
NZ
FIRST LIGHT


FIRST LIGHT
NZ


3RD PLACE

U.S. DEPARTMENT OF ENERGY
SOLAR DECATHLON

U.S. DEPARTMENT OF ENERGY
SOLAR DECATHLON

Architecture | Market Appeal | Communications | Engineering | Affordability

Entertainment | Hot water | Comfort Zone | Appliances | Energy Balance


FIRST LIGHT


TSB Bank


WASHINGTON DC
PHILADELPHIA
LOS ANGELES
MANZANILLO
CARTAGENA
AUCKLAND
WELLINGTON


GRISTLAM


101
New Zealand


3RD
PLACE
101
New Zealand
Victoria University


FIRST LIGHT
NZ
www.firstlightstudio.co.nz

BEYOND THE FIRST LIGHT NZ HOUSE

From prototype to production

Ben Jagersma

INTRODUCTION – Point of departure

PROTOTYPE – A net zero energy bach

PRODUCTION – Learning from the construction & transportation of the First Light house

WHERE TO FROM HERE

prototype production

prototype **production**

FIRST LIGHT NZ

prototype **production**

FIRST LIGHT NZ

prototype production

This is NZ

prototype **production**

production

production

production

Making homes affordable

National is working to make homes more affordable for all New Zealanders.

Affordable housing means more people can achieve the Kiwi dream of owning their own home. Good quality, affordable housing is important for the health and wellbeing of New Zealand families and communities.

National has a wide programme of practical work underway to improve home affordability.

National will:

- ✓ Free up land for new sections.
- ✓ Make the construction sector more productive by expanding the Apprenticeship Reboot to a total of 20,000 places and reducing compliance costs.
- ✓ Keep helping families into their first home with increased access to the KiwiSaver First Home Deposit Subsidy and Welcome Home Loans, announced last year.
- ✓ Reduce building costs by $3,500 on average by suspending duties and tariffs on building products.
- ✓ Rein in council development charges – these had trebled over the past decade and National is restricting what councils can charge on new sections and developments.
- ✓ Reform the Resource Management Act to reduce unnecessary costs and delays.
- ✓ Keep interest rates near 50-year lows by continuing to responsibly manage government finances.

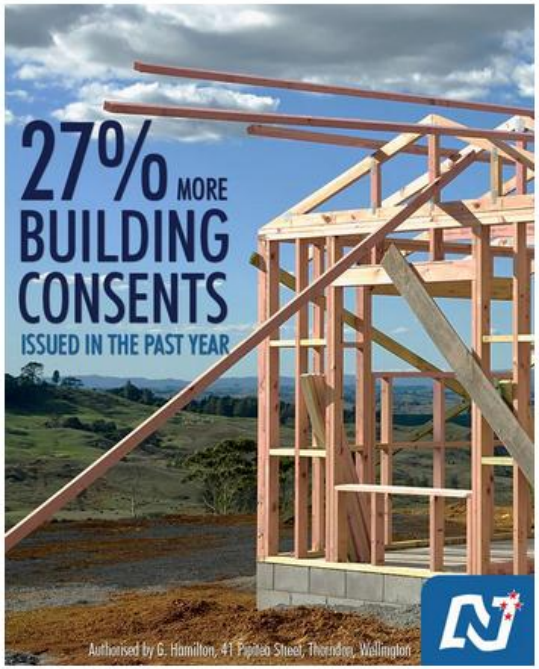
This page will be updated as policies are announced in the run-up to the election.

More Information

Housing affordability summary

Feature: First Home Buyers

"National values home ownership. It provides stability for communities and security for retirement. We want to help more Kiwis into their own home." – Prime Minister John Key



Home

« All policies

Everyone should have the chance to own their own home but home ownership rates are the lowest they've been in 50 years. We'll restore this Kiwi dream by making home ownership and rent more affordable.

Labour will:

- build 100,000 starter homes for Kiwi families - we call it KiwiBuild,
- cut down on speculation by restricting the ability of non-residents to purchase New Zealand houses, farm land, and monopoly services,
- require landlords to ensure every rental house in New Zealand is warm and dry,
- create new jobs, 2,000 apprenticeships and give a $2 billion boost to the economy through our building programme,
- introduce fairness with a capital gains tax and monetary policy reform to take pressure off house prices,
- introduce a National Policy Statement to ensure Councils are more likely to approve projects involving affordable housing,
- build 10,000 houses and take other measures to kickstart the rebuild in Christchurch and Canterbury.

What are we building?

↓

prototype? **production**

1940-60 State houses

prototype? production

1970's un-insulated houses

prototype? production

Today

prototype? production

Today

prototy

Today

Do we have the prototype right?

28% of New Zealand homes, the average indoor air temperature is below the healthy minimum (16°C) recommended by the World Health Organisation


New Zealand
Homes are Cold
Damp and
Unhealthy…

…and waste energy

Residential homes

1/3rd of all electricity consumed

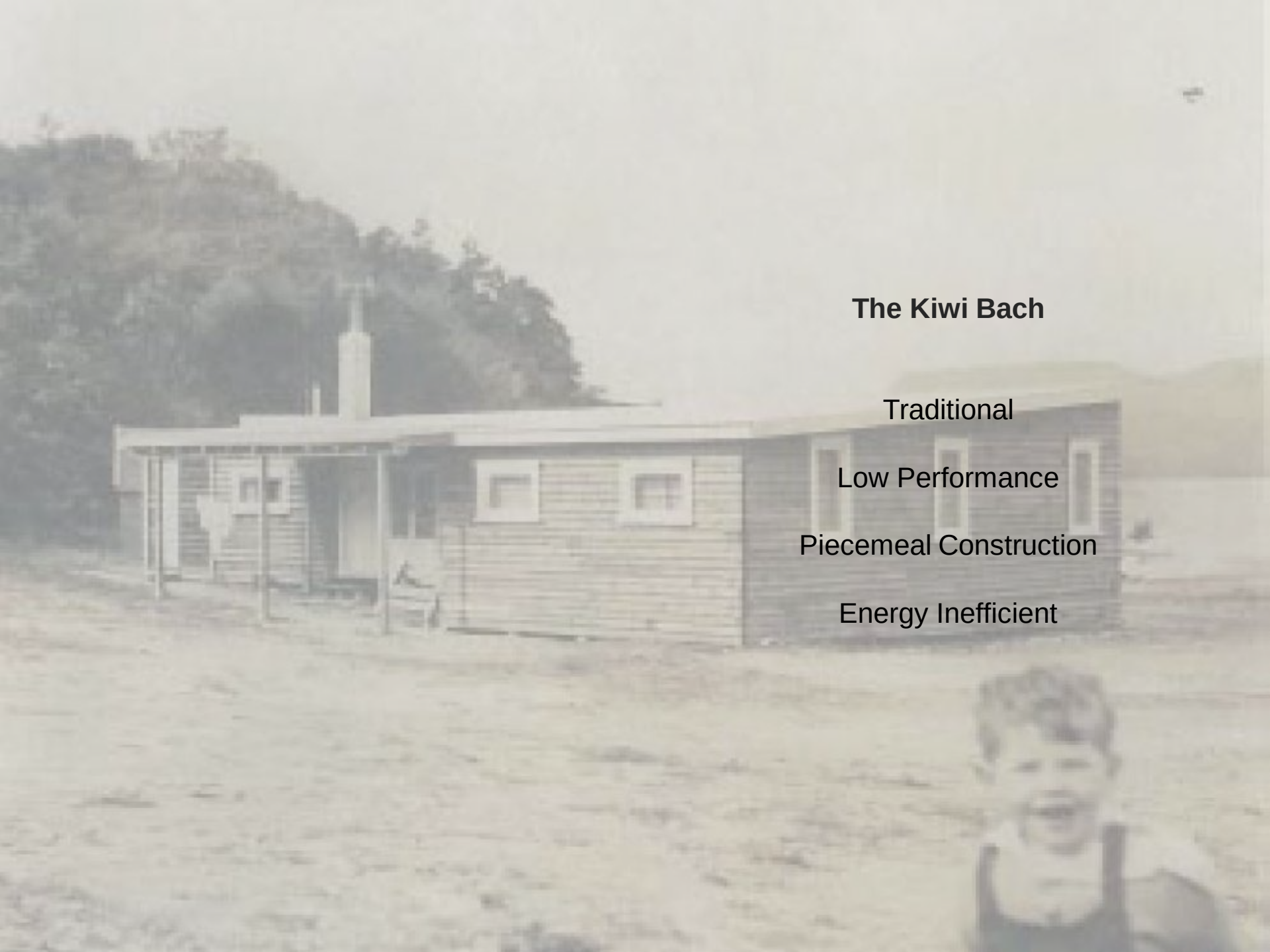

Residential homes
20% of CO2 emissions

Residential homes

Where we need to be

Average Electricity Consumption for New Zealand homes has remained constant for more than 30 years!

C’mon NZ
We can do better!



The Kiwi Bach

Traditional

Low Performance

Piecemeal Construction

Energy Inefficient

The Solar Decathlon

Competitive

High Performance

Transportation and Prefabrication

Energy Conservation

Energy Generation

International

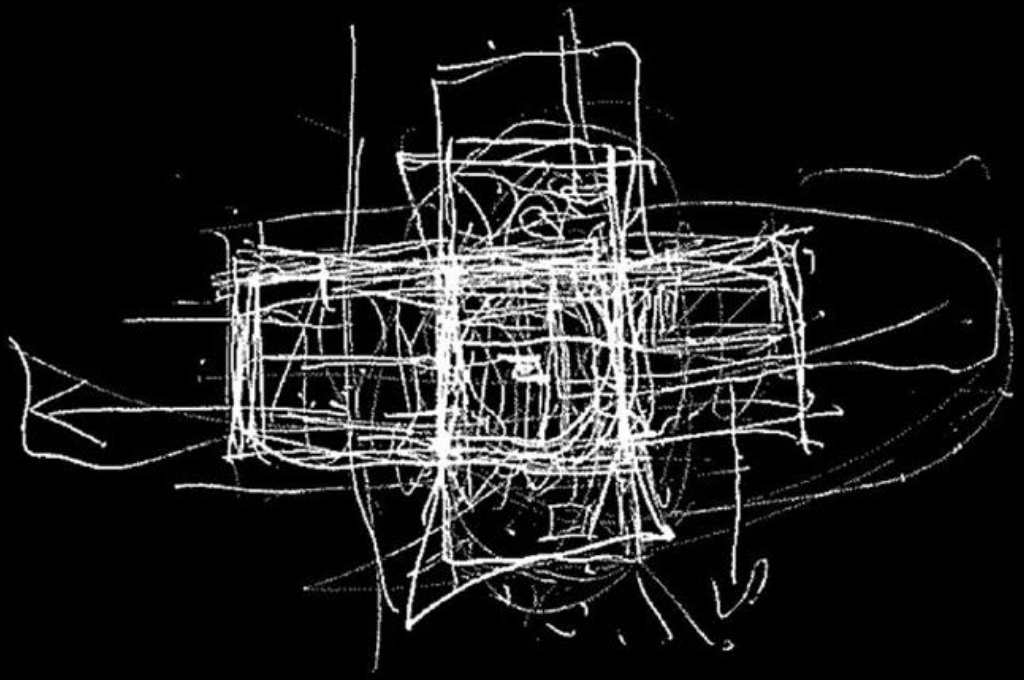
The Kiwi Bach

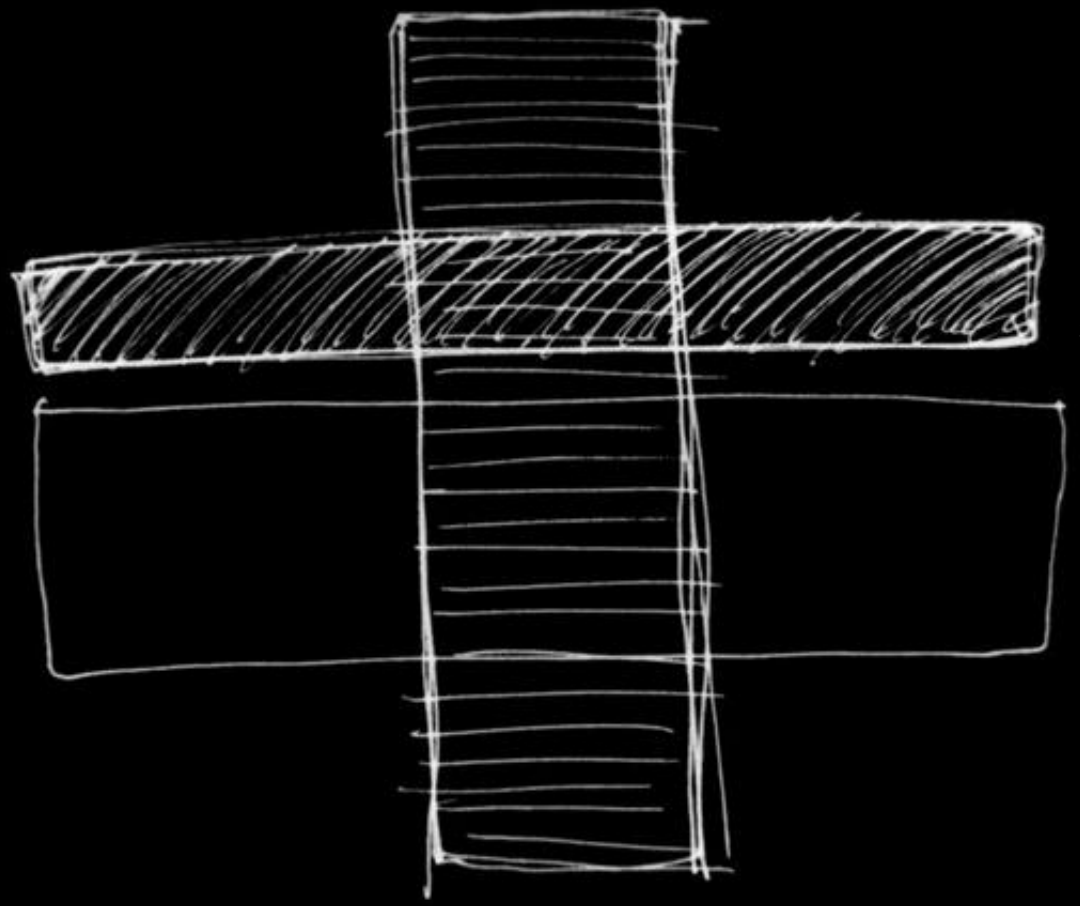
Traditional

Low Performance

Piecemeal Construction

Energy Inefficient





3 – Humanising technologies

1 – Focusing on social interaction

2 – Reconnecting with the landscape


Proposed planters
Inland planting
INTIMATE AREA
Road Area
STORAGE | SLEEPING
SITTING
KITCHEN
BATHROOM
LINEN
SERVICES
UTILITY AREA
SHED
Alpine planting
Coastal planting
Proposed planters


Proposed planters
Inland planting
INTIMATE AREA
Rest Area
KITCHEN
SERVICES
UTILITY AREA
lounge
LIVING
STUDY
BEDROOM
bedroom
SHED
Alpine planting
Herb garden
Coastal planting
Proposed planters


Proposed planters
Inland planting
INTIMATE AREA
Rest Area
KITCHEN
SITTING
lounge
BATHROOM
bathroom
LINEN
SERVICES
UTILITY AREA
STUDY
bedroom
SHED
Alpine planting
Herb garden
OUTDOOR LIVING
Coastal planting
Proposed planters

The First Light House – A net zero energy bach


KEY
Inland planting
INTIMATE AREA
Proposed planters
Rest Area
KITCHEN
BATHROOM
LINEN
SERVICES
UTILITY AREA
SHED
lounge
SITTING
bedroom
STUDY
roofing
Alpine planting
Herb garden
Coastal planting
Proposed planters
GENERAL NOTES
DO NOT SCALE OFF DRAWINGS
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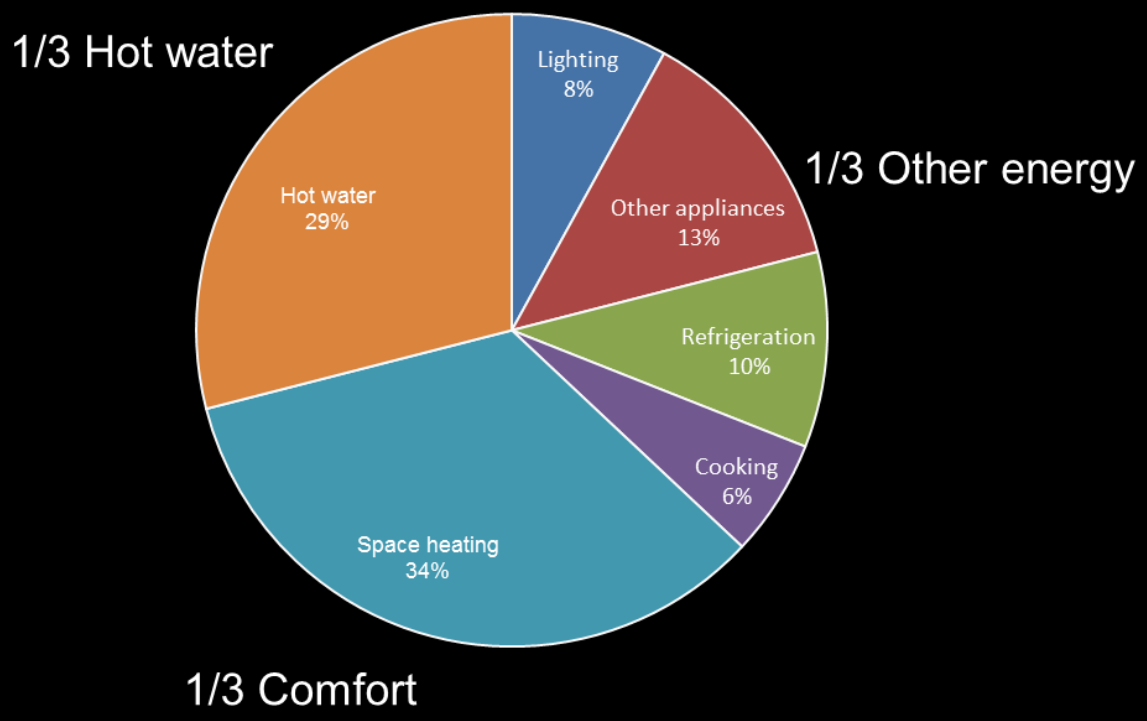
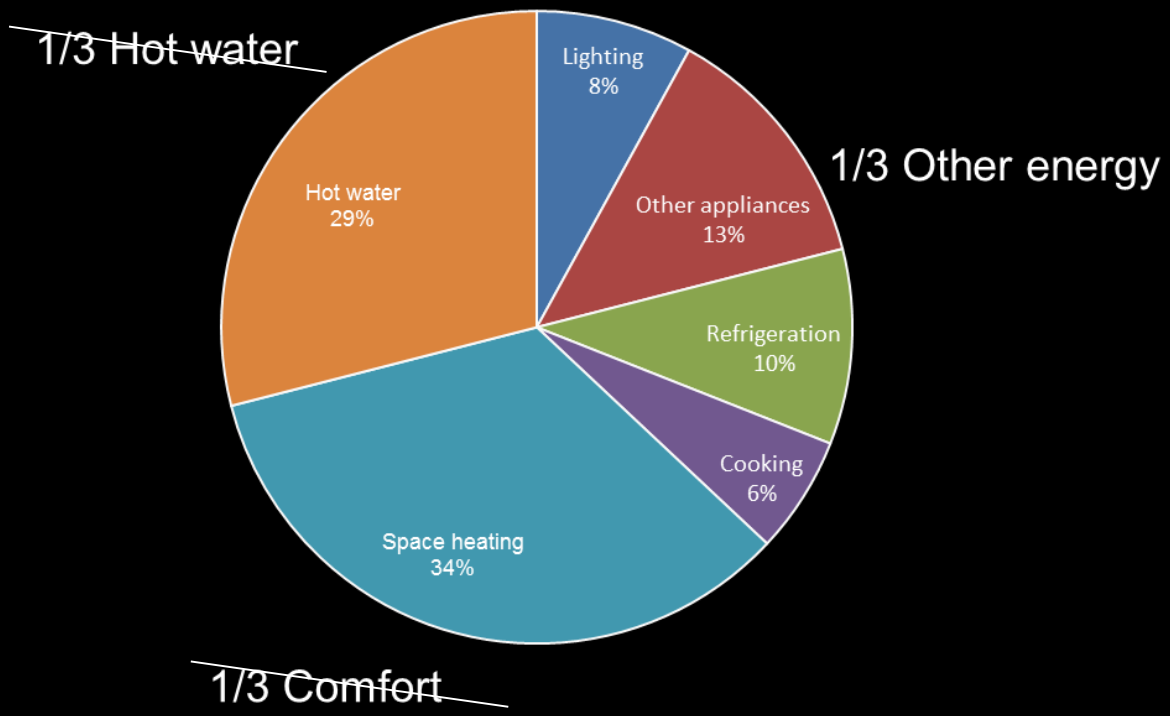


The average NZ home consumes 11,410kWh of electricity per year

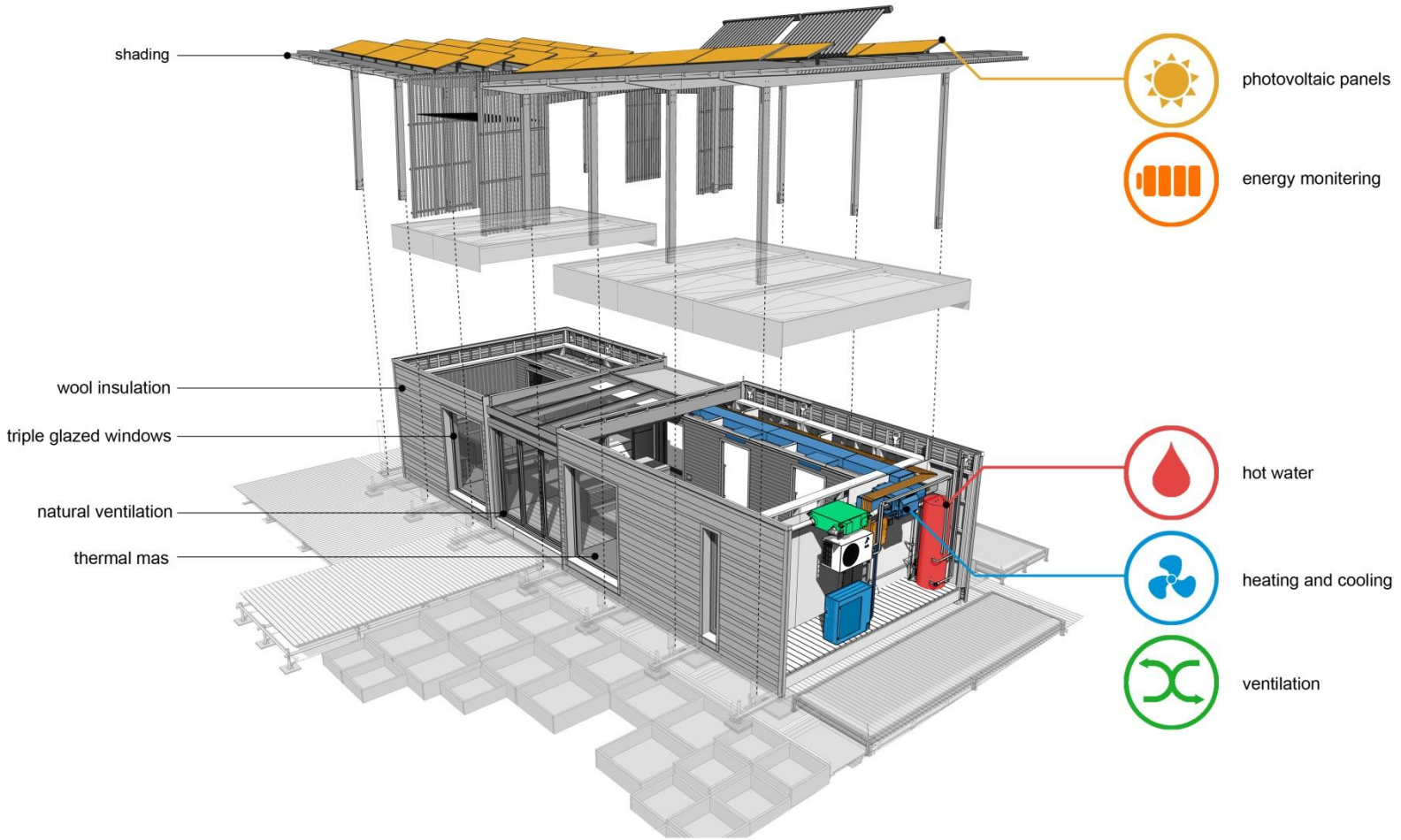


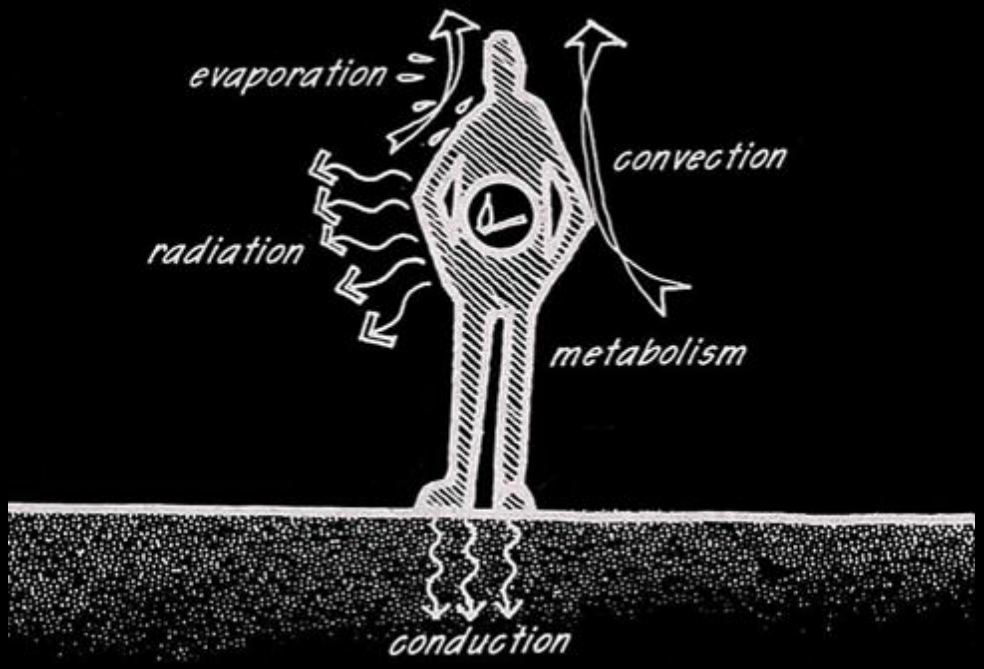
The First Light house consumes 3226kWh per year

All of which is generated with PV solar panels on the roof

passive

active



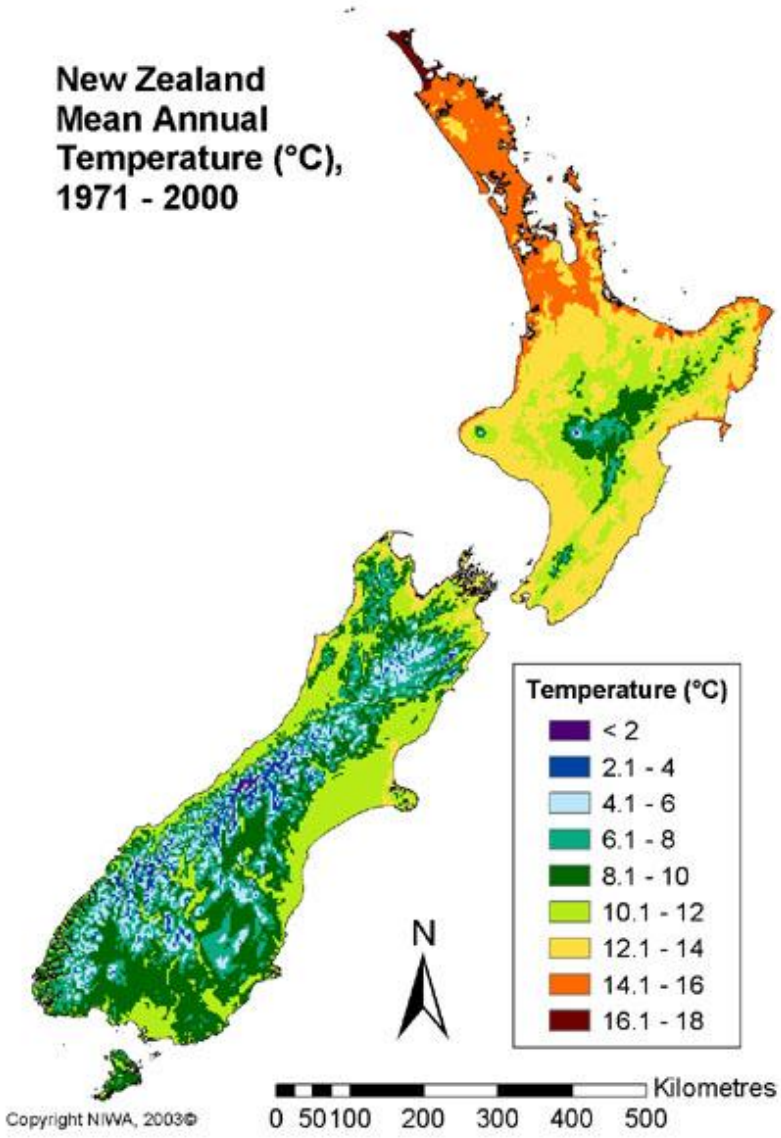


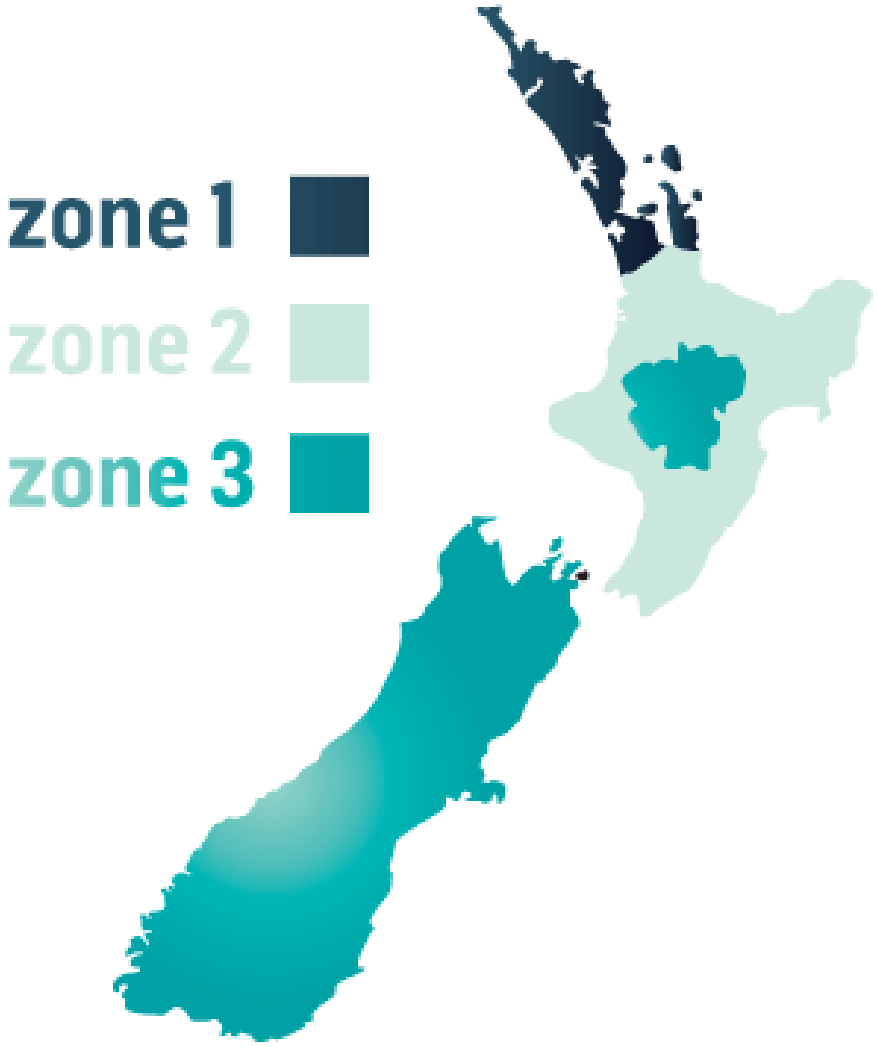
Solar Decathlon
21.7-24.4^{o}C

World Health organisation
18-24^{o}C

Washington DC

Wellington


New Zealand
Mean Annual
Temperature (°C),
1971 - 2000
Temperature (°C)
< 2
2.1 - 4
4.1 - 6
6.1 - 8
8.1 - 10
10.1 - 12
12.1 - 14
14.1 - 16
16.1 - 18
N
Kilometres
0 50 100 200 300 400 500
Copyright NIWA, 2003©


zone 1
zone 2
zone 3

Tauranga

Wellington

Tauranga Wellington

Queenstown

Nelson

Thermal modeling

Insulation

Thermal Mass

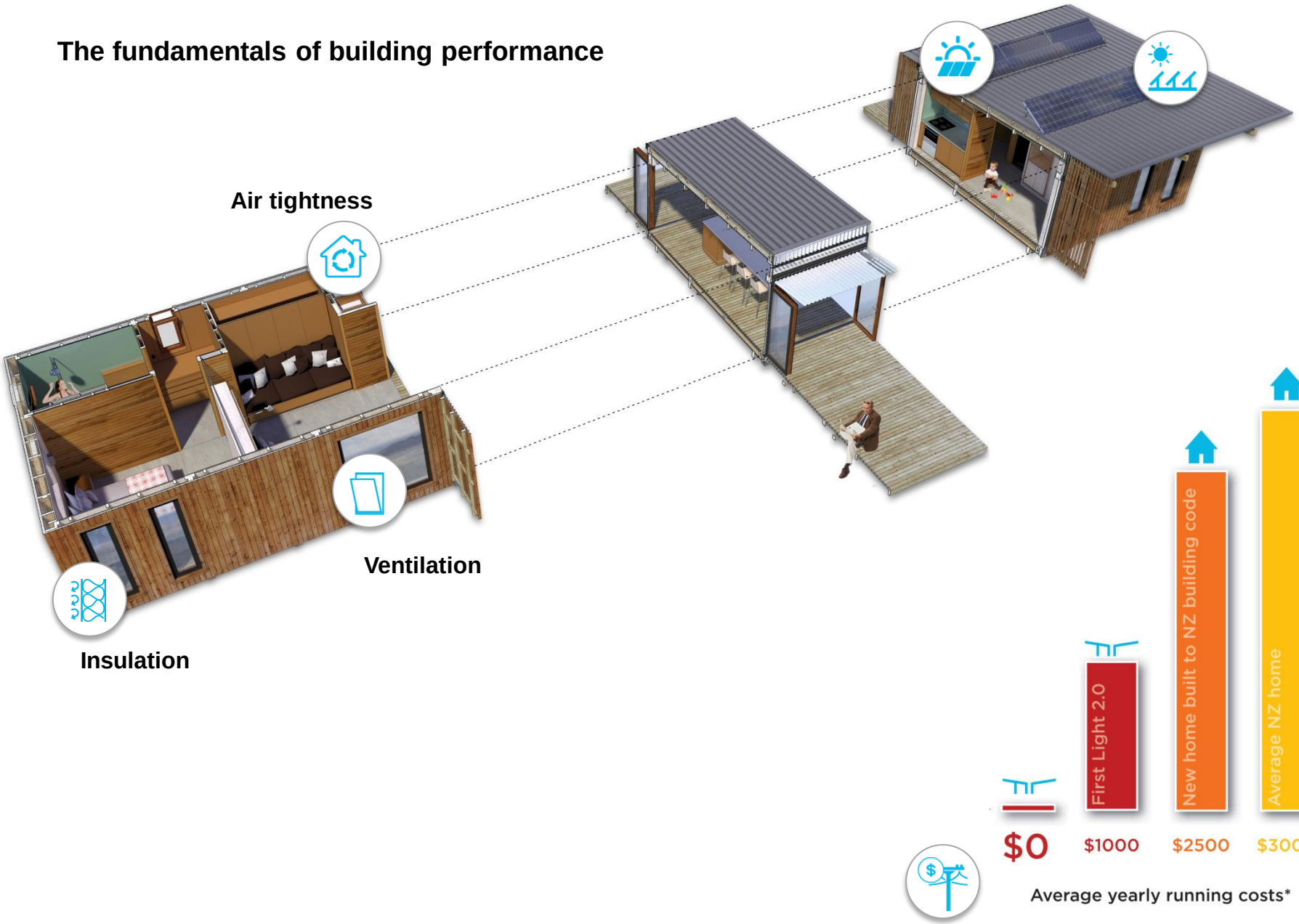
Glazing, Skylight & Shading

Ventilation

Air tightness

Why leave the design of our buildings up to chance?

The fundamentals of building performance

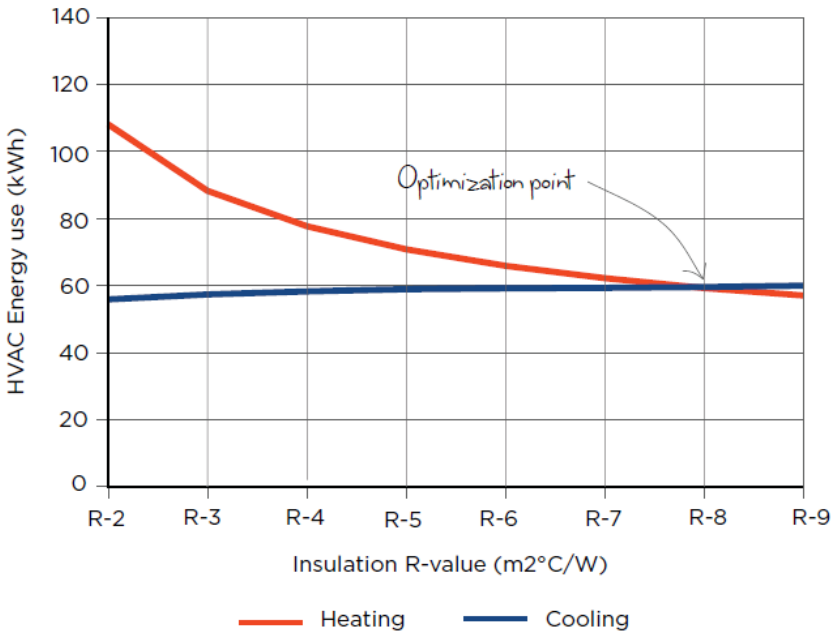


Any proposed changes to the Building Code requirements will not result in less energy use or fewer carbon emissions unless they focus directly on total energy use, not only on energy efficiency. Such regulations also need to be strictly enforced.

Thermal resistance of building envelope

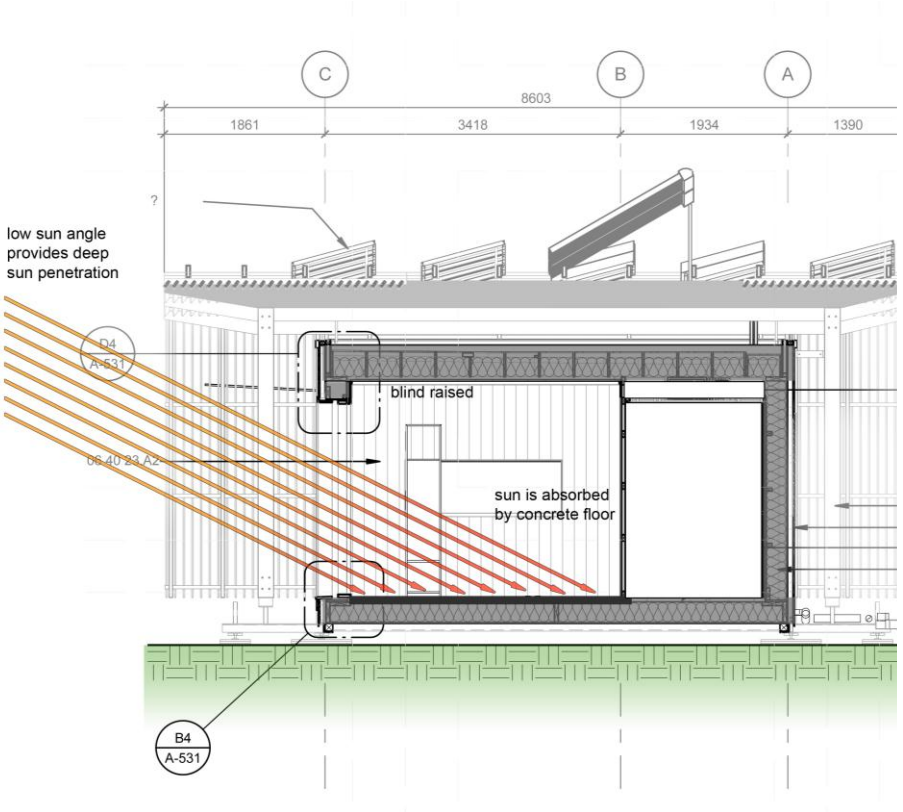
Building Element	Construction R-value ($m^2.°C/W$)	Construction R-value ($m^2.°C/W$)	Construction R-value ($m^2.°C/W$)	Construction R-value ($m^2.°C/W$)
	FL House	FL Home	Zone 1 & 2	Zone 3
Roof	6.48	4.2	2.9	3.3
Wall	5.77	3.2	1.9	2.0
Concrete Floor	5.46		1.3	1.3
Timber Floor	5.88	2.6	1.3	1.3
Glazing	1.11	1	0.26	0.26
Door	-			
Skylight	1.11		0.26	0.31


www.proclima.com

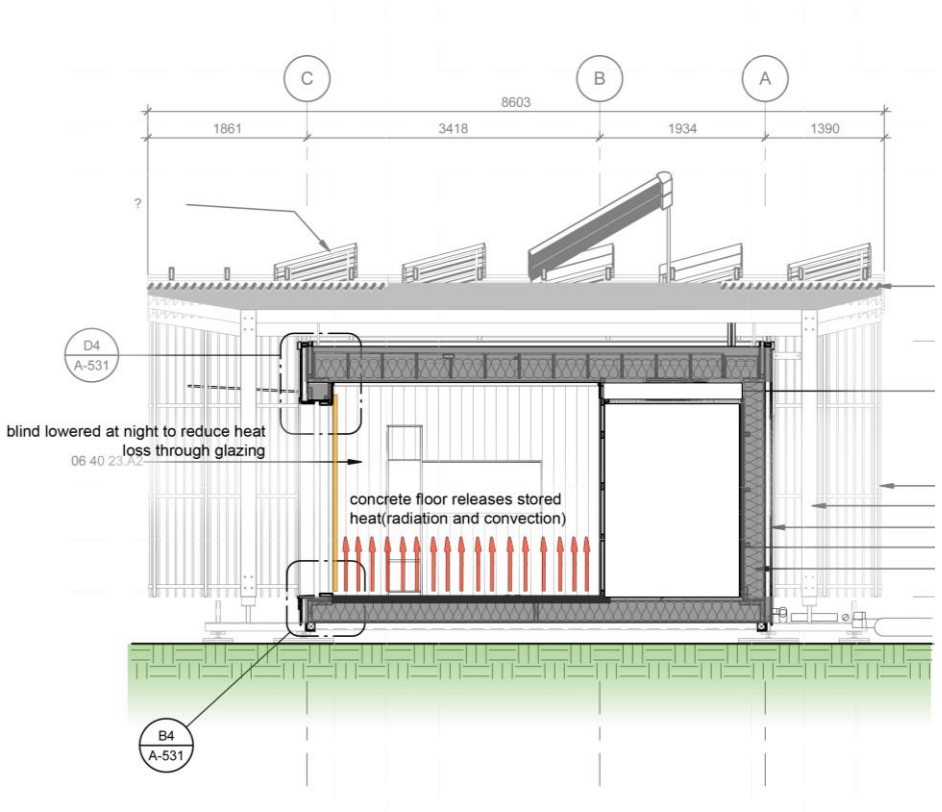

140
120
100
80
60
40
20
0
HVAC Energy use (kWh)
Optimization point
R-2
R-3
R-4
R-5
R-6
R-7
R-8
R-9
Insulation R-value (m2°C/W)
Heating
Cooling

Thermal mass

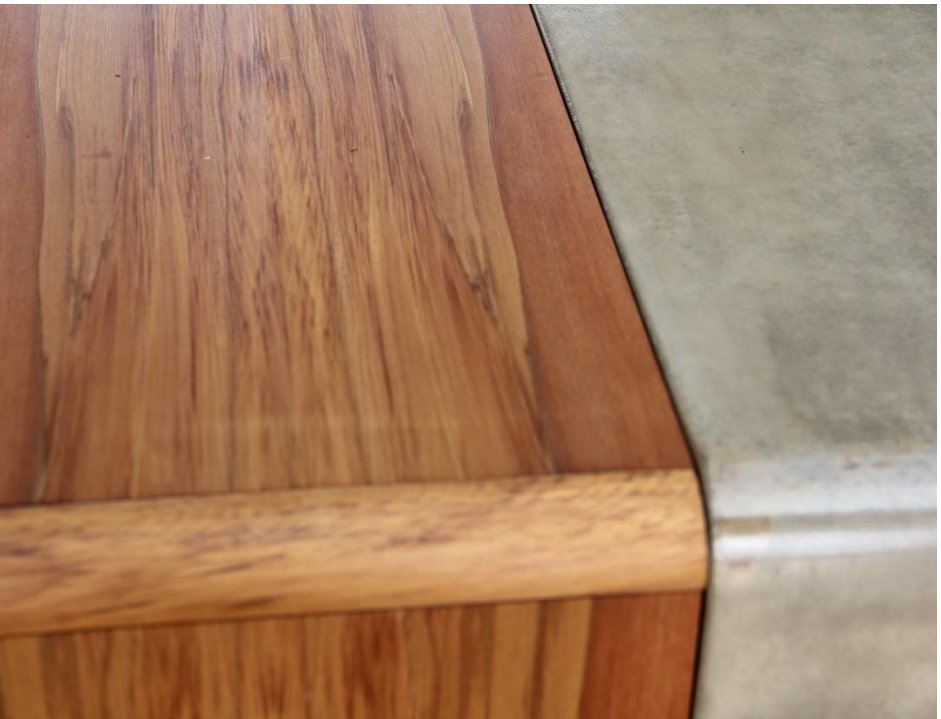
Optimizing the efficiency of the building envelope



Winter day

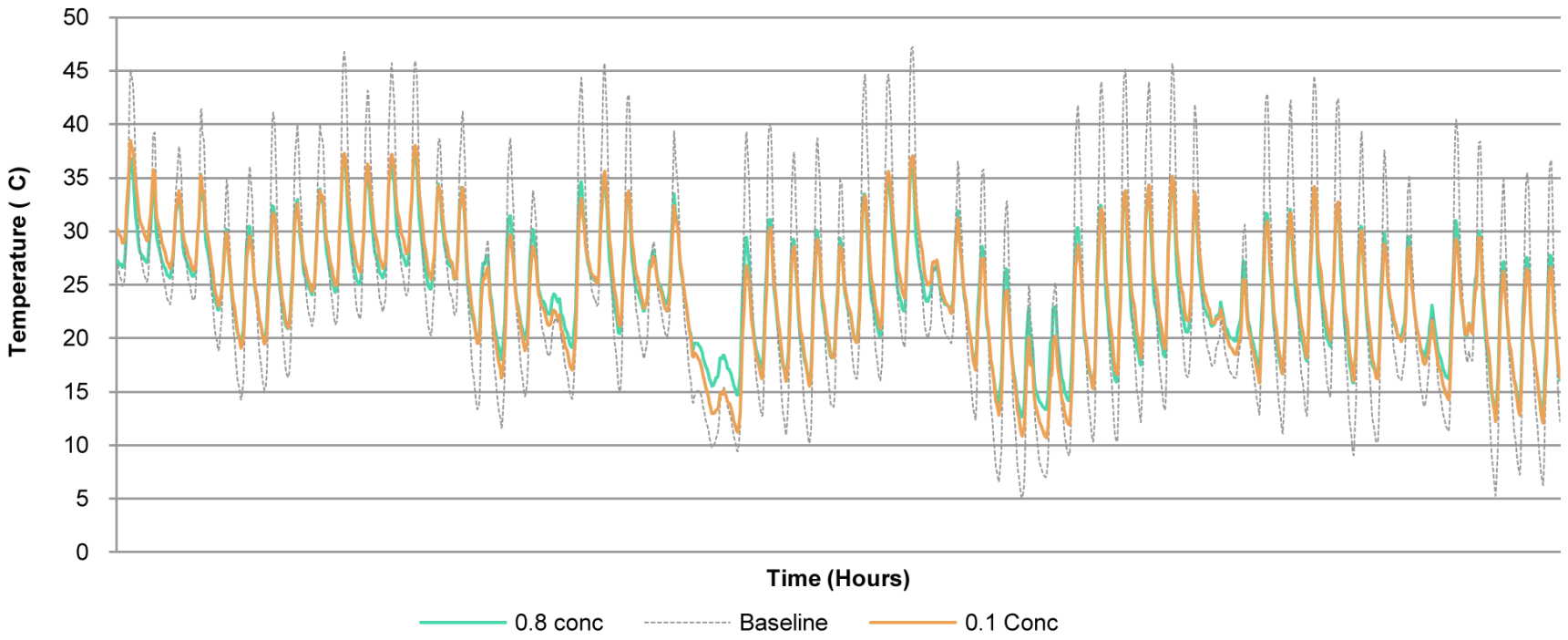


Winter Night



Thermal mass

Optimizing the efficiency of the building envelope



Glazing

Type of glass & Frame (Timber versus aluminium)

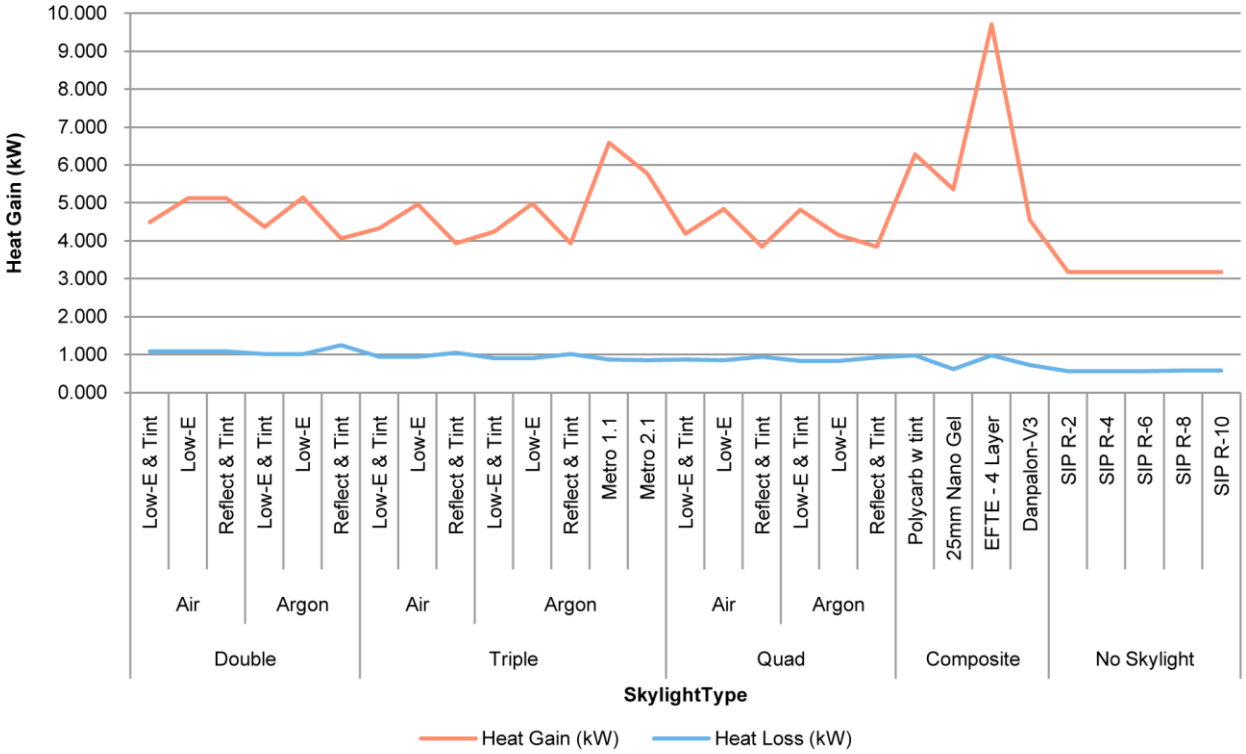


Chart 13: Maximum heat gain & loss (kW) through the glazing for the period from September 1st to October 31st

Air tightness

NZBC H1.3.3

H1.3.3 Account must be taken of physical conditions likely to affect energy performance of *buildings*, including—

(a) the thermal mass of *building elements*; and

(b) the building orientation and shape; and

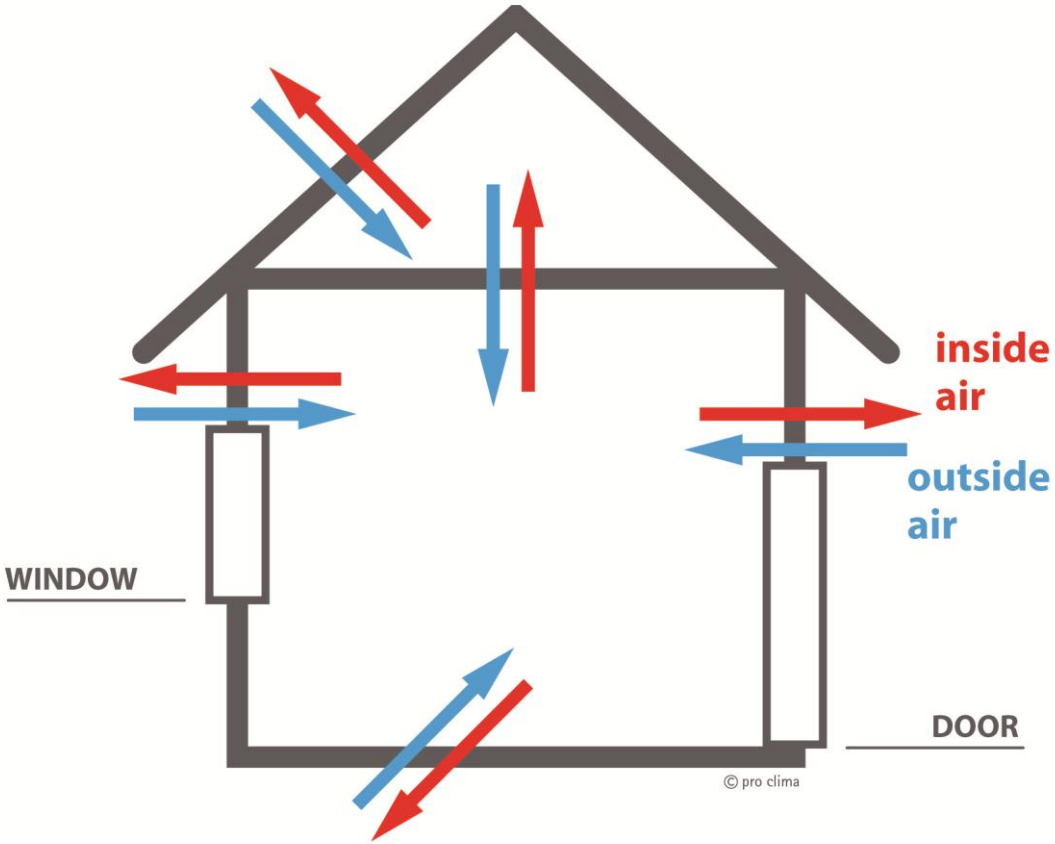
(c) the airtightness of the building envelope; and

(d) the heat gains from services, processes and occupants; and

(e) the local climate; and

(f) heat gains from solar radiation.

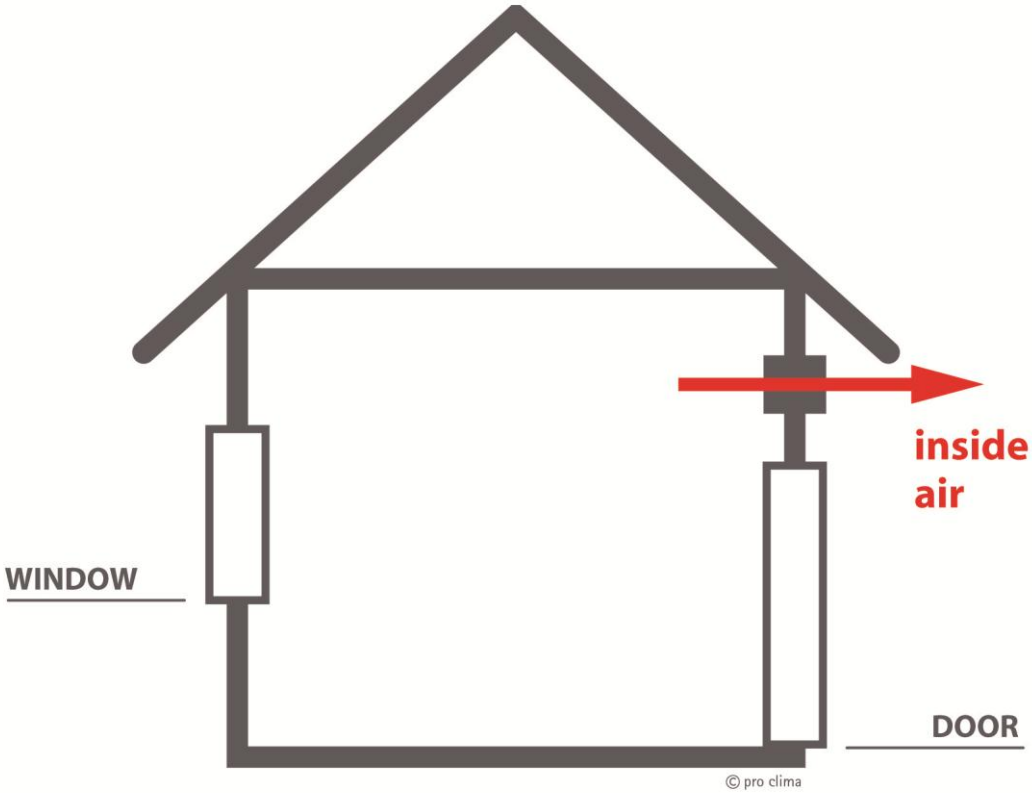
INFILTRATION



Uncontrolled air movement through the building envelope.

pro clima®

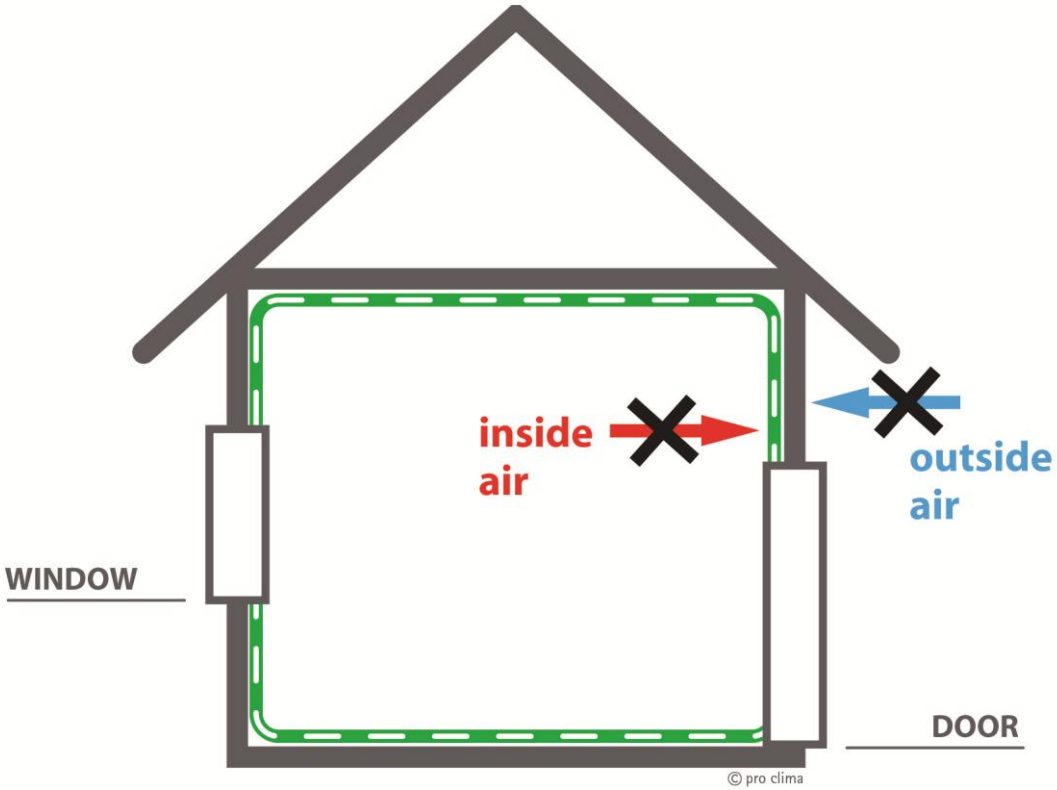
EXFILTRATION



Forced air movement from the inside towards the outside through extraction fans, range hoods, etc.

pro clima®

AIRTIGHTNESS



Preventing uncontrolled air movement (infiltration)
through the building envelope.

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INTELLO

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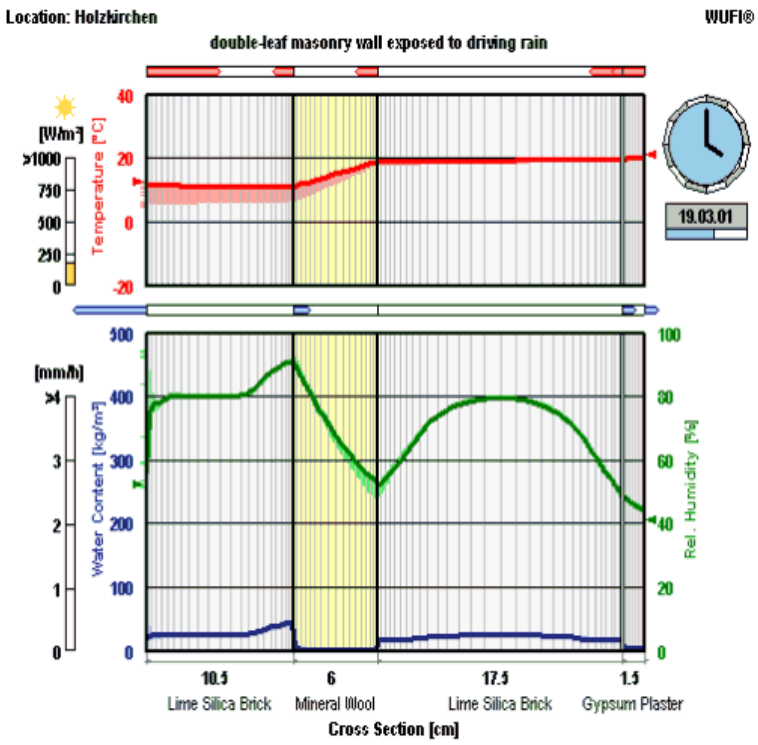
WUFI®

PC Programs for calculating the coupled heat and moisture transfer in building components



Calculation **M**ethods

WUFI

computer-assisted [dynamic] simulation program for heat and humidity transport
(Fraunhofer, Germany)

- real climatic data
- inside and outside temperature
- inside and outside humidity
- light absorption
- moisture storage capability
- capillary action

pro clima®

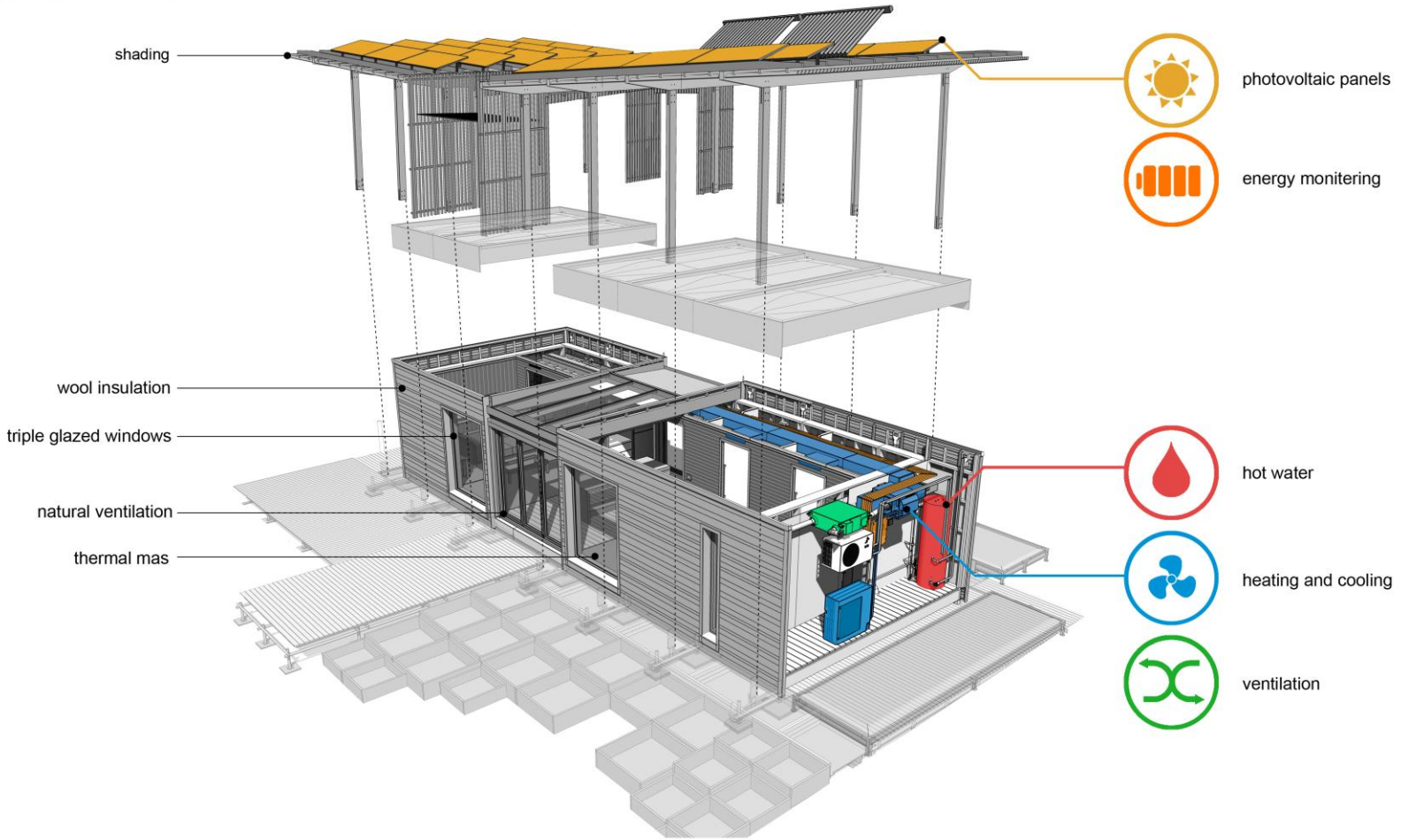
Any proposed changes to the Building Code requirements will not result in less energy use or fewer carbon emissions unless they focus directly on total energy use, not only on energy efficiency. Such regulations also need to be strictly enforced.

Blower door testing will identify the amount of air leakage occurring in the building.

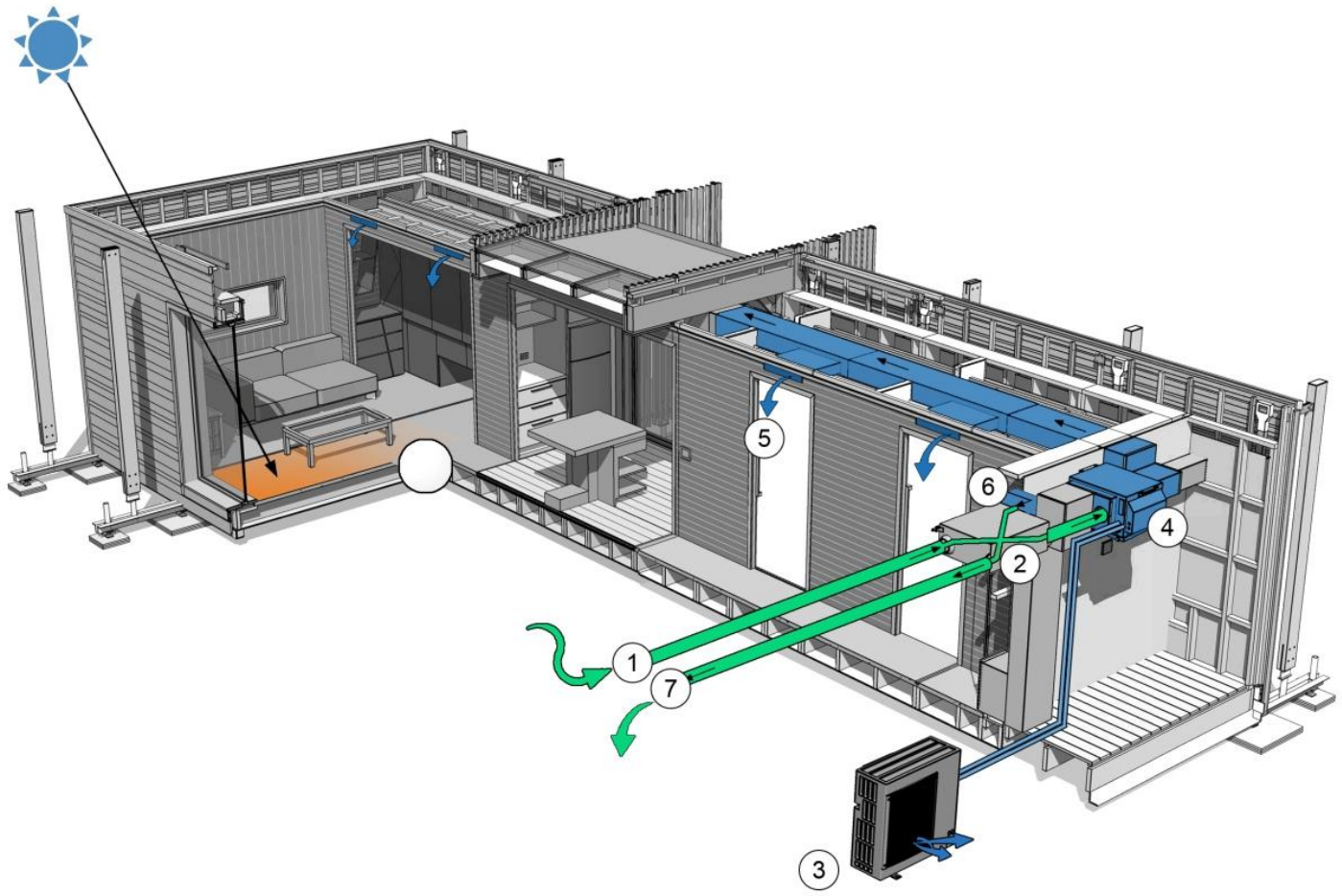
More importantly, it will provide insight as to whether or not a building has a sufficient air barrier.

passive

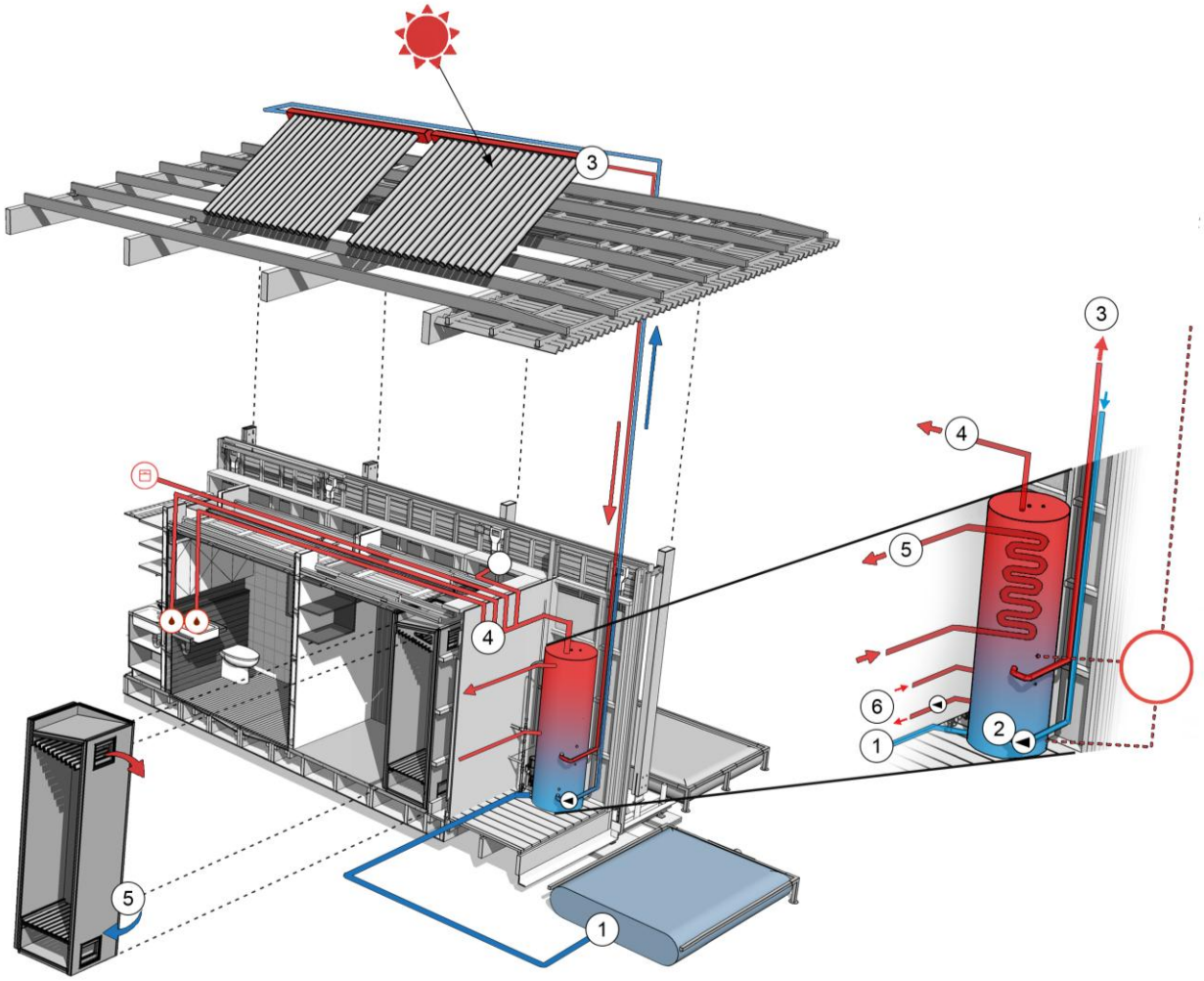
active

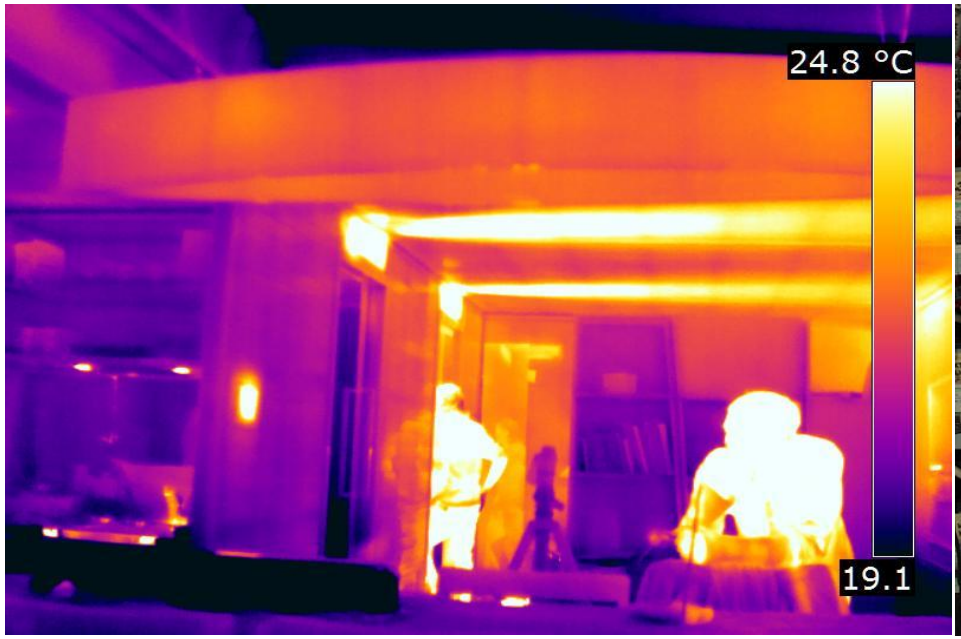


Heating & Cooling



Hot Water




24.8 °C
19.1


www.BlowerDoor.co.nz

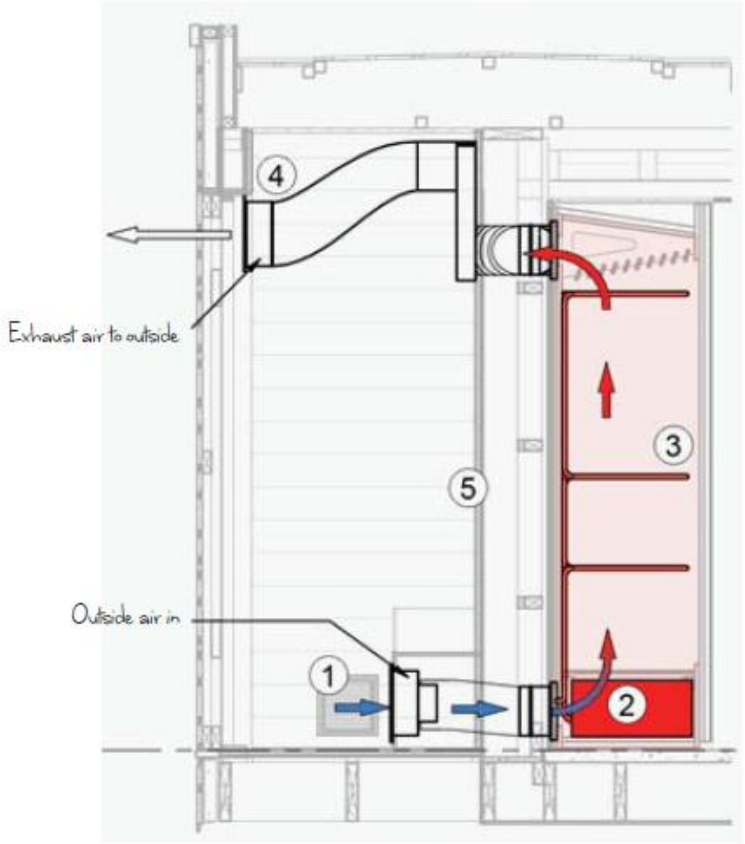
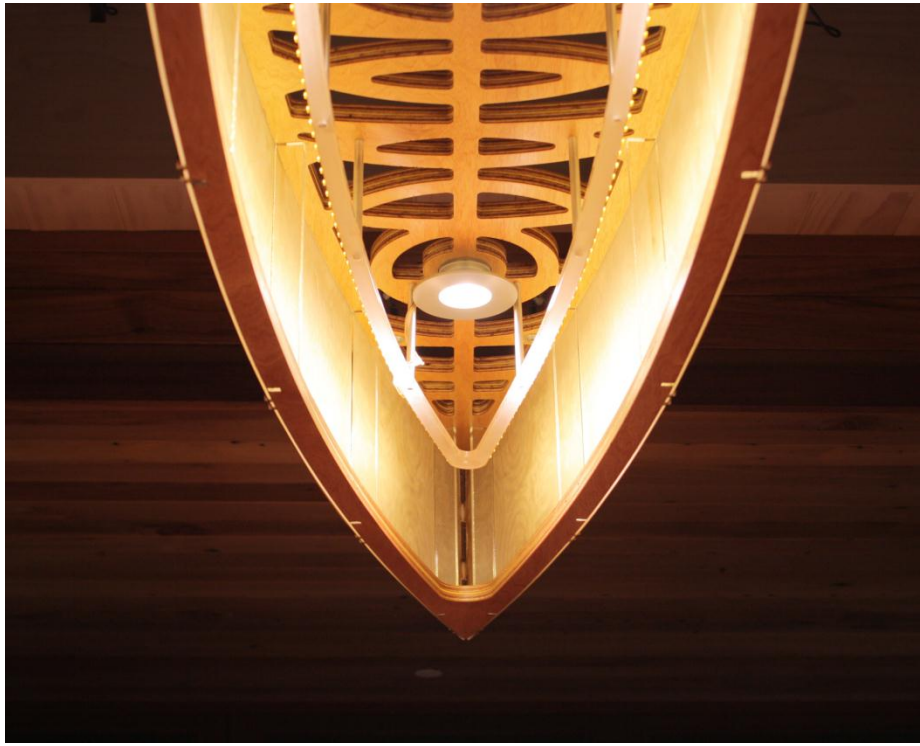
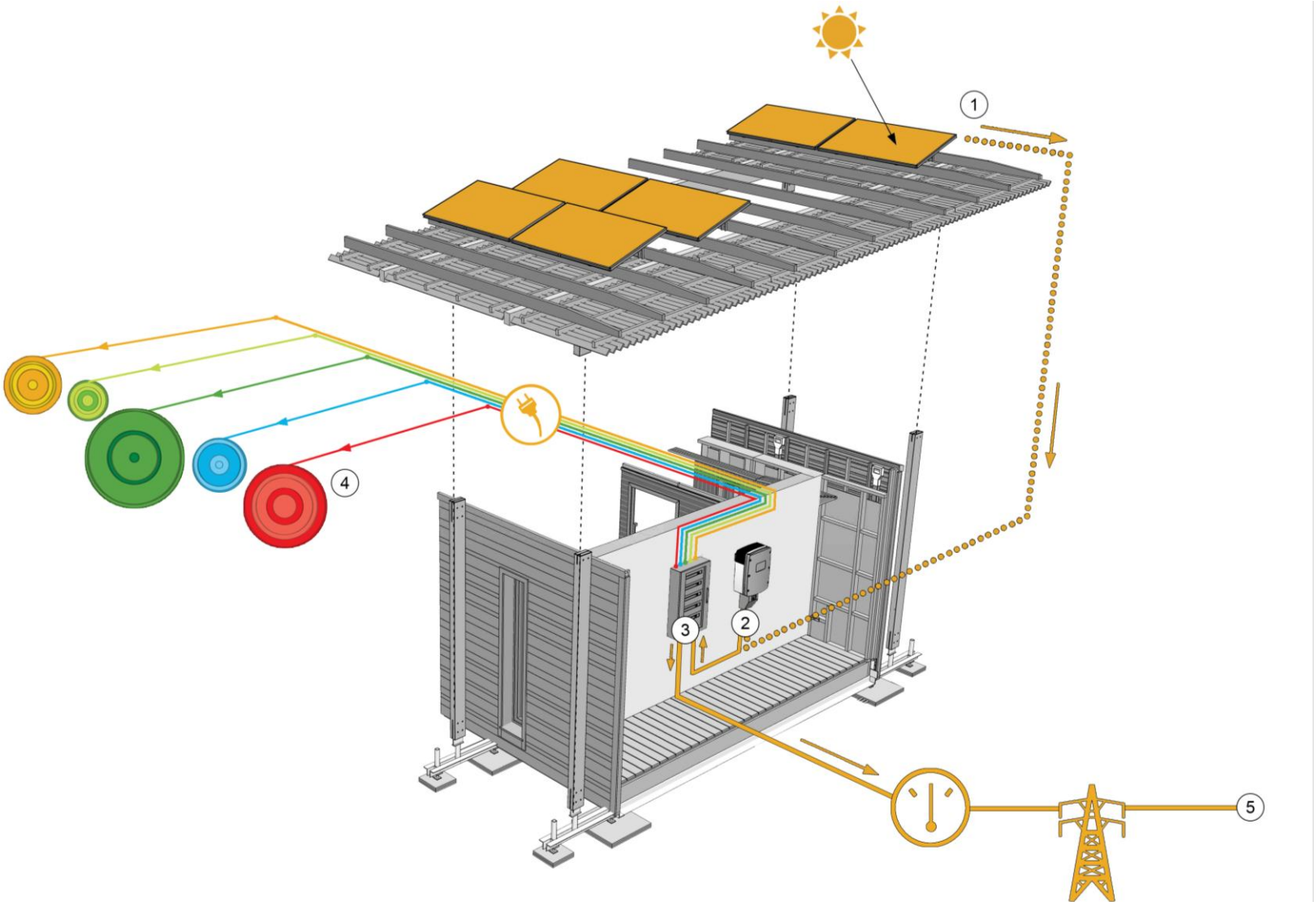


Figure 66: Diagram of hydronic drying cupboard

Appliances - Drying cupboard



Energy generation



Net zero energy housing

Reducing our energy use to optimize our energy generation

- Designing with climate in mind to reduce our energy consumption
- Use thermal modeling to test building performance during the design phase and create an optimal thermal envelope
- Using basic technology to improve energy efficiency
- Test building to ensure it meets minimum standards
- Reducing energy use in day to day lives
- Generating the power using PV’s

prototype **production**

Modular versus panelised

Learning from the construction of the Meridian First Light House


KEY
Inland planting
INTIMATE AREA
Proposed planters
Rest Area
KITCHEN
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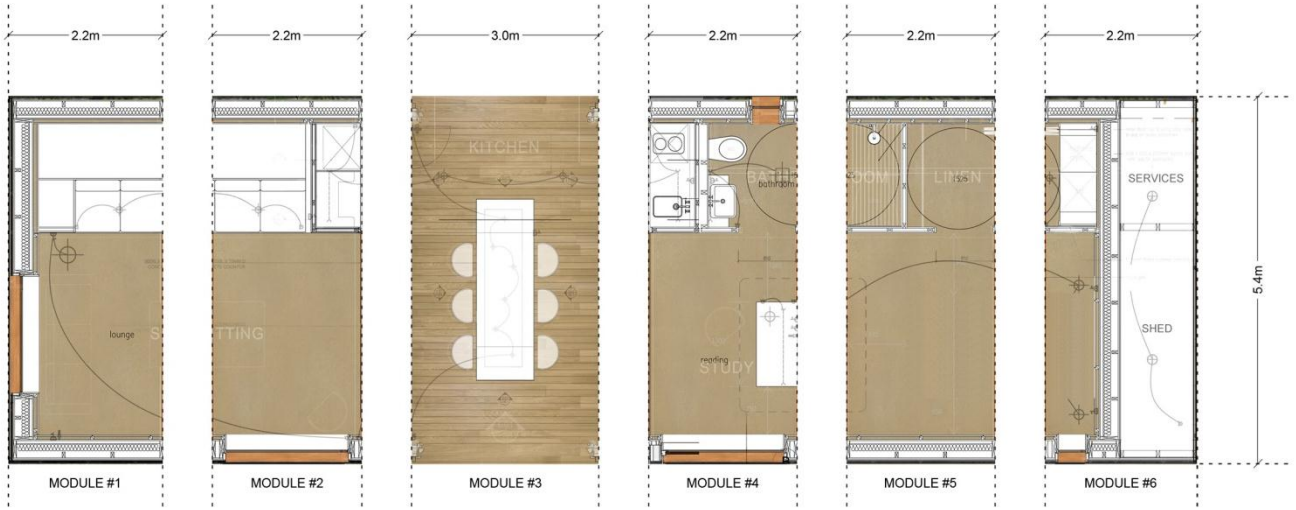
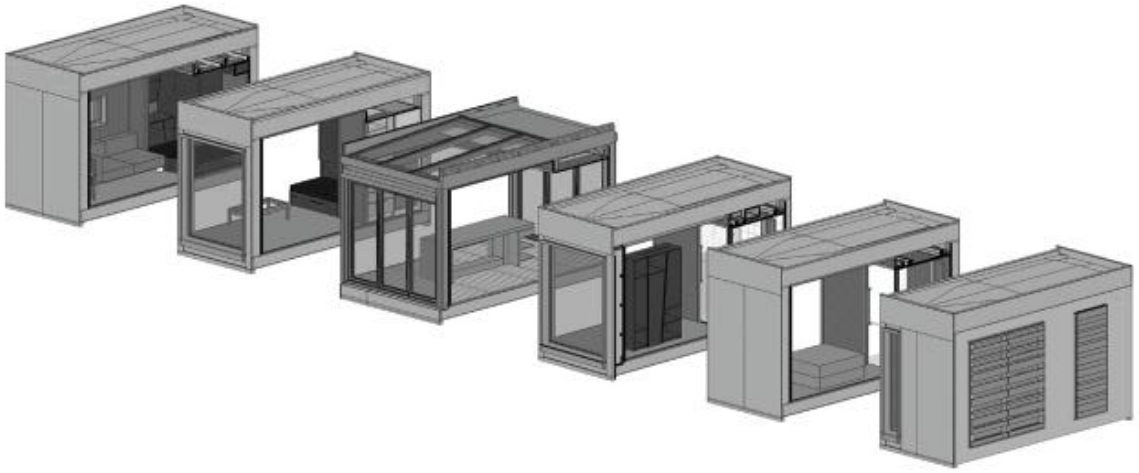
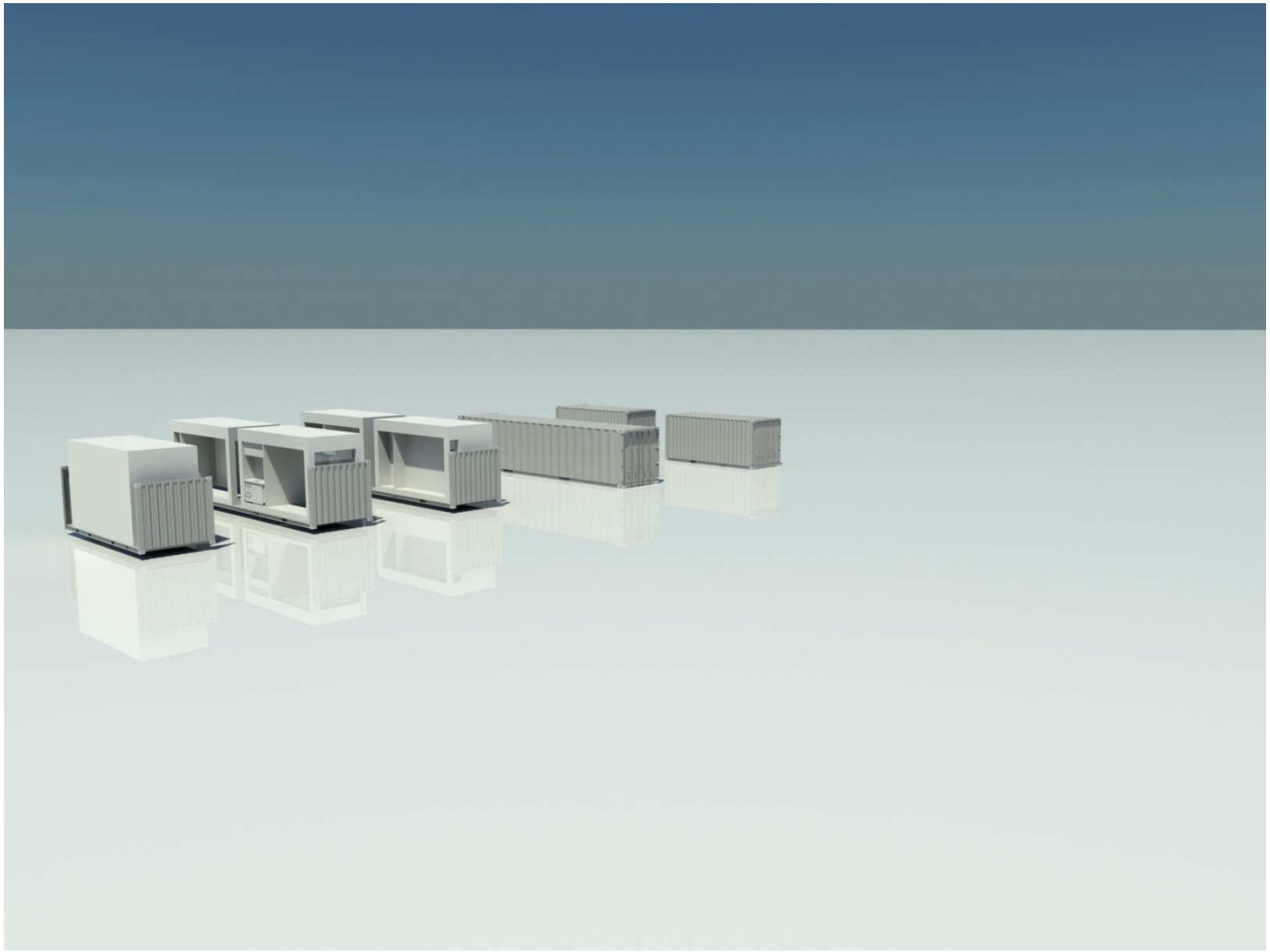
BUILT FOR TRANSPORT



- CONSTRAINED BY TRANSPORTATION REQUIREMENTS
- 7 DAY ASSEMBLY TIMEFRAME
- MODULAR
- PREFABRICATED



- 5 EQUAL MODULES
- ‘FLAT PACKED’ CENTRAL MODULE
- 2x 40’ FLAT RACKS
- 1x 20’ FLAT RACK
- 3x 40’ HI CUBE CONTAINERS

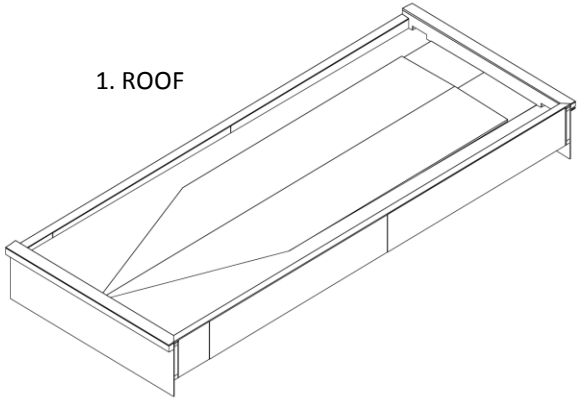


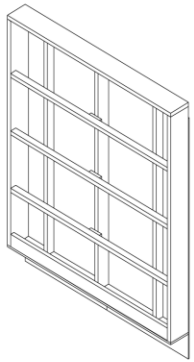
Modular

TYPICAL MODULE
STANDARDISED

Panelised

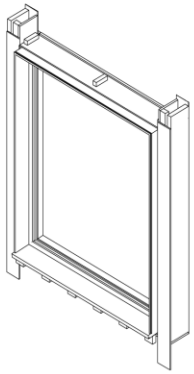
1. ROOF

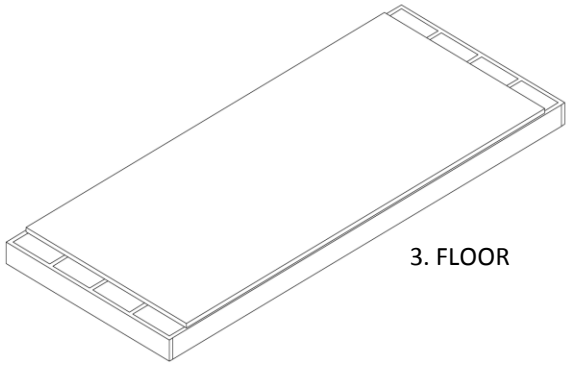




2. WALL

2. WALL & WINDOW

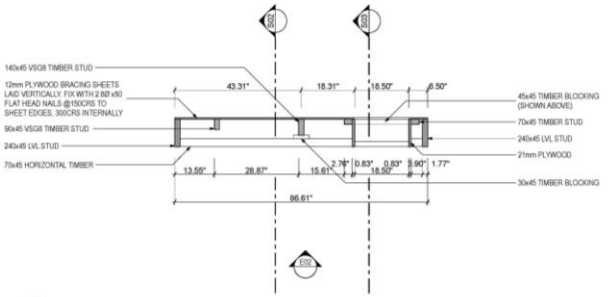




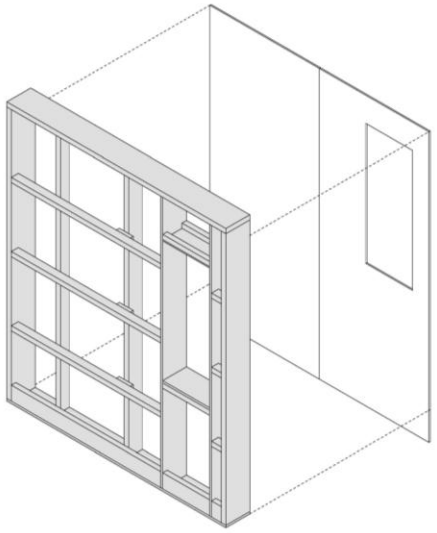
3. FLOOR

EXPLODED MODULE
PREFABRICATED

WALLS



Plan
1:20



GENERAL NOTES

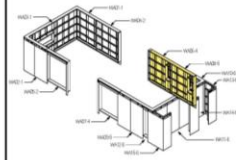
Do not scale off drawings.

All dimensions to be checked on site.

The work executed from, and all information contained within the drawings, specifications and other documents falls under Copyright law and remains the property of Victoria University of Wellington.

All drawings to be read in conjunction with relevant Specifications and supplementary documents.

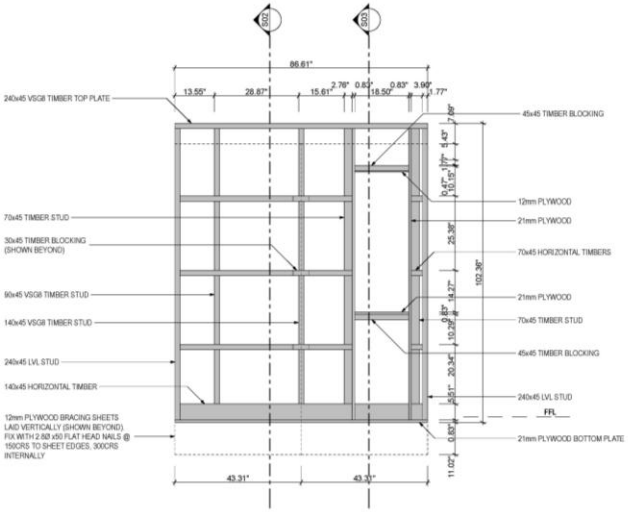
Note for Architect: Blocking at horizontal join in Plywood & 'Y' flashing to be added during phase two of construction.



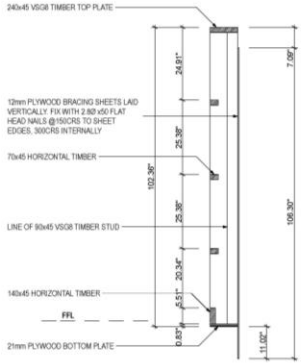
x2

1. WALL TYPE 2 OCCURS AT WA06-4 & WA08-5

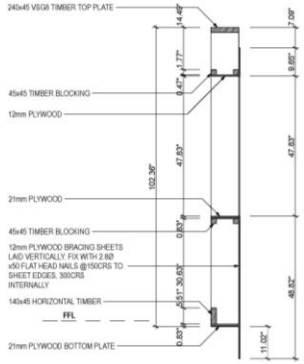
2. CCA OR LOSP TREATED TIMBER MUST NOT BE USED. REFER SPECIFICATION FOR CORRECT TREATMENT



E02 FRAMING ELEVATION
1:20



S02 SECTION
1:20

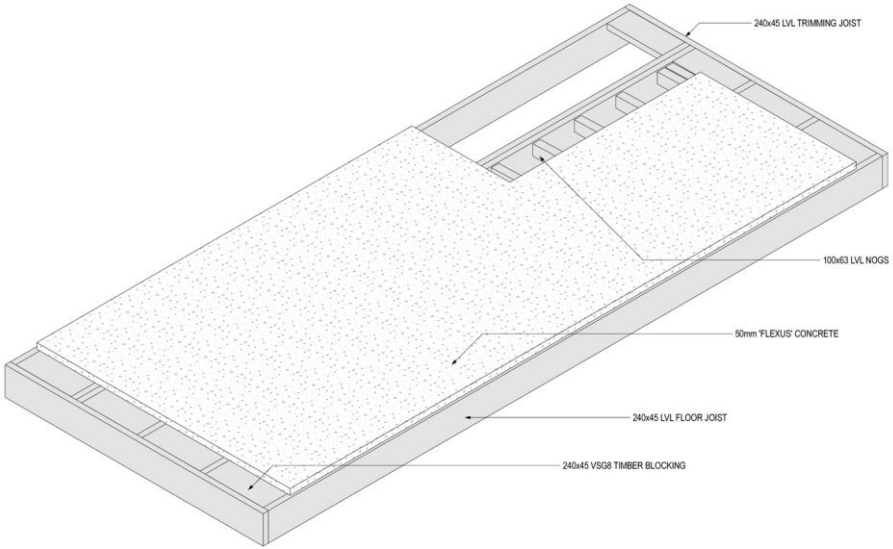


S03 SECTION
1:20


GANG-NAIL

FLEXUS CONCRETE AND LVL COMPOSITE FLOORS

Installing Ecoinsulation wool to underside of floor panel



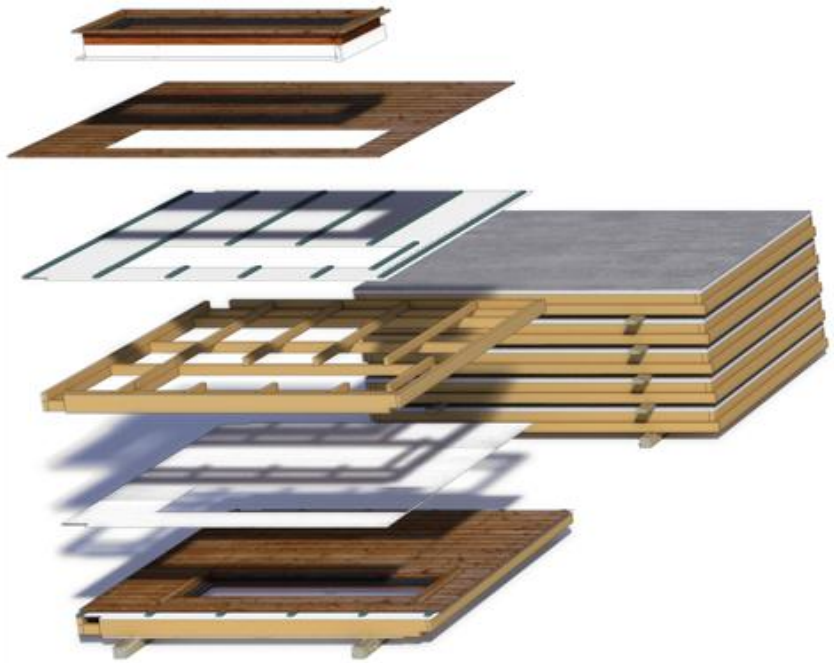
- 50mm THERMAL MASS
- LVL JOISTS
- RESISTANCE TO CRACKING
- 5.4m SPAN

Hybrid construction

Precision engineered in a factory

Factory built

Building houses on site from scratch is messy, wasteful, and outdated. We build all our houses in a carefully controlled factory environment and we are working at the leading edge of the industry. By making the most of the latest in construction technology, we build efficiency and quality right into your new home, from day one.



Factory Built

Precision engineered

By designing our walls, roof and floors on the computer, and constructing them as individual panels in a factory, we take the hassle and room for error away from those working on site. Engineered panels are delivered direct, made to measure.

Panels

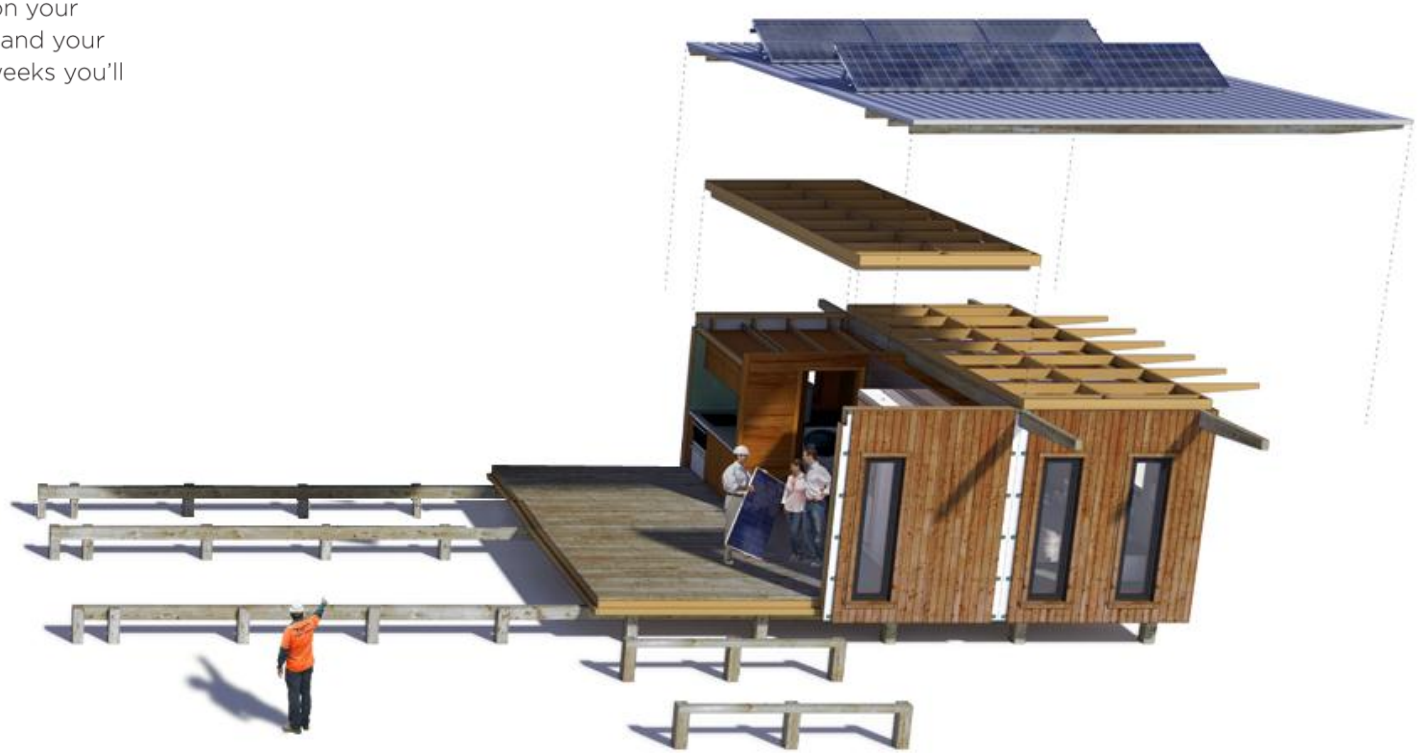
Trucked direct

Take advantage of our central building location, and have your new home trucked direct to site. All our materials are delivered direct to us, and then we deliver the house direct to you. No double or triple handling. No lost deliveries. No sending things back that don't fit. With First Light, your home will be working as it should, right from the speedy start.

Pods

Rapid assembly

Don't blink, you'll miss it! Houses don't need to take months to build, and months to finish. At First Light, they won't. After the foundations are in, give us two weeks on site, and we'll give you a house. Depending on your specifications for finishes and your site, within the next few weeks you'll be in your home! That's it!



Hybrid prefabrication

Whakahoro Eco Lodge


WA 01
WA02


KATO
OHAKUNE ENGINEERING LTD


OHAKUNE ENGINEERING L'TD
KATO
OHAKUNE ENGINEERING LTD
FUSO
AGU386
WHAKAHORO
ECO LODGE
OHAKUNE ENGINEERING L
FOR HIRE PH 06 385895


WHAKAHORO
ECO LODGE
WALL 1
WHAKAHORO
ECO LODGE
POD 1
KATO
WHAKAHORO
ECO LODGE
WALL 2


WHAKAHORO
ECO LODGE
WALL 2
WHAKAHORO
ECO LODGE
POD 1

Where to from here?

Lets create a new generation of NZ homes where energy efficiency and contemporary living are brought together to create a place that is both sympathetic to the environment and tuned to our way of life - for future generations to enjoy

What are we waiting for?

Information & resources?
Experience & expertise?
Innovation & improvement?
Government?


Whatever it is we are not going to get there
without working together…


FIRST LIGHT
NZ


NZ
FIRST LIGHT