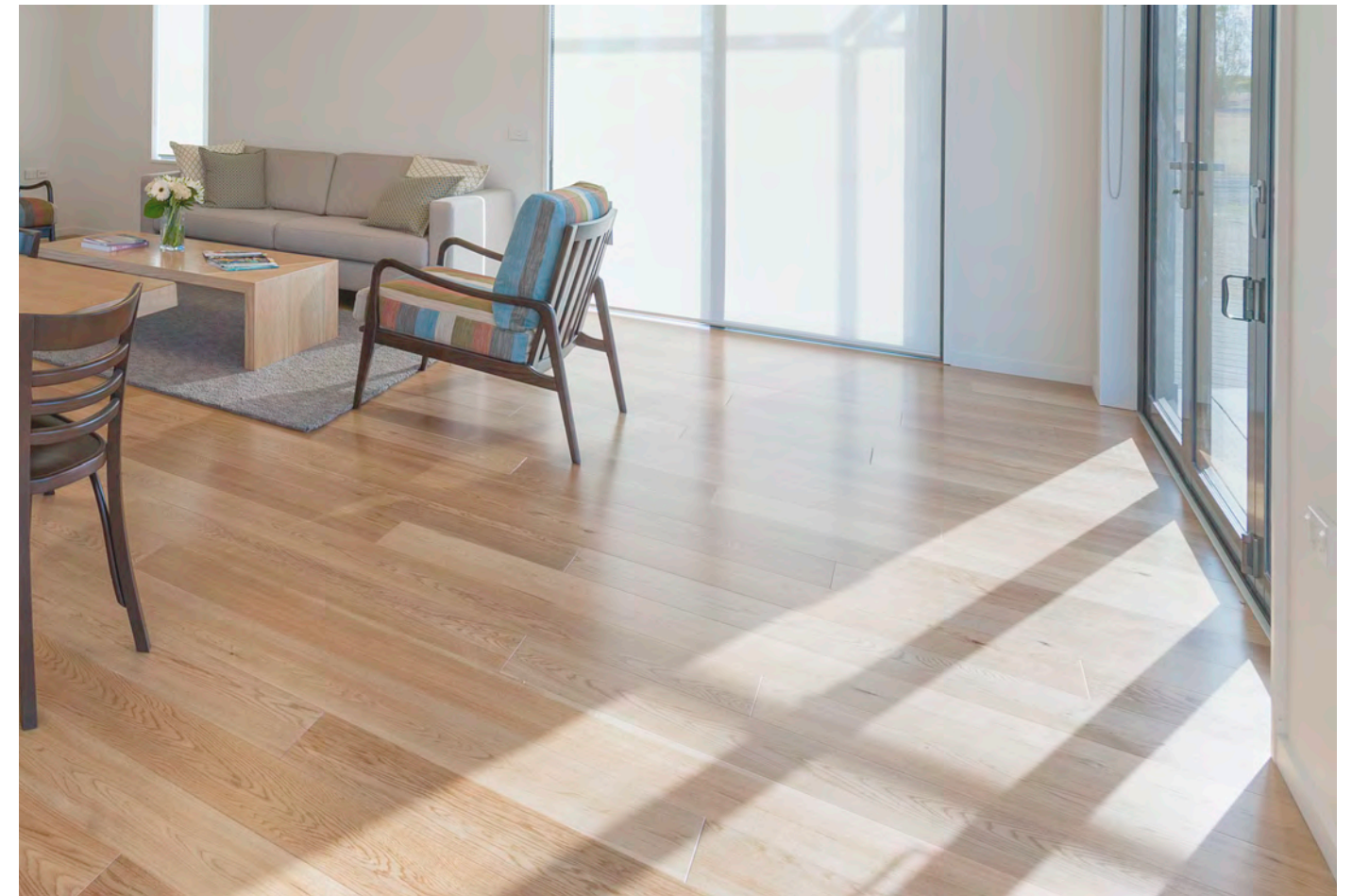
Oak Flooring Systems, a division of Bamboo Flooring Systems, stocks the premium European Ecodure range of laminate oak flooring.

The High Performance House uses Natural Oak 180mm laminate single click planks. These have a 3-ply engineered construction with a 4mm top layer of solid European Oak and spruce poplar backing. The planks are finished with 9 coats of water-based, solvent-free polyurethane with top quality German Treffert UV and scratch-resistant coating.

### Why Ecodure flooring?

- As it is fully factory finished, there is no need for on-site staining, sanding or polyurethaning.
- Solid ply construction is very stable and warp-resistant.
- Easy to clean – no need for vacuuming or messy wet mopping, just a simple sweep and swish with a microfibre mop is all that is needed.

[www.oak-flooring.co.nz](http://www.oak-flooring.co.nz)





# ENASOLAR

## INVERTER

Based in Christchurch, New Zealand EnaSolar is a wholly owned and operated solar division of Enatel Ltd. Enatel is one of the key providers of standby DC power solutions to the global market.

EnaSolar has provided the solar inverter for the High Performance House photovoltaic system. An inverter changes the DC electricity produced by the panels into alternating current (AC) electricity.

Why an EnaSolar inverter?

- Built-in Wi-Fi as standard for web based system monitoring and reporting.
- Integrated lockable DC and AC isolating switches. Fully compliant to NZ electrical safety standards.
- Front mounted heat sink allows more airflow, easy care and cleaning.
- Wide operating voltage range.
- Durable – 5 year warranty as standard and an efficient design for longer life and less call outs.
- EnaSolar's inverters are grid tied – they feed any excess electricity produced back into the utility grid; this surplus is credited to your electricity account.

[www.enasolar.net](http://www.enasolar.net)



# EUROFORM KITCHENS AND FURNITURE

## KITCHEN, LAUNDRY AND WARDROBES

Euroform Kitchens and Furniture is a local Christchurch business specialising in high quality joinery, kitchens and bathrooms and shop fittings. Euroform offers a design, build and installation service. All kitchens and joinery are custom made in their factory, and onsite installation is done by their professional team.

The kitchen in the High Performance House was designed and built by Euroform. The kitchen includes:

- All cabinetry doors/drawers painted in Resene Truffle and lacquered.
- American White Ash shelves.
- Island back and side panel is Laminex Metaline in "Style Queen" (aluminium based product, designed for splashbacks).
- Island bench top is Caesarstone in Osprey.
- Sink is Mercer Palio bowl under-mounted.
- Elite Flat Cross Bar handles with brushed nickel finish.

Euroform also built and supplied the wardrobes and laundry joinery.

[www.euroform.co.nz](http://www.euroform.co.nz)





# FISHER & PAYKEL

## APPLIANCES

Fisher & Paykel Appliances designs, manufactures and markets a range of innovative household appliances developed with a commitment to technology, design, user friendliness and environmental awareness.

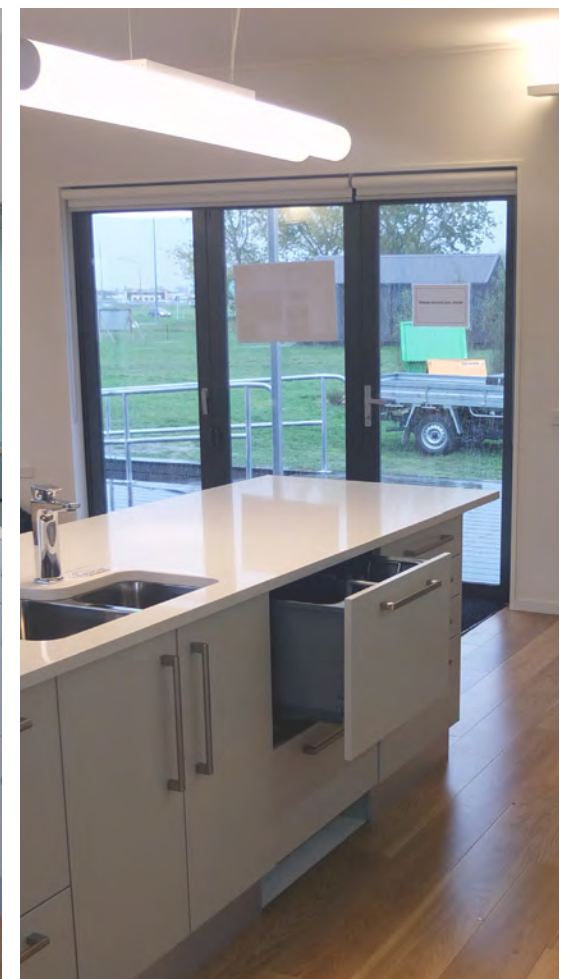
Products supplied for the High Performance House include:

- A frameless glass ceramic cooktop
- An ActiveSmart™ fridge freezer with a 2 star energy rating
- A double built in wall oven
- A double dish drawer with a 3.5 star energy rating and a 4.5 star WELS rating
- A front loading washing machine with a 3 star energy rating and a 4.5 star water rating

Why Fisher and Paykel appliances?

- Energy efficient appliances will help reduce power costs.
- Water efficient appliances will help reduce use of reticulated water, reducing the costs of supplying treated water to the region.
- Fisher & Paykel takes care to ensure appliances reduce impact on the environment throughout their lifetime. Scarce material is used sparingly while hazardous materials such as CFCs have been eliminated.
- All Fisher & Paykel products are designed to reduce energy and water consumption for the end user.

[www.fisherpaykel.co.nz](http://www.fisherpaykel.co.nz)





# FLETCHER ALUMINIUM

## WINDOWS

Fletcher Aluminium designs, develops and manufactures premium aluminium extrusions for an extensive range of industries; whether it is windows and doors, commercial systems or specialist aluminium extrusion for private supply. The company's investment in world-class technology and design is reflected in a diverse range of high performing products.

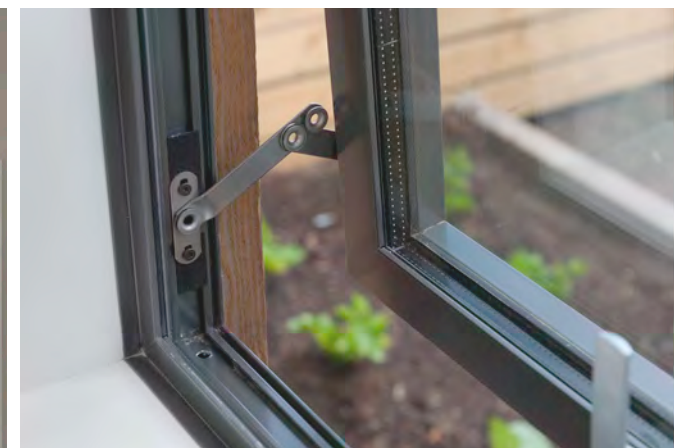
Fletcher Aluminium has provided awning windows, skylights and sliding doors from their Pacific Residential Suite for the Warmframe™ system used in the High Performance House. All windows and doors used low e glass with argon gas filled double glazing in thermally broken frames.

The windows were supplied and installed by Rylock which is one of four franchise brands producing Fletcher Aluminium window and door systems; the other three being Fisher, Nebulite and Vistalite.

Why Fletcher Aluminium windows and doors?

- A cleverly designed drainage system deals with any condensation that may form on the window.
- Performs well up to a very high wind zone – beyond Very High (1760pa ultimate wind pressure).
- Thermal breaks in aluminium frames reduce heat loss through the frames and make windows perform better.

[www.fletcheraluminium.co.nz](http://www.fletcheraluminium.co.nz)





# FRAMETEK - RFS / NEW ZEALAND STEEL

## FRAMING

Frametek-RFS has 15 years of knowledge and passion for producing rollformed steel profiles. It provides rollforming manufacturing services to customers in New Zealand and Australia.

Warmframe™ uses Axxis® steel made by New Zealand Steel and rollformed by Frametek-RFS. Rollforming is a crucial part of the Warmframe™ building system. Careful planning and precision cutting to ensure maximum accuracy and best fit are a key part of the success of Warmframe™.

Axxis® Steel for Framing is a galvanised, high-tensile steel specifically designed for New Zealand's house-framing market. It is:

- Cost effective – straight, clean, strong and stable and can be installed in any weather. The frames arrive on site as either knock down or pre-assembled. They are accurate, easily identifiable, and screw fixed (no welding required). Pre-punched plumbing and electrical service holes mean sub trades are installing services their first day on site.
- Durable – a galvanized 100% zinc coating, complete with a 50 Year Durability Statement.
- Stable – it does not expand or contract with moisture or temperature changes.
- Less wasteful – less construction waste due to the pre-manufactured process off site, reducing costs and the environmental impact of building.
- Environmentally friendly – 100% recyclable when the building is demolished.
- Healthy – no preservative chemicals and awarded the Sensitive Choice blue butterfly by The Asthma Foundation.

[www.axxis.co.nz](http://www.axxis.co.nz)

[www.nzsteel framing.co.nz](http://www.nzsteel framing.co.nz)

[www.frametek-rfs.co.nz](http://www.frametek-rfs.co.nz)

[www.nzsteel.co.nz/products/axxis-steel-for-framing](http://www.nzsteel.co.nz/products/axxis-steel-for-framing)





# INLITE

## LIGHTING

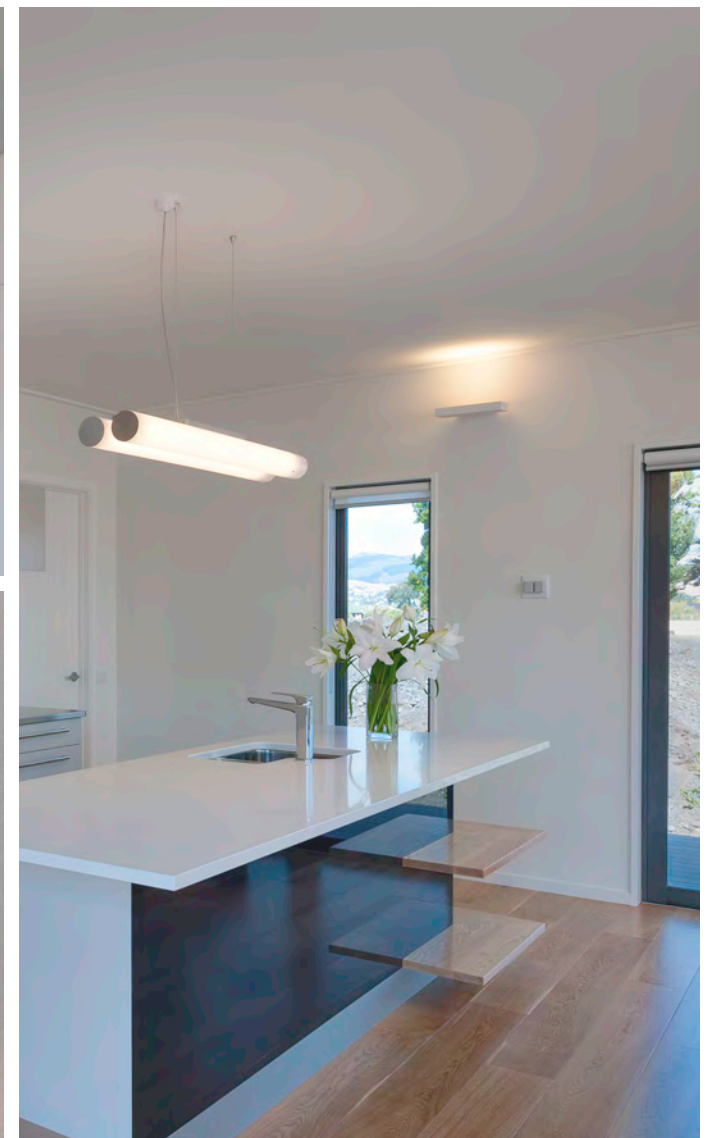
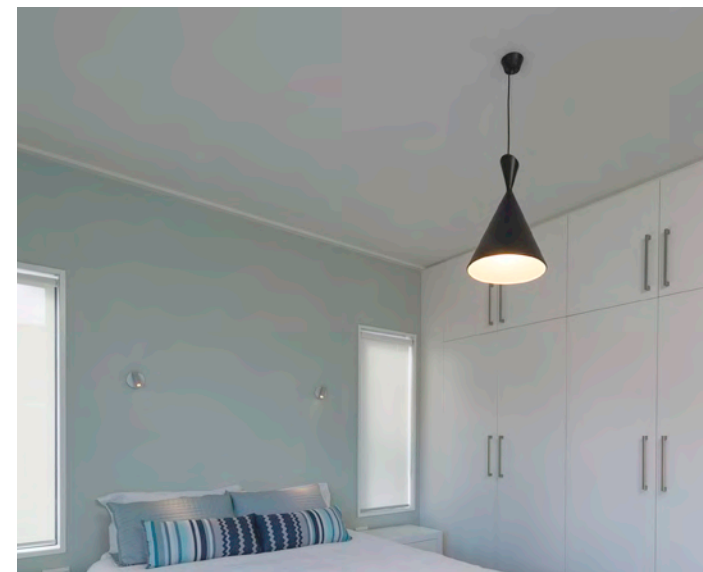
INLITE is a supplier of high-end architectural lighting solutions to the Australian and New Zealand architecture and design community. Utilising the development and support from key European suppliers such as Delta Light and Meyer, INLITE today represents some of the world's most technically advanced and creative producers of lighting instruments. With offices in New Zealand and Australia, INLITE offers the capacity to provide skilled advice, design and project delivery on scales large and small.

The High Performance House uses only LED and CFL lighting including the following products: Platform, Gala, Nanoo and Puk wall lights, Supernova, Be Cool, Husk and Nyx pendant lights, LED ribbon strip lighting (wardrobes, kitchen and laundry cupboards) and a recessed linear light. The INLITE products incorporated in the scheme have been carefully appointed to provide a timeless and minimalistic aesthetic fully integrated with the architectural language. A scheme of recessed, surface mounted and suspended fittings has successfully contributed towards an effective design, without imposing on the end user's individual style.

Why an LED / CFL lighting scheme?

- Effectively contributes towards the principles of: adaptability, comfort, good value and efficiency.
- High performance and quality
- Sustainable and affordable to run – LED lighting uses at least 75% less energy than incandescent lighting, saving on operating expenses.
- LED lighting lasts 35 to 50 times longer than incandescent lighting and about 2 to 5 times longer than fluorescent lighting.
- LED lighting is durable — won't break like a bulb.
- There is an increasing range of options and costs are coming down.

[www.inlite.co.nz](http://www.inlite.co.nz)





# INSULPRO

## INSULATION

InsulPro is a New Zealand owned and operated manufacturer of polyester thermal and acoustic insulation. They supply the local New Zealand market and export a range of insulation products for the home or commercial building.

A range of InsulPro acoustic and thermal insulation products are used in the High Performance House; they are NOVATHERM ceiling, wall and underfloor insulation, NOVAHUSH acoustic insulation for internal walls, and NOVAHUSH Bafflestack for the ceiling cavity.

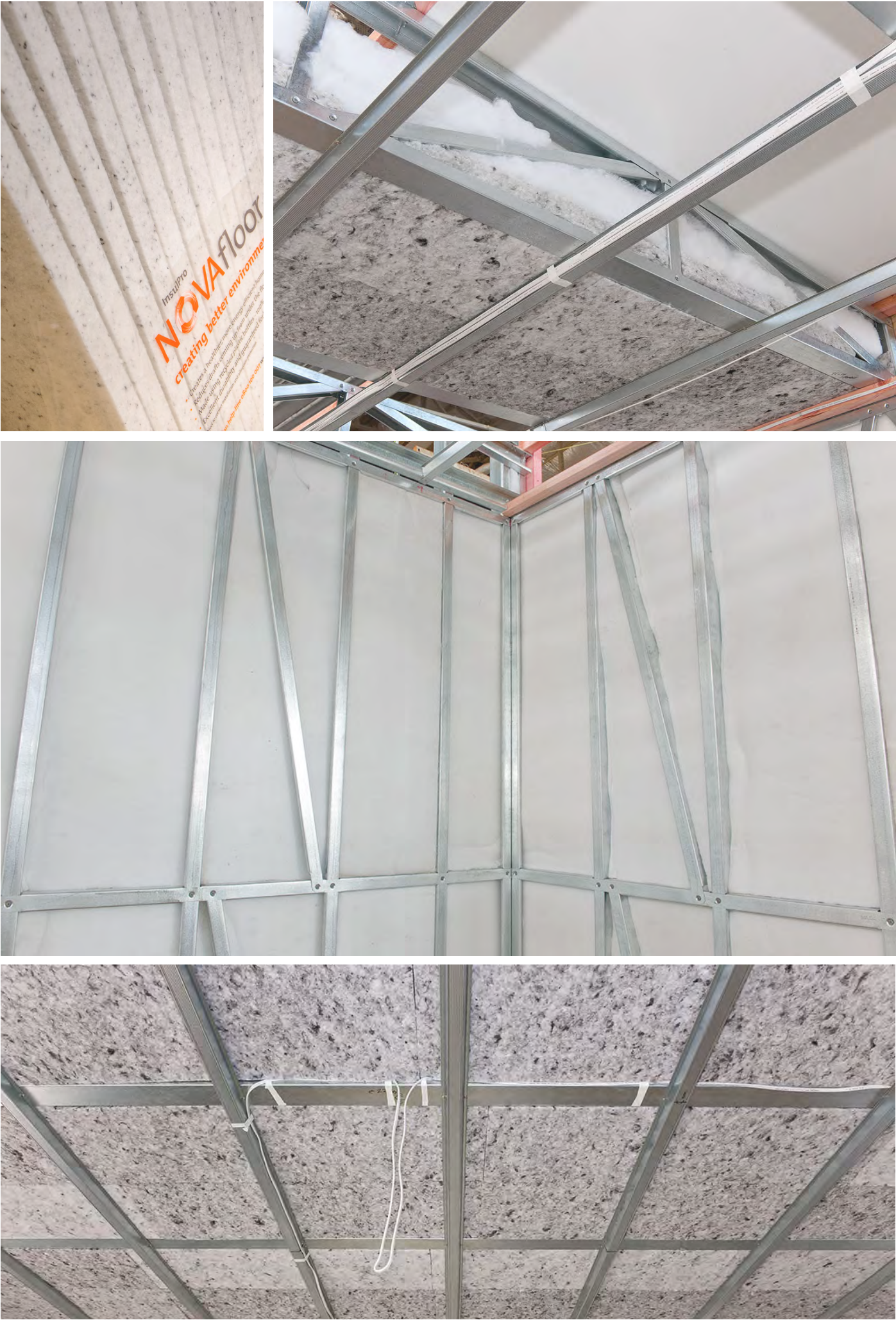
InsulPro products are an integral part of the Warmframe™ system, combining snugly fitting insulation solutions with steel framing, to provide the best possible thermal performance. Innovation in installation also improved thermal performance.

The insulation was installed by The Insulation Team, a specialist insulation business with more than 15 years' experience installing insulation into both residential and commercial & new build buildings. Based in Christchurch, The Insulation Team offers professional Insulation Association of NZ-trained installers.

### Why InsulPro insulation?

- InsulPro insulation is made from polyester – the same material that most pillow and duvets are made from. It contains no glues, VOCs or insecticides so it is quite safe for your family.
- It is made using fibres from recycled plastic bottles and is fully recyclable.
- InsulPro insulation has been robustly tested (both independently and in-situ) – it is one of the most effective insulation products available in New Zealand.
- It's made using non-irritant fibres so it is safe to handle, won't irritate your skin when you touch it, and is easy to install
- InsulPro products will absorb noise to create a quieter environment.
- InsulPro products are Building Code compliant, fit for purpose, have excellent durability and are covered by a 50 year warranty (so long as the insulation is installed correctly and remains adequately protected).

[www.insulpro.co.nz](http://www.insulpro.co.nz)  
or free phone 0800 100 007  
[www.theinsulationteam.co.nz](http://www.theinsulationteam.co.nz)





# INZIDE COMMERCIAL

---

## CARPET TILES

INZIDE Commercial are specialists in innovative sustainable interiors, offering quality, stylish carpet tiles, vinyls and modular wall art.

The bedrooms in the High Performance House have been carpeted with Interface commercial carpet tiles. These offer a range of backing options, a 15 year performance warranty and life-time Intersept™ anti-microbial and carbon neutral certificates.

[www.inzide.co.nz](http://www.inzide.co.nz)





# JSC TIMBER

.....

## CEDAR WALL CLADDING

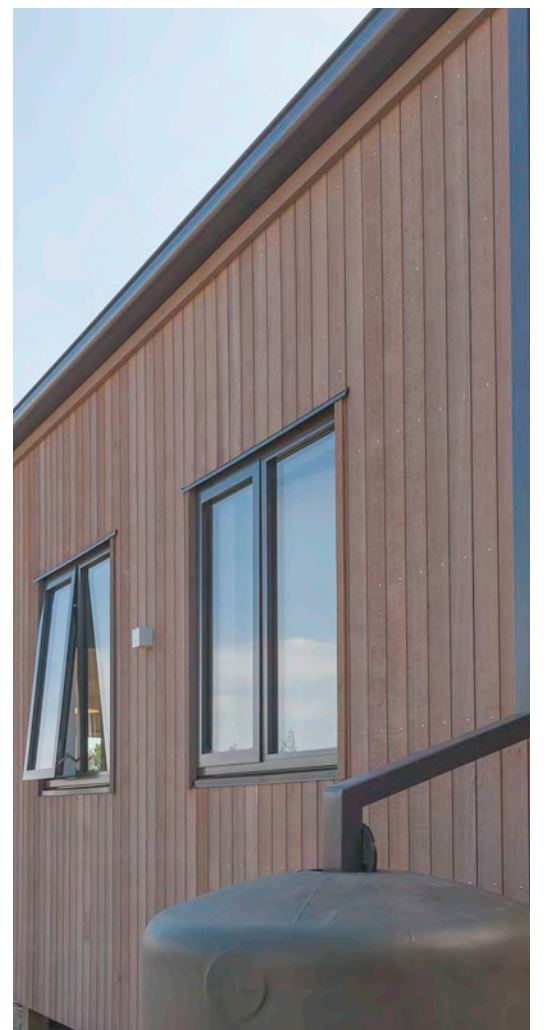
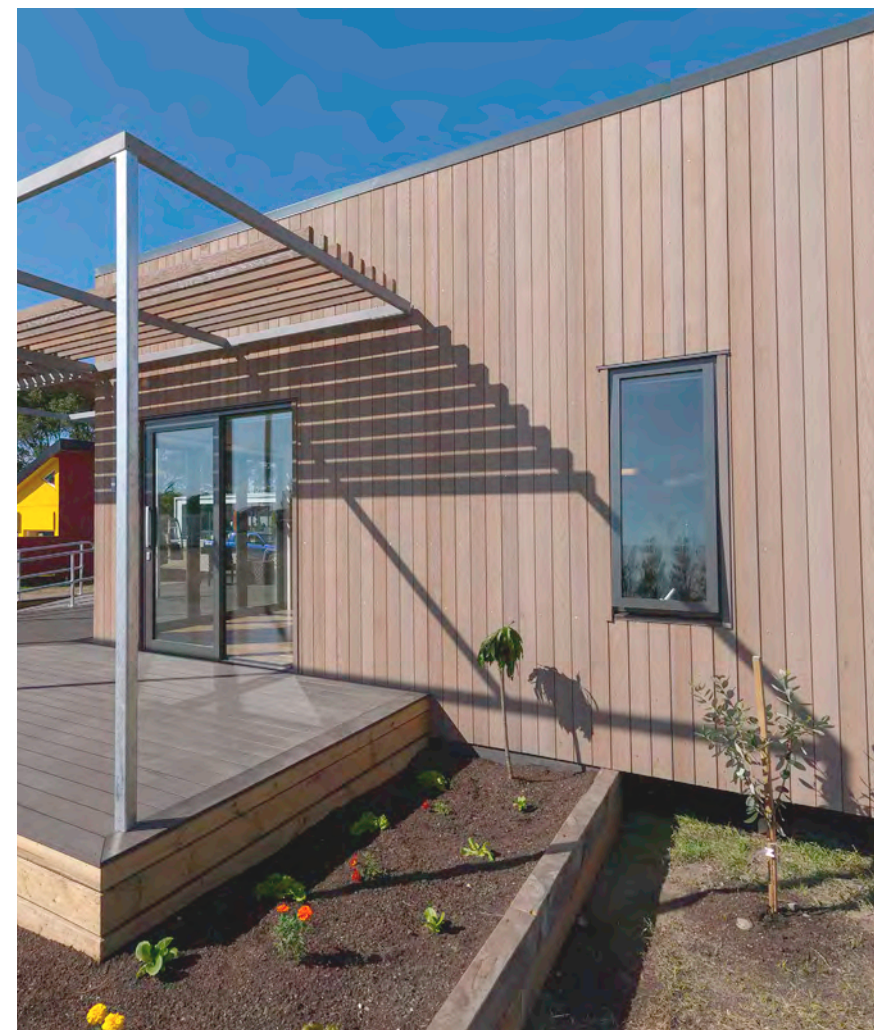
JSC Timber (J Scotts & Company), in operation since 1900, is a New Zealand owned and operated company. JSC Timber is a leading manufacturer and supplier of quality hardwoods and exotic soft wood timber products and is recognised as a market leader in timber cladding and cavity system development. Their modern factory and highly skilled staff allow them to create products and profile solutions to meet all requirements, inside and out.

The walls of the High Performance House are clad with JSC VertiClad, Vertical Shiplap Cavity System. This fully tested system uses Western Red Cedar weatherboards, meets the requirements of NZBC E2/VM1 and has a full Producer Statement-Design.

### Why JSC VertiClad?

- Western Red Cedar gives exceptional stability and longevity. The grain structure of this proven timber makes it an ideal base for surface coatings to further protect the weatherboards against the often harsh New Zealand environment.
- Western Red Cedar has a naturally occurring resistance to moisture and decay giving it a minimum service life of 15 years as required by NZS 3602 Table 2.
- JSC Western Red Cedar is FSC certified which guarantees it was sustainably harvested from the responsibly managed forests of British Columbia, Canada.

[www.jsctimber.co.nz](http://www.jsctimber.co.nz)  
or free phone 0800 572 688





# LIBBY BEATTIE INTERIOR DESIGN

---

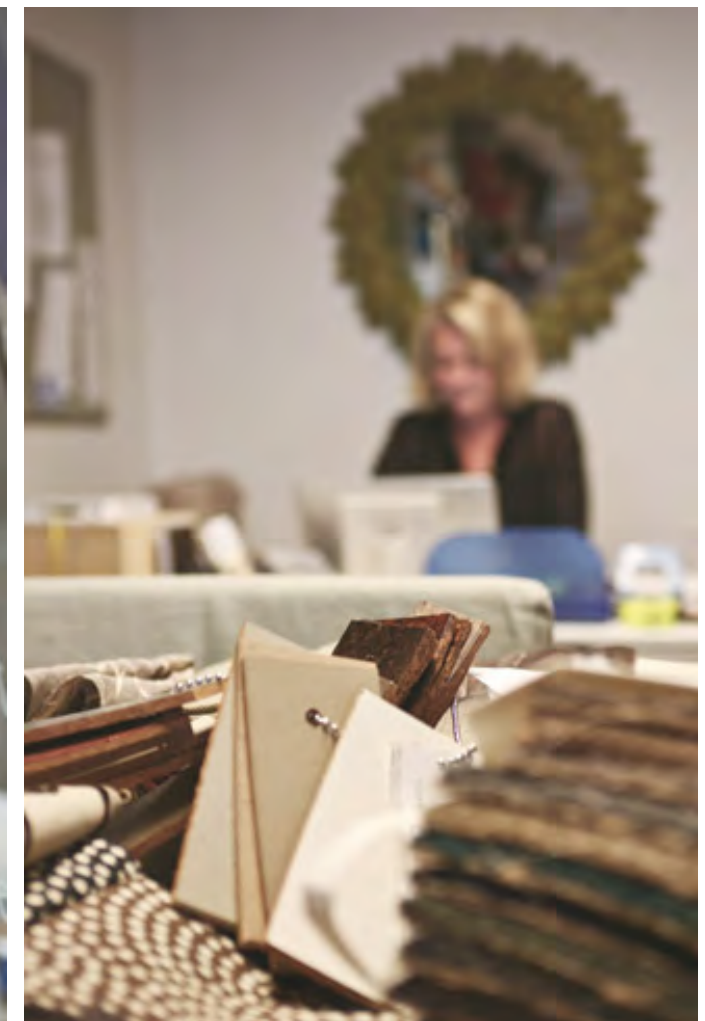
## INTERIOR DESIGN

The interior decoration of the High Performance House was designed and coordinated by Libby Beattie Interior Design.

Libby Beattie trained as an Interior Designer in London at the Inchbald School of Design in the 1980s and then worked for ten years in Europe before returning to New Zealand. Libby has worked on many residential and commercial projects all around New Zealand.

Libby has a Wellington based design practice with a furniture showroom situated at 24 Elizabeth Street, Mt Victoria, Wellington.

[www.libbybeattie.com](http://www.libbybeattie.com)





# MONTREUX FURNITURE

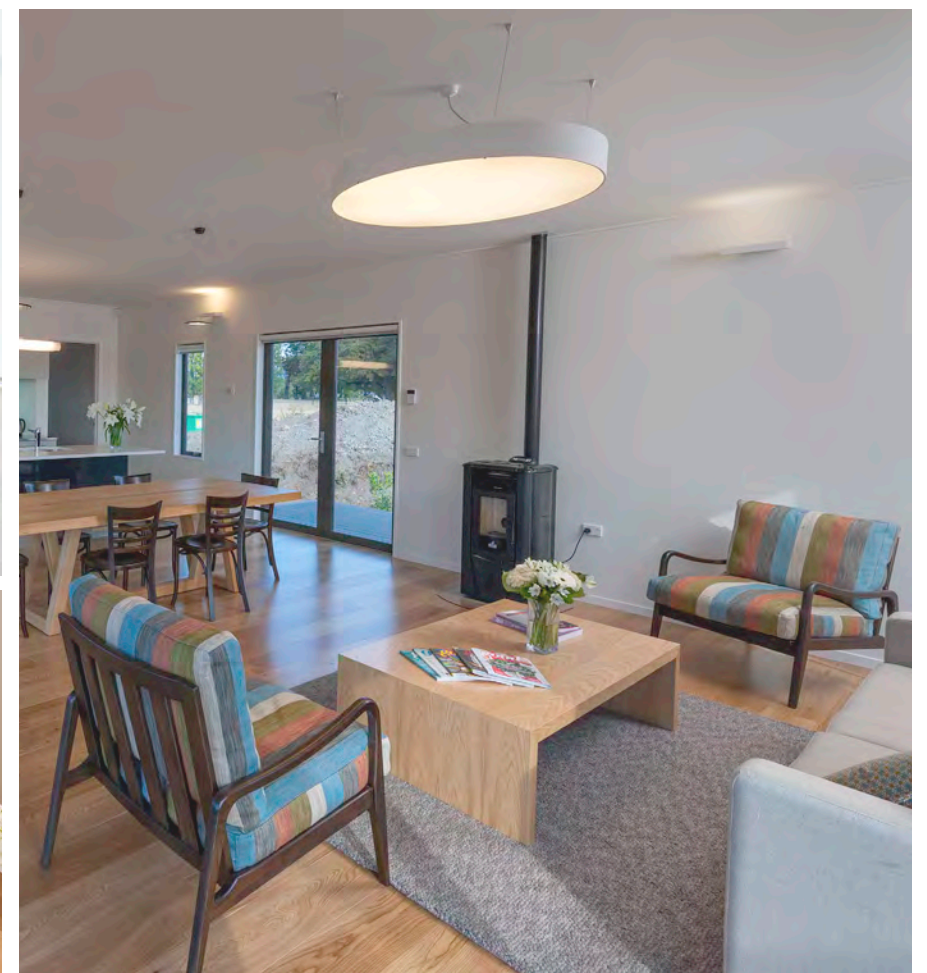
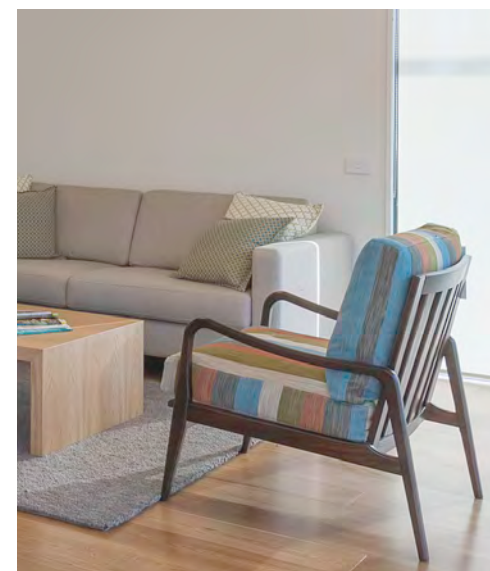
---

## LIVING ROOM CHAIRS

The Lucca Charis chairs were provided by Montreux Furniture, a local Christchurch manufacturer of quality sofas and chairs.

Montreux has a firm focus on environmental sustainability, sourcing raw materials from sustainable supplies, especially timber, and recycling scrap where possible.

[www.montreux.co.nz](http://www.montreux.co.nz)





# NATURE'S FLAME

## SOLAR WATER HEATER

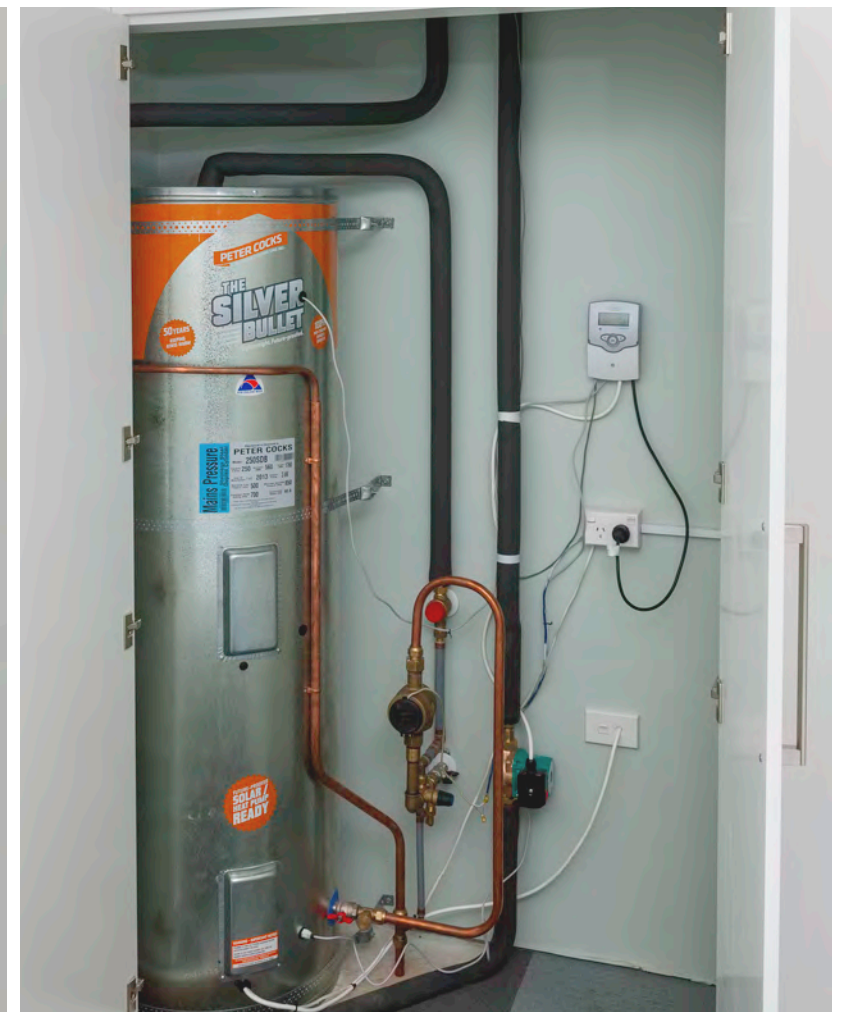
Nature's Flame, a business of Solid Energy, is the New Zealand distributor of Apricus solar systems. The company has provided an Apricus AP20 evacuated tube open loop solar water heating system for the High Performance House.

Why an Apricus solar water heater?

- Apricus Solar products allow you to make use of the sun's free energy to supplement your hot water requirements and save you money on your hot water heating bill.
- Apricus solar water heaters can integrate with existing water heating systems.
- Apricus systems can come with a controller which monitors water usage, internal and external temperatures and the amount of sunlight. These help get the most effective use of a solar water heater.
- Apricus is one of New Zealand's most energy efficient evacuated tube systems, providing excellent annual output.
- When purchasing an Apricus solar water heating system, you can be confident that you have chosen a high quality system from an established, trustworthy, proven manufacturer, with successful installations all over the world.
- Apricus products meet, and in some cases, exceed, all New Zealand and Australian building regulations and are manufactured to AS/NZS2712 standard.
- Apricus systems are durable with 10-year warranty on tubes and a 15-year warranty on the copper header pipe of the solar collector.

Apricus can provide national installation and technical support.

[www.apricus.co.nz](http://www.apricus.co.nz)  
[www.naturesflame.co.nz](http://www.naturesflame.co.nz)





# NATURE'S FLAME

## WOOD PELLET FIRE

Nature's Flame is New Zealand's premier manufacturer of wood pellet fuel and they are passionate about inspiring Kiwis to love the experience of sustainable wood pellet heat. Nature's Flame's wood pellets are being used nationwide to heat all Kiwi homes from Auckland to Invercargill, as well as in larger settings such as schools, industrial businesses and even in the snow covered New Zealand Army Base in Waiohuru.

Nature's Flame has provided a Monica Plus pellet fire from their Euro range for the High Performance House.

Why the Monica Plus pellet fire?

- Free standing and fits easily into many spaces.
- Includes a remote, timer & thermostat controls to better manage your heating (turn off/on according to time)
- Burns renewable, New Zealand made pellet fuel – wood pellets are made from waste wood products from responsibly managed forest resources.
- Highly efficient – produces virtually no smoke and leaves very small amounts of ash.
- Clean Air approved to National Environmental Standards – not only good for the environment, but really good for people as well. Choosing to burn wood pellets in specially designed fires and boilers, instead of traditional fossil fuels, has significantly improved air quality in Canterbury over the last decade, and the trend has been catching on all across New Zealand.
- Energy saving – pellet fire installations have reduced peak electricity demand at least 30MW compared with electrical heating alternatives.

[www.naturesflame.co.nz](http://www.naturesflame.co.nz)





# NICK RADFORD RUGS

---

## LIVING ROOM RUG

The living room rug in the High Performance House was provided by Nick Radford Rugs, a Christchurch based company that produces a range of luxurious, custom made floor coverings using the finest wool yarns New Zealand has to offer. They are well known for beautifully felted yarns and extremely textured shag, loop or plush piles.

[www.nickradford-rugs.com](http://www.nickradford-rugs.com)





# NZ CLEAN ENERGY SYSTEMS

## LG SOLAR PANELS

Based in Christchurch, NZ Clean Energy Systems provides solar power systems (panels and inverters) for residential customers.

NZ Clean Energy Systems has provided a Mono X LG250S1C-G2™ solar panel for the High Performance House.

Why an LG solar panel?

- Quality tested product – LG provides rigorous quality testing to solar modules to assure customers of the stated power outputs of all modules, with a positive nominal tolerance starting at 0%.
- Designed for durability – LG solar modules are designed with slim and durable glass to be light in weight while also being able to withstand heavy loads up to 5400 Pa. The Mono X TM includes a power output warranty of 80.25% for up to 25 years.
- Environmentally friendly – The Mono X TM module is the first in the world authorised to display the Carbon free Certified Label.
- Output does vary depending on climatic and environmental conditions but a 1.5kW system should produce between 2,250-3,000 kW hours per annum.

[www.nzces.co.nz](http://www.nzces.co.nz)





# NZ EQUIPMENT

.....

## DECKING

NZ Equipment provides viable, sustainable alternatives to timber, steel and concrete, including a range of eco-friendly composite timber products that are produced from recycled plastics and hardwood, otherwise known as WPC. Composite timber produces the aesthetic appeal of traditional timber, is lightweight and easy to install, yet is incredibly strong and will not rot, fade or warp.

The outdoor decking on the High Performance House is Dura Deck, a low maintenance composite decking with a traditional timber appearance. It has a 50+ year lifespan and is UV stable and hardwearing.

### Why Dura Deck?

- It is an 87% recycled product.
- Durable – it has a 25 year warranty. Lower maintenance means lower lifetime costs.
- The two widest boards in the market 225mm and 295mm – ideal for large areas and quicker fitting.
- Safe – it is non-slip (ideal around swimming pools, ponds and lakes) and won't splinter (child-friendly). Hidden fixings mean you won't trip or fall over decking nails.
- New Zealand company – proudly owned and based in Canterbury.

[www.nzequipment.co.nz](http://www.nzequipment.co.nz)

[www.dcaustralasia.com/products/timber/dura-deck-1-1/](http://www.dcaustralasia.com/products/timber/dura-deck-1-1/)





# PERFECT PIECES

---

## OUTDOOR TABLE AND CHAIRS

Providing the outdoor settings for the High Performance House, Perfect Pieces specialises in the importation and distribution of water hyacinth furniture from Yothaka International of Thailand. Yothaka's award winning designs in water hyacinth are now handcrafted with new materials to create a stylish outdoor collection. Perfect Pieces provides an exclusive range of furniture and accessories for the interior and architectural design markets.

[www.perfectpieces.co.nz](http://www.perfectpieces.co.nz)





# PLUMBING WORLD

## PLUMBING PRODUCTS

With branches nationwide from Kerikeri to Invercargill, Plumbing World has grown to become the largest 100% New Zealand owned national plumbing merchant. Supplying everything from basic trade products to fashion fittings, with brands from New Zealand and around the world, Plumbing World also provides specialist plumbing advice.

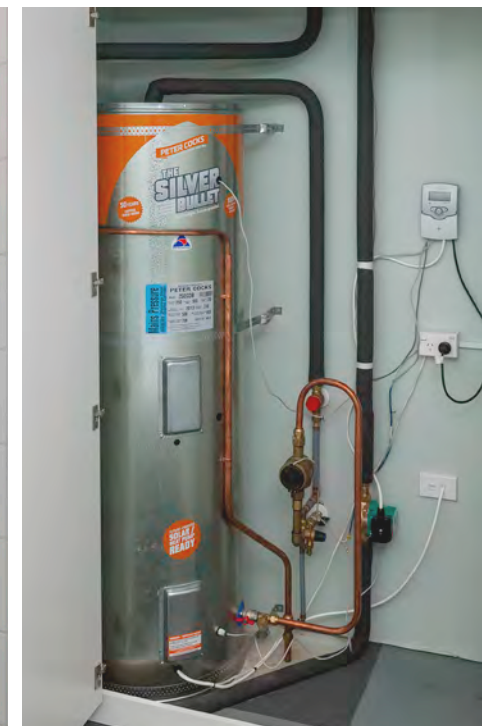
Plumbing World has supplied a solar capable cylinder from Peter Cocks Cylinders ([www.petercocks.co.nz](http://www.petercocks.co.nz)). In addition, they supplied water efficient toilets and tapware for the High Performance House to meet the following Homestar specifications:

- maximum 6L / 3L flushes for toilets.
- maximum flow rate of 9L / min for showers.
- maximum flow rate of 4.5L / min for taps.

The High Performance House has been fitted with the following products:

- Caroma toilet suite with 4.5L / 3L Smartflush technology.
- Methven Koha Satinjet shower head - WELS 3 star rated with 8.5L / min flow rate.
- Aquatica Prestigio basin mixer – WELS 6 star with 4.5L flow rate.
- Felton Urban sink mixer – WELS 6 star with 4.0L flow rate.

[www.plumbingworld.co.nz](http://www.plumbingworld.co.nz)





# RESENE

## PAINT

Established in 1946, Resene manufactures colours, coatings, wood stains and paints for exterior and interior house painting plus commercial, industrial and marine painting applications. Innovation has been a cornerstone of Resene's success from environmental sustainability, to new colour technologies, to healthier VOC free options.

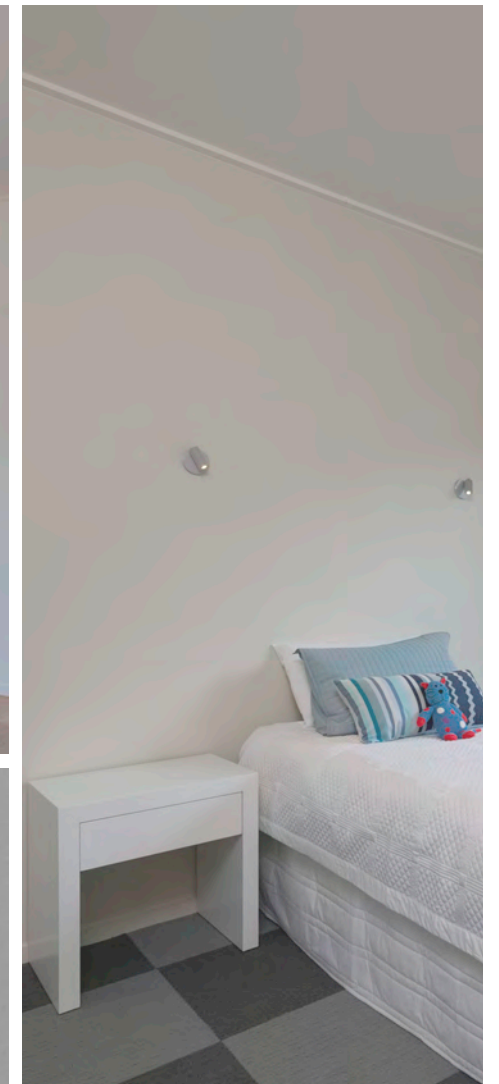
Resene paints were used on both the interior and exterior of the High Performance House.

- Resene Earthsense ceiling paint was selected: this Environmental Choice approved paint is formulated with a special renewable extender pigment, providing at least 20% by volume of renewable raw materials in the final paint film.
- Resene Lustacryl Kitchen & Bathroom, used for trims and framing, combines the benefits of a waterborne enamel with added anti-bacterial silver protection and MoulDefender.
- Resene Zylone Sheen VOC Free, used in the living room and bedrooms, is Environmental Choice approved and combines the popular features of Resene Zylone Sheen without unwanted volatile organic compounds (VOCs).
- Resene SpaceCote Low Sheen Kitchen & Bathroom, used in the hall and bathroom, is also Environmental Choice approved, and includes added anti-bacterial silver protection and mould protection.
- Resene Waterborne Woodsman used on the exterior weatherboards is also Environmental Choice approved and includes fungicides for mould resistance.

### Why Resene paints?

- Environmentally preferable – it is possible to select a Resene Environmental Choice approved waterborne product for most applications.
- Healthier – in 2007 just 8% of the decorative paint Resene sold was solvent-borne, while the average per litre VOC levels of Resene decorative paint sales have dropped by over 90% in the last two decades. Innovative new ranges mean low VOCs and low odour. Resene decorative tints are non VOC, enabling colours to be tinted without adding VOCs. These highly concentrated durable tints are exclusive to Resene.
- Old paint can be recycled – Resene's PaintWise paint and paint packaging recovery programme is the first comprehensive paint and paint packaging product stewardship programme in this part of the world, and is the only paint product stewardship programme accredited by the Ministry for the Environment.
- Resene paints have been developed and made in New Zealand since Resene began in 1946, and Resene continues to be 100% New Zealand owned and operated.
- Resene was awarded Sustainable Business of the Year 2010 and Most Trusted Paint Brand 2012.

[www.resene.co.nz](http://www.resene.co.nz)





# SALMOND ARCHITECTURE

## ARCHITECT

Salmond Architecture is based in Wanaka in the Queenstown Lakes District. They have a track record in residential, commercial, retail and community architecture in Canterbury and the lower South Island. Salmond Architecture has a people focused, collaborative approach to creative design, and focuses on designing high performance buildings that are sustainable over the long term, sympathetic with the landscape and appropriate in their context.

Salmond Architecture designed the High Performance House based on their High Performance Houses™ adaptable building design which uses combinations of prefabricated pavilions and links to create customised and affordable site-specific homes.

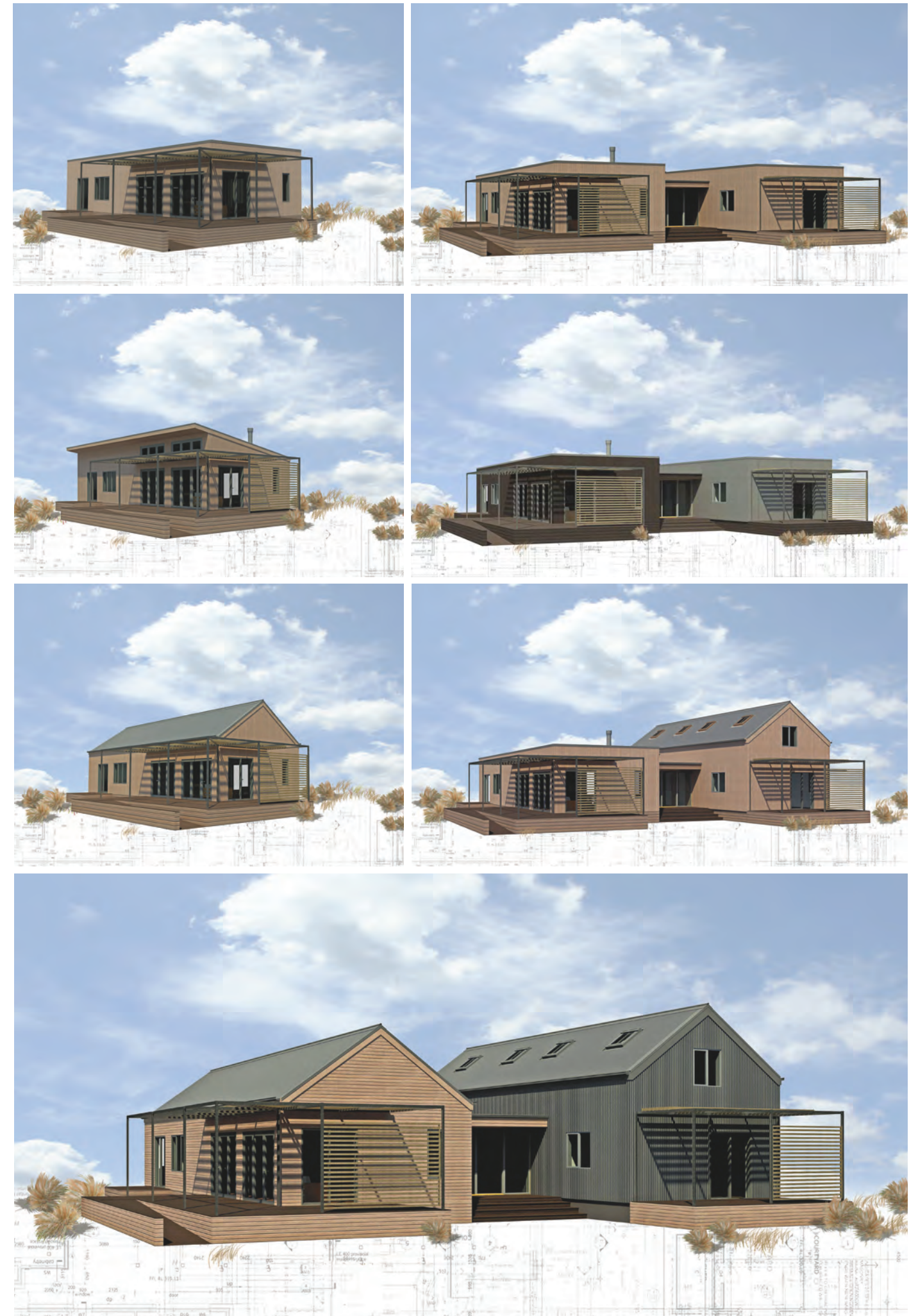
Opposite are images of different form options for the High Performance House.

### Why Salmond Architecture?

- The pavilion system is ideally suited to off-site construction and meets design principles of future flexibility.
- Designs are focused on achieving high standards of home performance
- They have a focus on sustainability, particularly, passive solar design, renewable energy and resource efficiency.

[www.salmondarchitecture.co.nz](http://www.salmondarchitecture.co.nz)

[www.highperformancehouses.co.nz](http://www.highperformancehouses.co.nz)





# SP BLINDS

## WINDOW TREATMENT

With over three decades' experience, SP Blinds has valuable experience and knowledge of the demanding requirements of the New Zealand market and unique weather conditions. SP Blinds offers advice, planning and manufacturing for both commercial and domestic applications.

SP Blinds are committed to environmental sustainability. They are a CarboNZero Certified Organization, and are heavily involved in specifying window coverings for buildings to be rated under the Green Star scheme. Durability is a focus to avoid low grade manufacture and inferior quality materials which fail to last and increase the impact at landfill. Most SP Blinds fabrics are tested for low VOC emissions.

[www.spblinds.co.nz](http://www.spblinds.co.nz)





# STEEL & TUBE / NEW ZEALAND STEEL

## ROOF CLADDING, SPOUTING, DOWNPIPES

Steel & Tube specialises in steel merchandising, reinforcing, plate processing, roofing and fastenings, with outlets spread throughout New Zealand. The roofing division manufactures and markets long run roofing materials, rainwater goods and accessories.

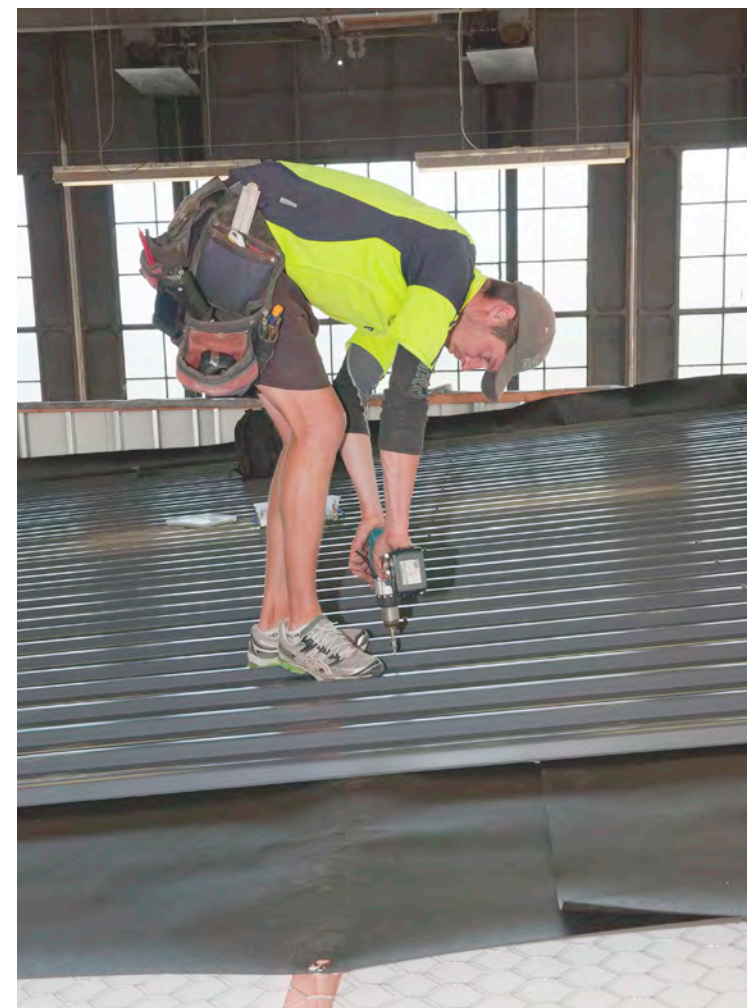
The roof of the High Performance House is clad with COLORSTEEL® Endura™, a paint system consisting of a ZINCALUME® coated steel substrate to which a prepainted finish system is applied. COLORSTEEL® Endura™ product is suitable for a wide range of rollformed roof and wall claddings, rainwater accessories and general building products.

### Why COLORSTEEL® from Steel & Tube?

- All Steel & Tube Roofing Products sites are certified to a minimum standard of ISO 9001:2000 for the manufacturing, marketing and delivery of metal roofing and rainwater products.
- Durable – warranted for 15 years, longer than the service life of most traditional post-painted systems. The system protects against corrosion in areas where Moderate to Severe environmental conditions are experienced.
- Steel & Tube's Warranty Plus is the most comprehensive in the industry, and is transferable to subsequent owners.
- Resilient and strong – light steel framed roofs have stood up well to Canterbury's earthquakes.
- Certified safe for rainwater collection.

[www.steelandtube.co.nz](http://www.steelandtube.co.nz)

[www.nzsteel.co.nz/products/colorsteel](http://www.nzsteel.co.nz/products/colorsteel)





# THE TILE SHOPPE

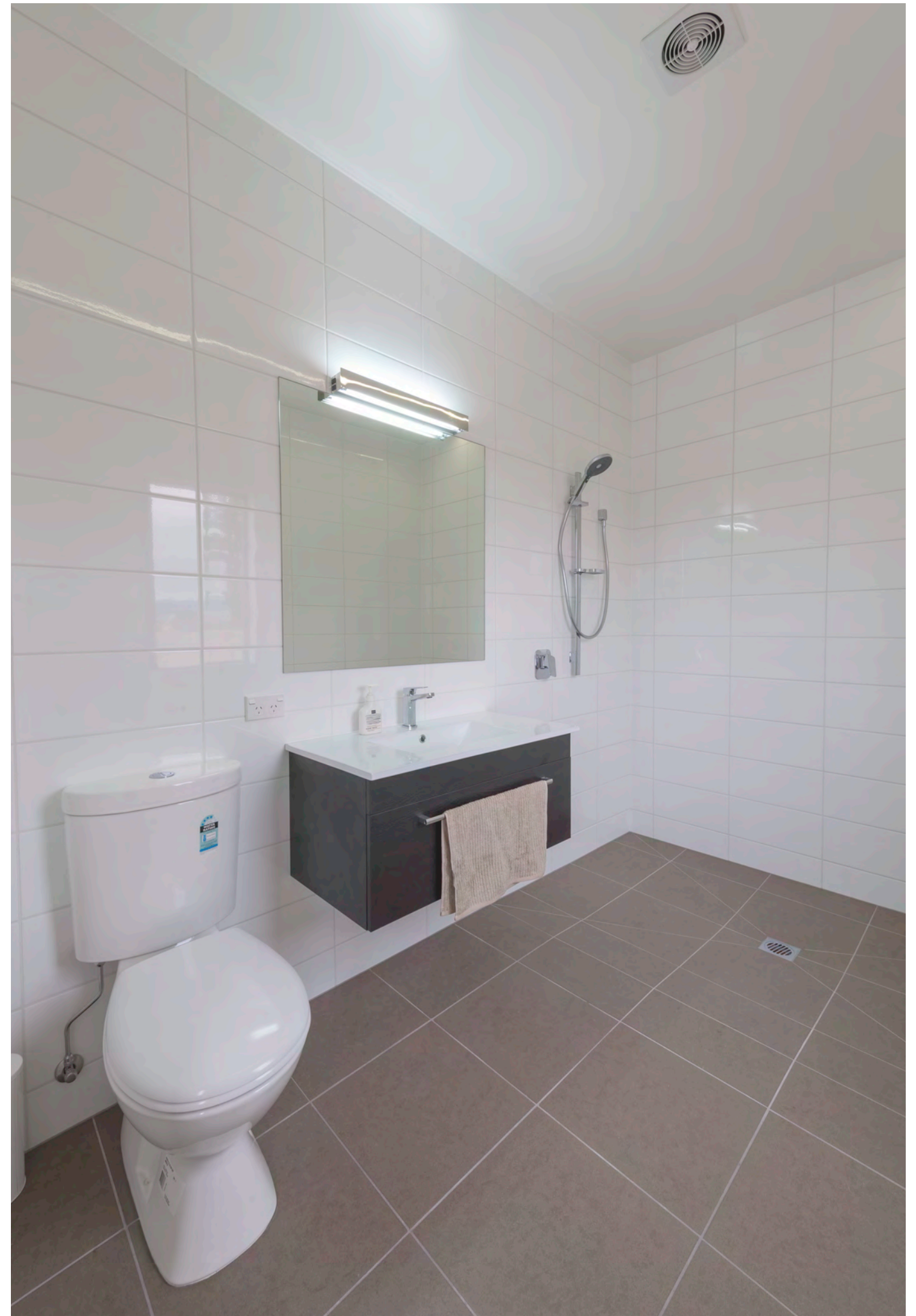
---

## TILES

The Tile Shoppe are specialists in supplying tiles for walls and flooring including tiles for walls, flooring, and swimming pool tiles.

The Tile Shoppe has provided wall and flooring tiles for the kitchen and bathroom in the High Performance House.

[www.thetileshoppe.co.nz](http://www.thetileshoppe.co.nz)





# THONET NEW ZEALAND

.....

## DINING ROOM CHAIRS

Thonet New Zealand provides exquisitely designed and crafted furniture from New Zealand and overseas for projects throughout New Zealand, including the dining room chairs in the High Performance House. They are based in Wellington with dealerships in Auckland, Hamilton and Christchurch.

[www.thonet.co.nz](http://www.thonet.co.nz)





# TRÉOLOGY

---

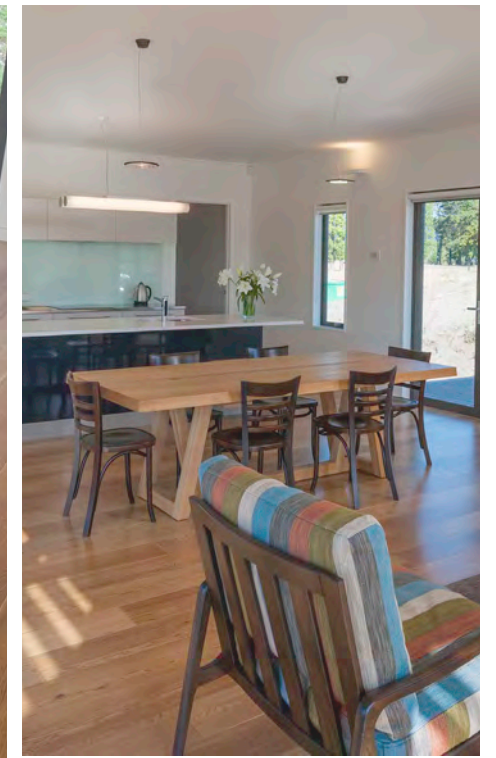
## DINING ROOM TABLE

Providing the Umber dining room table in the High Performance House is Tréology, a local Christchurch family business manufacturing furniture from rediscovered timbers (kauri, rimu, totara and oak).

Their respect for nature, combined with their craftsmanship, is evident in their ability to enhance the inherent beauty of wood. They value the sanctuary of family, the wonder of nature and the adventure of life. For more than 50 years, their dedication to fine craftsmanship and integrity in everything they do has come together in Tréology.

Created in nature. Crafted by man.

[www.treology.co.nz](http://www.treology.co.nz)





# WINSTONE WALLBOARDS

## INTERNAL LININGS

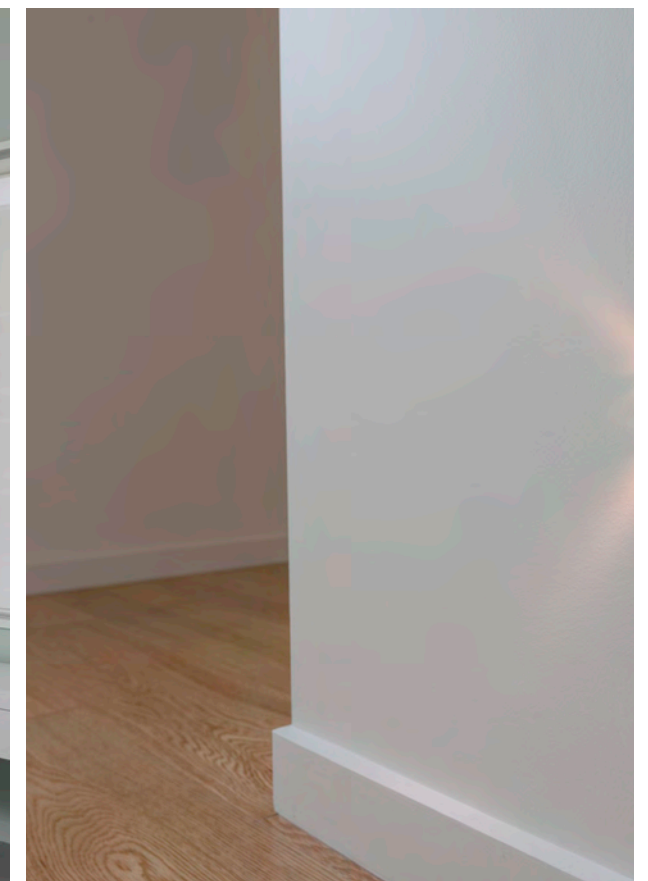
Winstone Wallboards Ltd is New Zealand's largest manufacturer and marketer of gypsum plasterboard, drywall systems, associated products and services. The company has been operating since 1927 and manufactures plasterboard systems under the GIB® brand name.

Three GIB® products have been used in the High Performance House: GIB® Standard plasterboard on most of the walls, GIB Aqualine® plasterboard on bathroom and laundry walls, and GIB Noiseline® plasterboard on bedroom walls.

### Why GIB®?

- Manufactured to a high standard and independently tested and audited to guarantee consistent quality and reduce risk once installed. ISO certified, Telarc audited.
- GIB® plasterboard is made up of naturally occurring gypsum, 100% recycled paper, and a small quantity of other ingredients – it has no toxins.
- GIB® plasterboard is completely recyclable
- GIB® plasterboard can be ordered in many standard sizes that allow the builder to reduce the amount of waste by ordering the most efficient lengths.
- Thermally responsive – the nature of GIB® plasterboard composite allows it to respond quickly to heating and cooling effects.
- Acoustic properties – GIB Noiseline® is used to reduce noise levels within residential and commercial buildings for the comfort of building occupants.

[www.gib.co.nz](http://www.gib.co.nz)





---

# STAR RATINGS

The High Performance House was rated by two design and performance rating schemes.

---



# HOMESTAR™

NZ GREEN BUILDING COUNCIL

Homestar™ is New Zealand's home performance rating scheme. Homes can be rated online or by certified assessors.

The High Performance House received a rating of 8 stars (out of a possible 10). It was one of only two houses to receive 8 stars at the time.

[www.homestar.org.nz](http://www.homestar.org.nz).



# LIFEMARK™

LIFETIME DESIGN

Lifemark™ is an independent seal of approval awarded to homes that meet specific design criteria to enable occupants to live in their own home no matter what age, stage or ability.

The design of the High Performance House met a 5 star Lifemark™ standard receiving 297 points.

[www.lifemark.co.nz](http://www.lifemark.co.nz).



The Lifemark™ has been awarded to:  
Beacon Pathway  
High Performance House  
HIVE  
Curletts Rd,  
Wigram,  
Christchurch 8042

Having been designed and built in accordance with the Lifemark Design Standards



  
Andrew Olsen  
General Manager, Lifetime Design Ltd

15th December 2012  
Lifemark 5 Star  
REF: 12-0172-1



# ACKNOWLEDGEMENTS

## PHOTOGRAPHY FROM MURRAY IRWIN OF MANNERING & ASSOCIATES PHOTOGRAPHY

.....

Mannering & Associates is a commercial photographic studio specialising in high quality advertising, commercial, corporate and industrial photography both in our modern well-equipped studio, and on location, based in Christchurch, New Zealand. Further technical services include aerial, time lapse and stop motion photography.

Murray Irwin of Mannering & Associates Photography has taken photos and time lapse sequences of the High Performance House, from construction to finish.

[www.manneringphoto.co.nz](http://www.manneringphoto.co.nz)