



ARCHITECTURAL
DESIGN 2019

ADNZ
NATIONAL
CONFERENCE

ADNZCONFERENCE.CO.NZ

Fixing the Code

17-19 OCTOBER
QUEENSTOWN

HOSTED BY

ADNZ
+
Architectural
Designers
New Zealand

PRINCIPAL SPONSOR



how we got here

NZBC



Current situation and how we got here

Building regulations were introduced after the Napier Earthquake



Resilience =Sustainability

Natural hazards floods super storms
etc
3155 days



The building code is meant to provide a level of protection, but that's a fallacy. People thought that the code was a safe target. We need to move beyond just being happy with the minimum requirement of the being preventing Death. Death Dollars Downtime. 90% of the CBD needed to be demolished. That's about as unsustainable as it gets...all that demolition waste going to landfill and the resource to rebuild etc etc

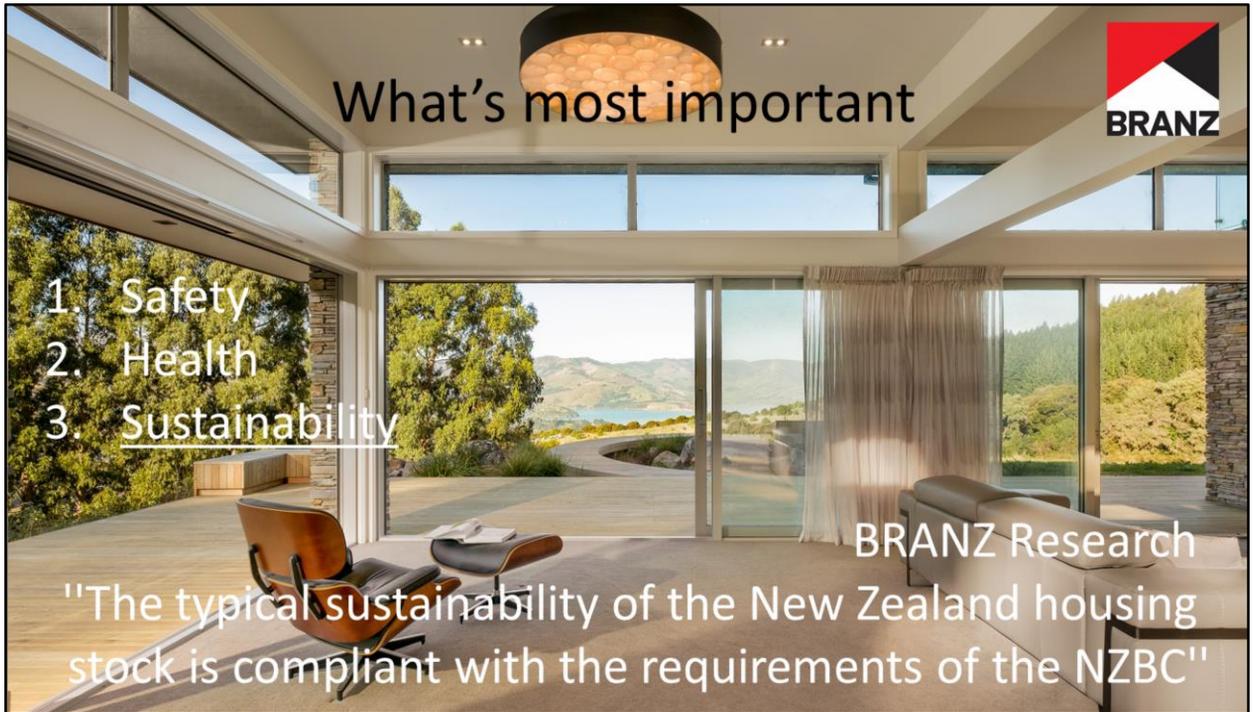


Bahnstadt Heidelberg, Germany...4000 residents

Bahnstadt Heidelberg, Germany. These people had the vision for 4000 people living in zero energy homes. The largest group of passive houses in the world. Where once there was a disused railway shunting yard. Last year's conference I did a 20min talk and the next day I hoped on a plane to Cardiff to present on sustainable architecture at a conference in Wales.

I dropped in to Germany on the way back.

Negligence

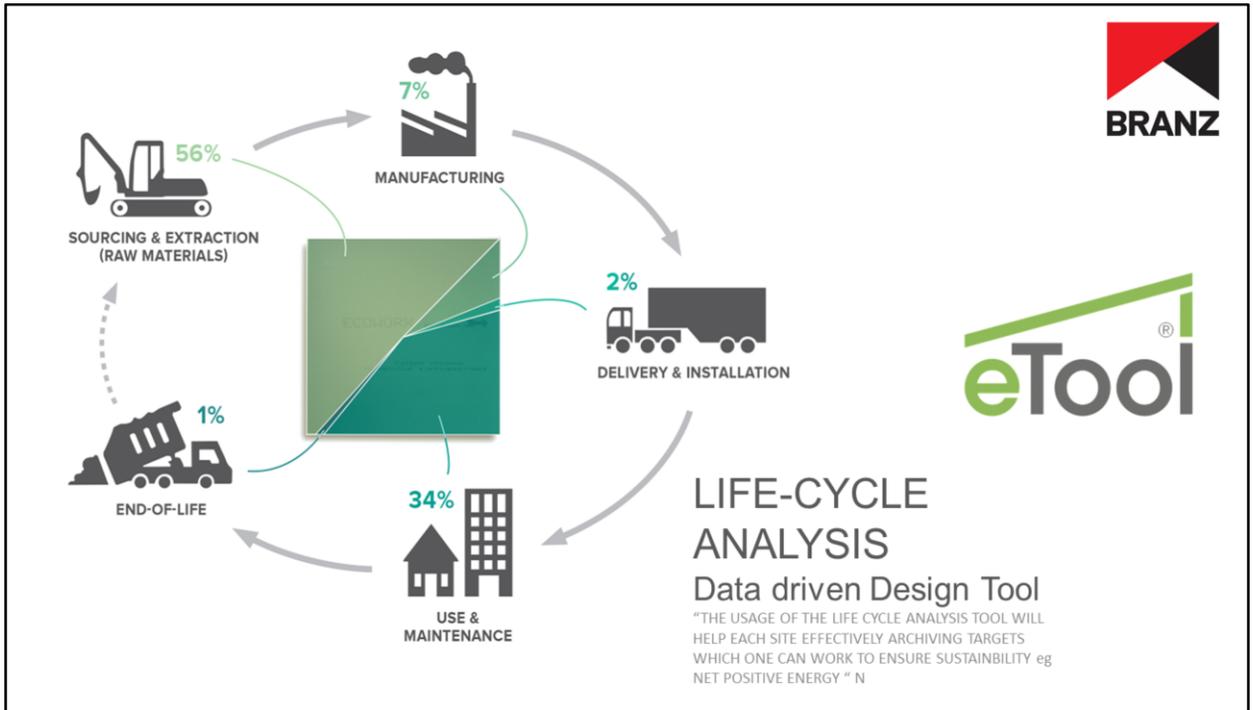


Building Code is meant to be a level of protection for society

Do you know who this is. The building on the right is a give away. Disney concert hall. Renowned American architect Frank Gehry says architecture should do something for Humanity.

I think we as designers need to try to look at the wider context of what we are creating... and our client understanding of how everything we do is nest in a bigger system.

Frank was talking about something else but the same applies for 98% of our building code in NZ. And what the problem with that? Well ...NZ building code is over 20 years out of date compared to many OECD countries with similar climates. **OUR BUILDINGS ARE GARBAGE** and the are not fit for purpose and making us sick.



MH: SHAW floors contacted for new image.

KEY POINTS:

Embodied carbon = carbon dioxide emissions associated with raw material extraction, manufacture, transport and construction
Operational emissions = all carbon dioxide emitted during the life of a building
Need to consider both (i.e. high performance materials could offset their efficiency through higher embodied carbon)

NARRATIVE:

Embodied carbon is a measure of the carbon dioxide emissions associated with the raw material extraction, manufacture, transport and construction of building materials.

This is as opposed to **operational emissions**, which are all carbon dioxide emitted during the life of a building from such processes as heating, cooling, and lighting.

Why worry about embodied carbon?

- Reducing embodied carbon represents immediate 'savings': it is carbon that has not gone into the atmosphere. Reductions in operational emissions are future reductions. To minimize global warming and climate change, it's important to reduce the quantity of emissions as soon as possible.
- National Trust for Historic Preservation's *The Greenest Building: Quantifying the Value of Building Reuse*: "It takes 10 to 80 years for a new building that is 30 percent more efficient than an average-performing existing building to overcome, through operations, the negative climate change impacts related to the construction process."
- Energy-efficient buildings may be using more, and more carbon-intensive, materials to achieve lower operational emissions. Therefore it is important to design for net reductions.

References

- **National Trust for Historic Preservation's *The Greenest Building: Quantifying the Value of Building Reuse***
 - http://www.preservationnation.org/information-center/sustainable-communities/green-lab/lca/The_Greenest_Building_lowres.pdf
- **Embodied Carbon: Measuring How Building Materials Affect Climate. BuildingGreen.com, April 2011.**
 - <http://www.buildinggreen.com/auth/article.cfm/2011/3/30/Embodied-Carbon-Measuring-How-Building-Materials-Affect-Climate/>

Fixing the Code?



I am an Architectural Activist, a Design Disrupter. We have the best job in worldbut with it comes a huge responsibility and one which I take very seriously. All Architects and Designers have the opportunity to change lives and and we can design and construct building that heal the climate. The serendipitous side effect is they can make people happier, healthier, wealthier. We can literally pull carbon out of the sky and lock it up in building, using carbon sequestering materials, natural non-toxic materials. We have the technology now it just requires a paradigm-shift. (net zero energy, zero waste, zero water etc, energy positive) We and a small number of you already design zero carbon buildings. Just as producers of products, from design through to manufacture are increasingly being required to. We all need to be responsible for the environmental credentials of our designs. I believe they should be beautiful too.



New Zealand is wonderfully innovative. We push the boundaries and punch above our weight in many sectors, produce world class science, music and art and without a doubt some beautiful innovative architecture – so, why are our buildings so inefficient? World wide building produce 1/3 of GHG's, consume 40% of energy, (70% in cities), 50% of processed raw materials and are responsible for over 50% of waste going to landfill.

Is Fixing the Code the right thing to be thinking about? What about thinking about our personal Code. Our code of conduct. Our Code of ethics. Our professional responsibility to society as well as our communities and our clients.

THE GOLDEN CIRCLE

Simon Sinek

WHAT

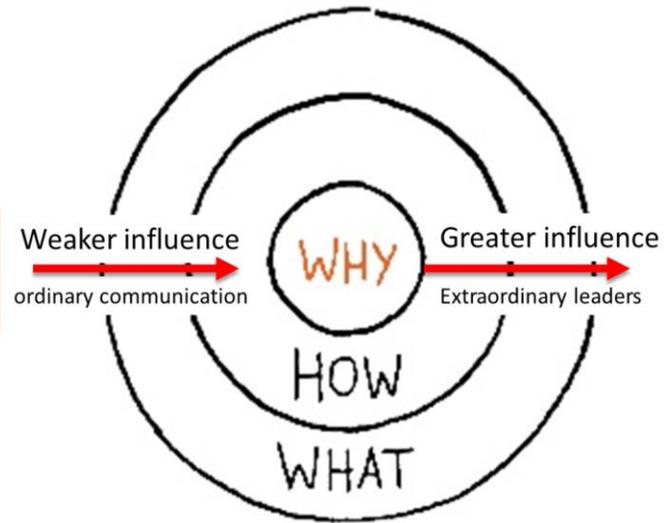
Every organisation on the planet knows WHAT they do. These are products they sell or the services.

HOW

Some organisations know HOW they do it. These are the things that make them special or set them apart from their competition

WHY

Very few organisations know WHY they do what they do. WHY is not about making money. That's a result. WHY is a purpose, cause or belief. It's the very reason your organisation exists.





A sculpture of German politicians discussing climate change. Recently Christchurch declared a CLIMATE EMERGENCY many other regions and groups have too. Politicians should declare a national climate emergency.





Building better more energy efficient, environmentally friendly homes will also be better for our health and wellbeing and financial sustainability as well as mitigating climate change.





early adoption - low ethermally broken....

RESILIENCE - seismic performancecentre of masslow damage design

wind load greatest structural bracing requirement

longevity weathertightness





Icing on the quake

We got to test drive this home after feb 22 when we move here after our house was damaged and consequently learn about how well the design works.





Hawkesbury Ave, St Albans

We rented this house after the EQ could not get anything better as we had two dogs and lots of competition for rentals at the time

This house had problems, sodden house syndrome

Could not be heated even with dehumidifier running constantly

Sodden House Syndrome





Mould on fire place and carpet
Mould, rising damp, not evident in summer
Not heat-able in winter - unhealthy



Cold but able to be heated because dry and we have added insulation to ceiling and under floor
Next is to double glaze



**World Health
Organization**

Housing and Health Guidelines

House Toll > Road Toll

1600 EWM, 28,000 kids hospital nights, \$154,000,000 care

1/5 TAX 17b, 6b resp. illnesses

Protection Safety – Caring for vulnerable citizens

100 years ago housing improvement was a medical intervention

Torpedoed decesses – advent of internal plumbing

1947 Housing Improvement Reg's... Bldg code 1992, Bldg Act 2004

Local DHB's, Doctors, prescribe home inspections, insulation etc



**MINISTRY OF HOUSING
AND URBAN DEVELOPMENT**

Healthy Homes Standard

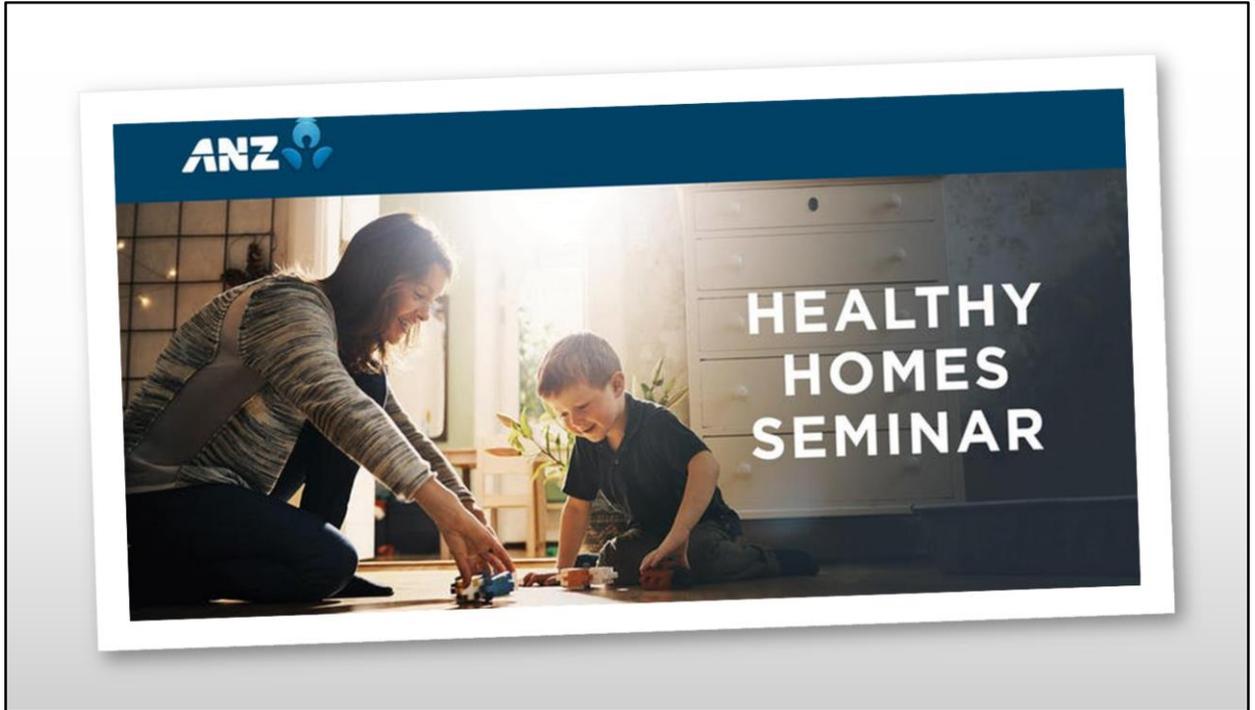
Home Truths Confronting New Zealand's Housing Crisis

Philippa
Howden-Chapman

BWB Texts

What Next S2E2 TVNZ OnDemand Bob Burnett Architecture

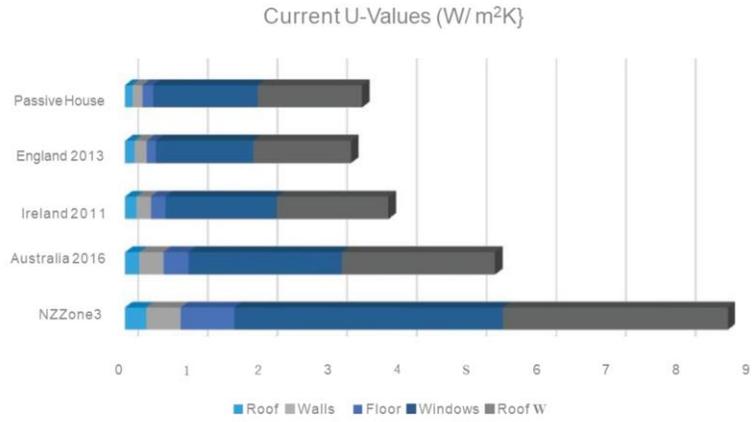




ANZ have recently introduced a green mortgage and next month I am presenting a Healthy Home Seminar which will also cover the financial literacy around building green the ROI and green mortgages. ANZ have based their Healthy Home Loan Package on Homestar and offer up to 1% off your mortgage interest rate if you have built a home to 6 homestar or above. Many different versions of green mortgage or eco-loans and other incentives have been available in other countries for many years. Green mortgages and other innovative finance options can incentivise transitioning to a low energy and low carbon built environment, which will be better, not just for our bank accounts, but also health and wellbeing while mitigating climate change.

how we compare

Current building codes



How we compare



R value	NZ zone1&2	NZ zone3	UK	USA LosAngeles	Sweden Stockholm	Norway Oslo	Australia Canberra	Australia Alpine
Roof	2.9	3.3	9.1	8.56	7.69	5.55	5.10	6.3
Wall	1.9	2.0	4.0	4.76	6.79	4.54	2.80	3.8
Floor	1.3	1.3	7.7	4.76	6.79	5.55	2.75	3.25
Window	0.26	0.26	0.8	0.55	0.77	0.83	0.45	0.45
Air Leakage	NZ no standard							
Ventilation	NZ no standard (natural only) spot extraction from kitchens and bathrooms only (no supply)							

Should we be considering community based standard setting in the absence of political will.

What if industry got together and created NSZ 3605: 2020 Healthy carbon zero homes

The Building Act 2004 states under ‘Purposes’:

“This Act has the following purposes:

(a) to provide for the regulation of building work, the establishment of a licensing regime for building practitioners, and the setting of performance standards for buildings to ensure that—

- (i) people who use buildings can do so safely and without endangering their health; and
- (ii) buildings have attributes that contribute appropriately to the health, physical independence, and well-being of the people who use them; and
- (iii) people who use a building can escape from the building if it is on fire; and
- (iv) buildings are designed, constructed, and able to be used in ways that promote sustainable development:



Construction R Values (and comparisons)	Superhome Movement thermal ratings		
	2019- 2020	2025	2030
year introduced / targets			
	Baseline	Better	Best
Floor	R3.0	R4.0	R4.5
Walls	R4.0	R4.5	R5.0
Roof	R5.0	R6.5	R8.0
Windows	R0.55	R0.75	R1.0
	minimum	preferred	exemplar

Targets, pathways, impediments, incentives

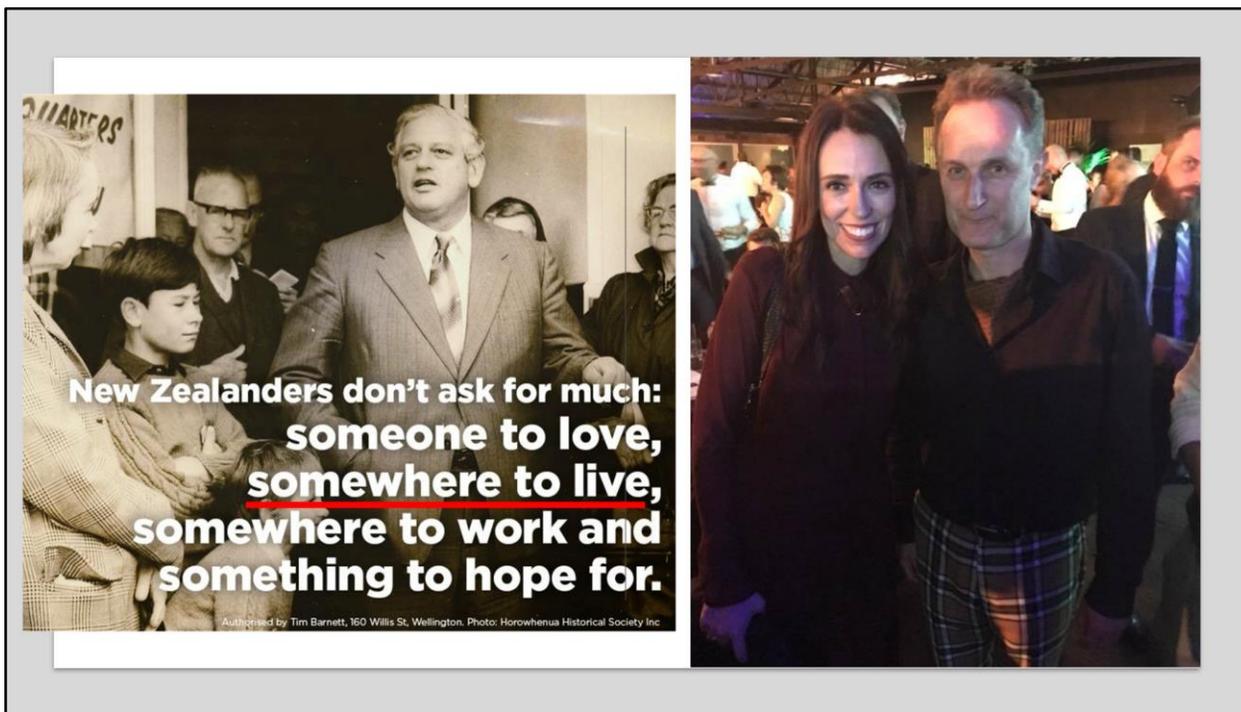
Net zero carbon 2030

Net zero energy 2030 (new builds)

Net zero energy 2050 (existing buildings)

V.C. City Code – Greenest City Zero emissions 2025 new bldgs. 2050 all bldgs

Ca. Inspections \$20m



Before Jacinda came into office. In her first speech to open the election campaign she reference this quote from Norman Kirk.

I have underlined somewhere to live. Perhaps it could be changed to somewhere decent to live,

Some where decent to living the is not going to make you sick that is not going to make you sick and harness you to a lifetime of mammoth power bills.

Office of Hon Phil Twyford

MP for Te Atatū
Minister of Housing and Urban Development
Minister of Transport



03 APR 2018

Bob Burnett
Director, Bob Burnett Architecture
bob@bbarc.com

Dear Bob

Thank you for your email of 4 December 2017 regarding Superhome and KiwiBuild. Please accept my apology for the delay responding to you.

I would like to thank you for your offer and enthusiasm to assist with the Government's KiwiBuild programme which aims to build 100,000 high quality, affordable homes over the next ten years. I want to assure you that this Government is committed to addressing the housing affordability crisis New Zealand is facing.

This is going to be a huge undertaking that will deliver better lives for Kiwi families. To achieve it, the Government will work with business, local government, iwi, community groups and experts.

As you are aware, the New Zealand building code is a minimum standard and can be exceeded. I am supportive of working towards having KiwiBuild houses exceed minimum requirements but not at the cost of decreasing affordability.

I am currently working with officials to establish the finer details of the KiwiBuild programme, including the procurement process, and will be making an announcement in the near future. If there are ways in which Superhome can contribute to KiwiBuild, I invite you to submit your offer once the procurement process has been established.

I have passed on your email onto officials at the Ministry of Business, Innovation and Employment for their reference.

Thank you for taking the time to write to me.

Yours sincerely

Hon Phil Twyford
Minister of Housing and Urban Development

Hon Dr Megan Woods

MP for Wigram
Minister of Energy and Resources
Minister for Greater Christchurch Regeneration
Minister of Research, Science and Innovation



12 FEB 2019

Bob Burnett
bob@bbarc.com

Dear Bob

Thank you for your email of 19 December 2018.

As you know, your correspondence has been transferred to Hon Phil Twyford's office as your email is more closely connected to his Housing and Urban Development portfolio.

However, I wanted to write to you personally to congratulate you on your achievement. I am so pleased that you have been recognised by His Royal Highness the Prince of Wales for your work on New Zealand's Superhome Movement.

I wish you all the best for your participation in the celebrations for this year's Commonwealth at 70: Prince Charles at 70 project.

Thank you again for taking



what we need to do

NZBC evolution



**1935 NZ Building
Code established-**
Model Building Bylaw

what we need to do

NZBC evolution



1935 NZ Building Code established -
Model Building Bylaw



1991 NZBC Performance Based Code -
based on generic performance requirements

what we need to do

NZBC evolution



prescriptive



performance
based



outcomes
based

**1935 NZ Building
Code established -**
Model Building Bylaw

**1991 NZBC
Performance Based
Code - based on generic
performance requirements**

2020 NZBC?
- based on as built rating

The worlds most
advanced
indoor air quality
monitor





HOW MUCH DOES IT COST TO RUN A HOME?



We choose our appliances and cars based partly on energy ratings, why don't we have a similarly easy to understand rating system for kiwi homes?

How much does it actually cost to run a kiwi home?



ENERGY RATING

- Easily Achievable Home energy consumption ratings
 - In the UK, and most areas of Europe, all homes are required to have an energy performance certificate (EPC) listing the energy consumption of homes so that consumers know how much a home costs to run.
 - New Zealand needs a similarly simple rating system to help consumers understand how energy efficiency not only protects the environment, it also will protect their pocketbook and health.

EPC



ENERGY PERFORMANCE CERTIFICATION





Late 2015 we complete 2 homes in Church Square that are NZ's first 10 star Superhomes.



You don't need to have a homestar rating to be a SUPERHOME but if you did get it certificated under that scale it would in the range of 7-10
 Homestar measures the way a home performs – thermal performance, health and comfort, use of energy and other resources, water, waste, management air quality, healthiness and general amenity and functionality

NZ Building Code is about 3.....
 Auckland Unitary Plan has 6 stars as a minimum and Chch Proposed District Plan called for a minimum of 6 stars, which was seen as a healthy and affordable level, but this was not well enough supported by the industry and local council and ultimately rejected by central government



A useful VR online app for the homeowners, industry and stakeholders to review options to build better and explore operational costs vrs capital costs (build costs) of the various innovations what each level of homestar gives you in terms of cost vrs performance healthy and comfort. Plus what the monthly power bill will be comparison to a NZ standard house The long term savings have massive effect when this surplus savings are added to mortgage payments. (a mortgage calculator is incorporated into the app) % increase in property value. The true affordability calculation includes ongoing cost of ownership Other non financial benefits are not displayed in the dashboard – eg. Health and wellbeing / psychological benefits Days off work sick, doctor or hospital visits etc

Christchurch SUPERHOME Tour

Take a free, self-guided tour through some of the most innovative and sustainable homes in New Zealand.

11am–4pm Saturday and Sunday

www.superhome.co.nz

1 35 Tonbridge St
Timber raft foundations, solar central heating, airtight EcoPanel walls. Dan Sanderson Construction and Bob Barnett Architecture

2 20A Canon St
External insulated cladding, new panel building system, results well beyond the code. Homeco

3 10 Fernbrook Pl
Passive solar design, central heating, rainwater collection for edible garden. Esjay Builders

4 124 Bowhill Rd
NZ's newest 10 star home. Wooden features, grey water recycling, acoustic ceiling panels. Nook Architecture and ZBuilt

5 20 Lamorna Rd
Generates more power than it uses, airtight panel construction, metal floors and totara cladding. Black Hat Designs

6 49 McBeath Ave
Space efficient (no hallways), energy solutions and beautiful timber features. Architecta

7 15 Dove Grove
Super-insulated, airtight home with heat recovery ventilation, powered with solar and batteries. Evolution Homes

8a 10 Cashmere Rd (a)
Eco-friendly home, GIB Fix framing and SuperWall systems. Lite Green Projects

8b 10 Cashmere Rd (b)
Airtight, well-insulated home with heat recovery ventilation and uPVC SuperWindows. Lite Green Projects

9 54 Kotuku Cres
SIP floor panels, walls and roof, and European-style tilt and turn windows. Lite Green Projects

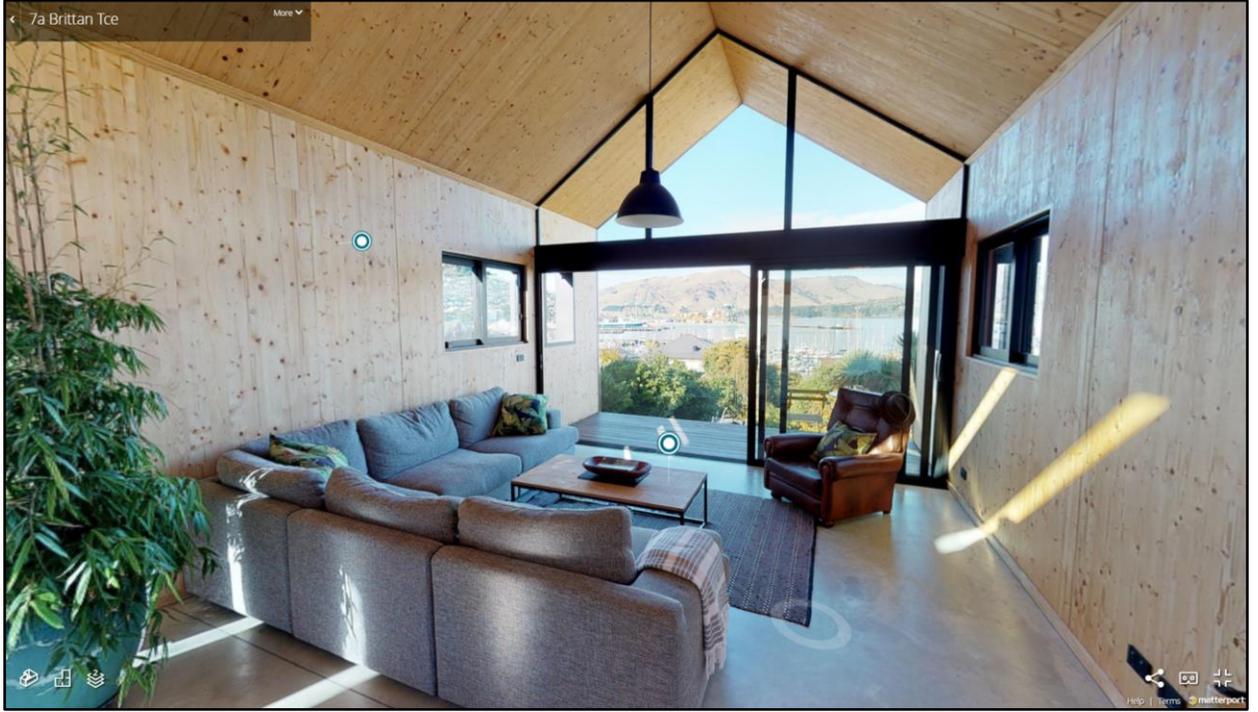
10 160 Bridlepath Rd
Wellhaus sustainable SIP panels, uPVC SuperWindows, earthquake resilient foundations. ZBuilt and Bob Barnett Architecture

11 7A Brittan Terrace
Compact European standards, NZ's first compacted wood fibre insulation, laminated timber construction. Julie Villard

Pending homescar rating for each home

Cantabrians have the opportunity of seeing, touching and feeling the warmth of homes built to the Superhome standard during the Movement's annual tour. Held for the last three years, a record 10,000 people attended the tours last year visiting 12 homes over three weekends. "The tours are really popular and people love going into the homes on a cold winters day, seeing how warm the house is, asking what the power bill is and who the designer and builder was and what it cost."

Consumer and trade awareness is a key objective of the popular tours. "We're getting in front of people, influencing their decision making and educating them about the benefits of building well above building code minimum. We want to educate consumers on ways to achieve better homes, and why it is beneficial to their health, livelihoods, and the economic, social, and environmental future of the communities we live in."



Trajectory of Ecological Design

Ecology

Habitat +
+ Infrac
A whole



LESS ENERGY
REQUIRED

Handprint

SUPERHOME

Living System Design

Living & Whole Systems
Pattern Thinking

Regenerating

Living Systems

CONVENTIONAL

GREEN

SUSTAINABLE

RESTORATIVE

REGENERATIVE

Building &
Infrastructure

Degenerating

Technical System Design

Technologies &
Techniques
Fragmented Thinking

Footprint

NZ CODE

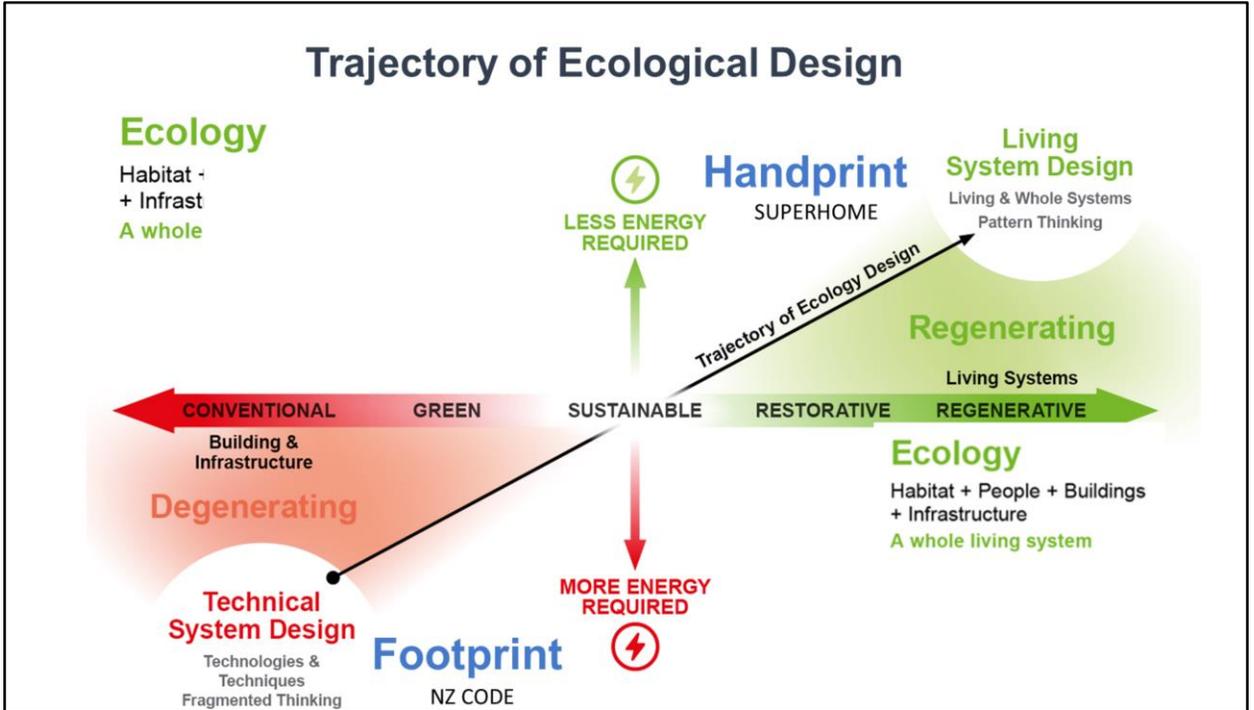
MORE ENERGY
REQUIRED



Ecology

Habitat + People + Buildings
+ Infrastructure
A whole living system

Trajectory of Ecology Design



Christchurch
CONVERSATIONS
He Whakawhiri Kōrero



a conversation with
BILL REED

TRANSFORMING OUR BUILT ENVIRONMENT:

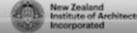
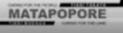
An introduction to regenerative development and design

11 June 2019, 6:00-7:30pm
Tūranga, Cathedral Square

FREE EVENT

Join the conversation: #chchconversations
www.teputahi.org.nz

▶ ⏪ 🔊 0:01 / 1:14:05





SUPERHOME

movement

Learning / Sharing / Innovating

Connect / Collaborate / Co-create

Walking the talk

A movement for better healthy and wellbeing...mitigating climate collapse

The movement's activities and events provide open source sharing of new design ideas, technologies, and building techniques by connecting leading experts with homeowners, designers, builders. SHM liaises with industry, researchers, education providers, government, stakeholders, to collaborate towards achieving higher building standards for all New Zealand homes.

SUPERHOME movement was created because we were dismayed by the poor quality homes being built in NZ. Building Code is used the target for almost all homes but its suboptimal and unhealthy.



Superior (to crappy building code)
SUPERHOME
movement

Learning / Sharing / Innovating

Connect / Collaborate / Co-create

Walking the talk

Superhome is possibly the wrong name, but we are stuck with it as it is now a national group that is well known. Rather than Superhome - Superior to crappy building code Home is more accurate. All homes should be superhomes. Its about raising the minimum standard in the absence of a satisfactory building code...its not just for the elite 1% of top end homes.



SUPERHOME

movement

1. **Design** (function, performance and beauty)
2. **Resilience** (Quakestar, longevity and durability)
3. **Green** (environment & resource use)
4. **Energy** (cost, comfort & affordability)
5. **Health** (well, happy & productive)

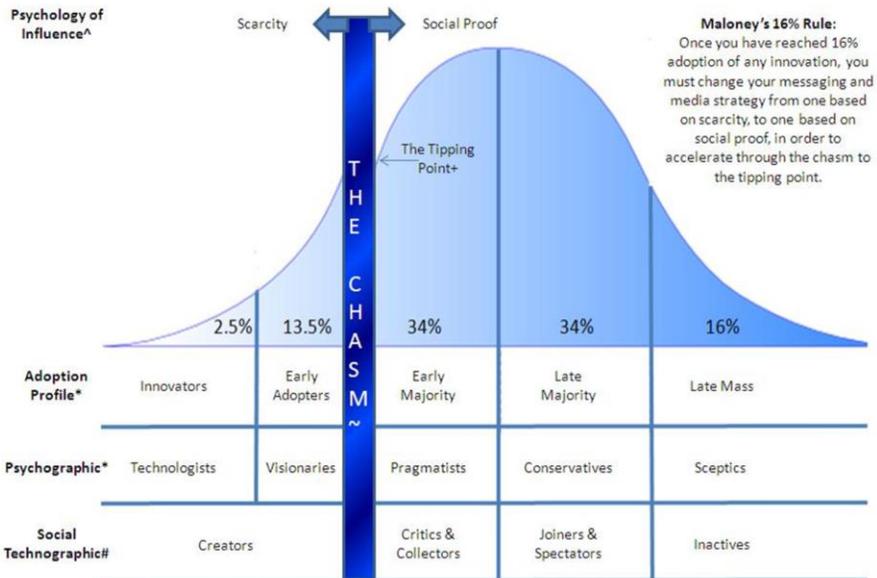


Never doubt that a
small group of thoughtful,
committed citizens
can CHANGE the world;
indeed, it's the only thing
that EVER has

Margaret Mead

@EC with EM

Accelerating Diffusion of Innovation: Maloney's 16% Rule



[^] Robert Cialdini ^{*} Everett Rogers [#] Forresters [~] Geoffrey Moore + Malcolm Gladwell

Why we need to rethink how we build homes | Ged Finch | TEDxWellington

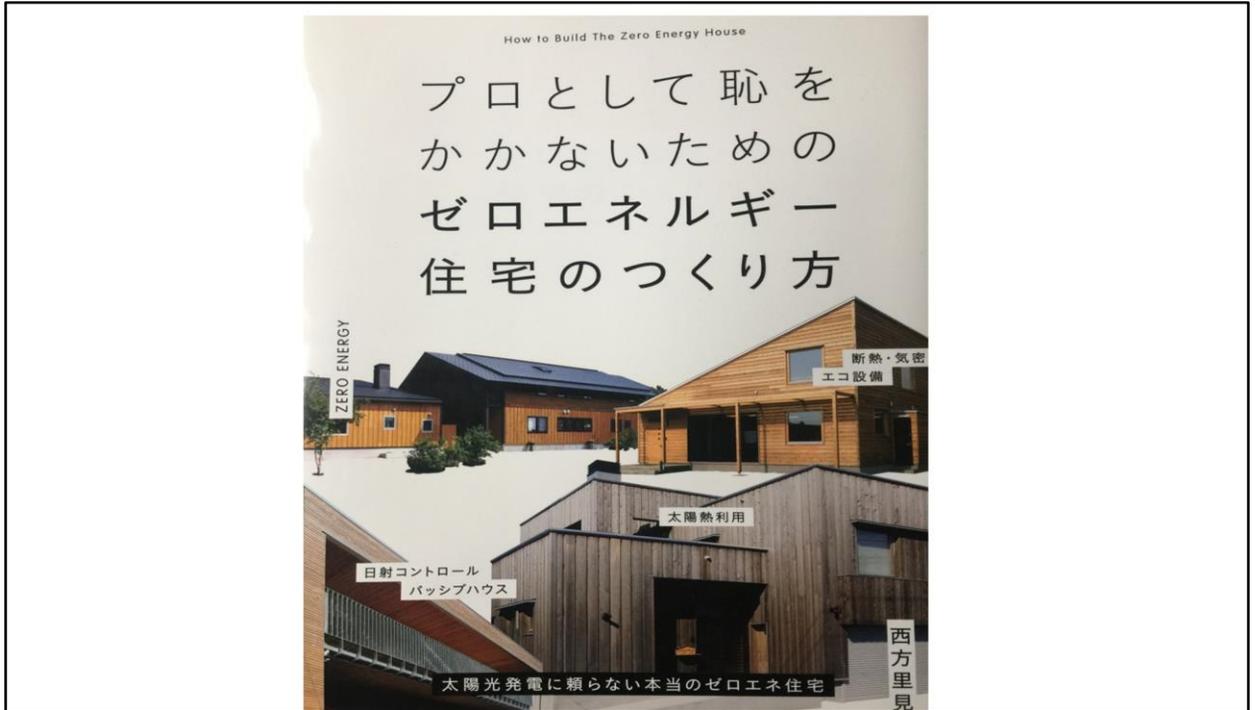


0:27 / 14:21





Sadiq Khan London's mayor as part of the measure to mitigate climate change has pledge 500 million pounds for energy efficiency upgrades to homes and offices.
RIBA Royal Institute of British Architects, declared a climate emergency and all future project will first need to meet minimum environmental credentials to be eligible for entry into awards
Bill de Blasio, New York's mayor has banned full glass buildings in NY City.



How does SUPERHOME movement have a role in helping to successfully survive the slowdown. What is the superhome movement.

Buildings account for more than 40% of energy demand and one-third of greenhouse gas emissions. Due to their long lifetime, buildings can leave a lasting legacy of environmental impacts for generations to come.

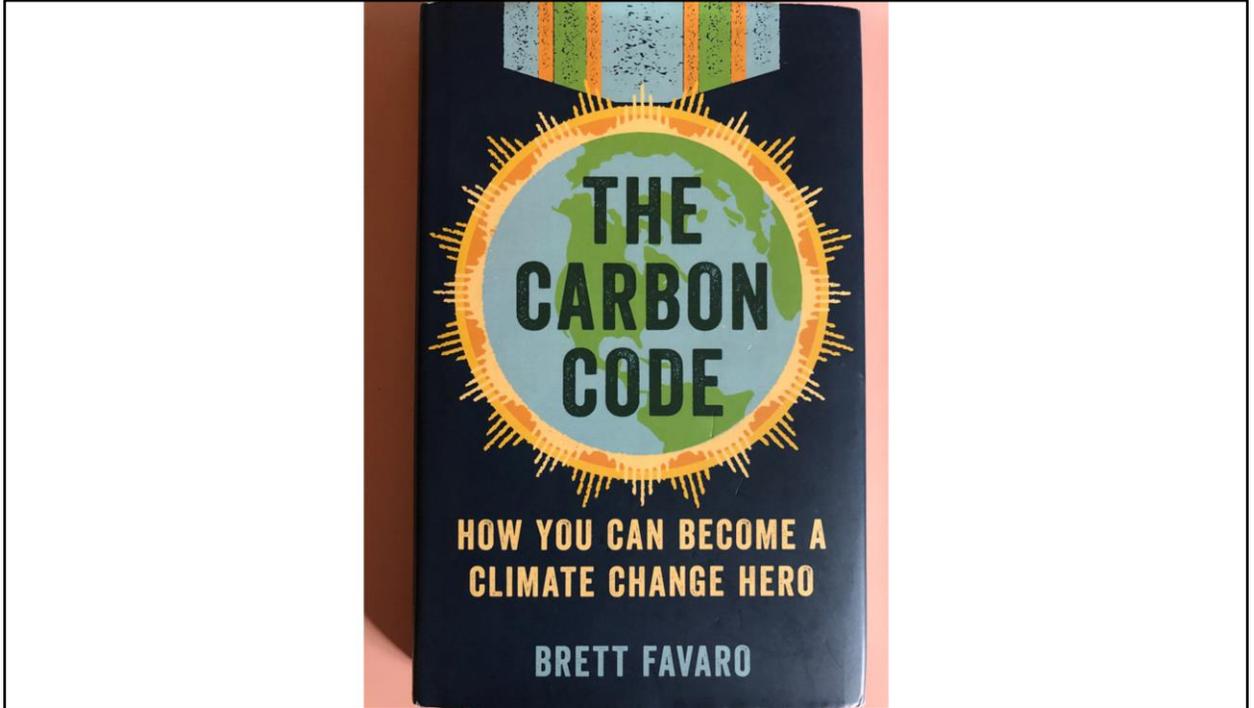
"TRULY, WHAT A FANTASTIC, TIMELY, IMPORTANT BOOK!"
- PAUL HAWKEN, author of *Drawdown* and *Blessed Unrest*

THE NEW CARBON ARCHITECTURE



BUILDING TO COOL
THE CLIMATE

BRUCE KING



The Carbon Code

My favorite code of conduct

Star Trek...

To explore strange new worlds

To seek out new life and civilizations

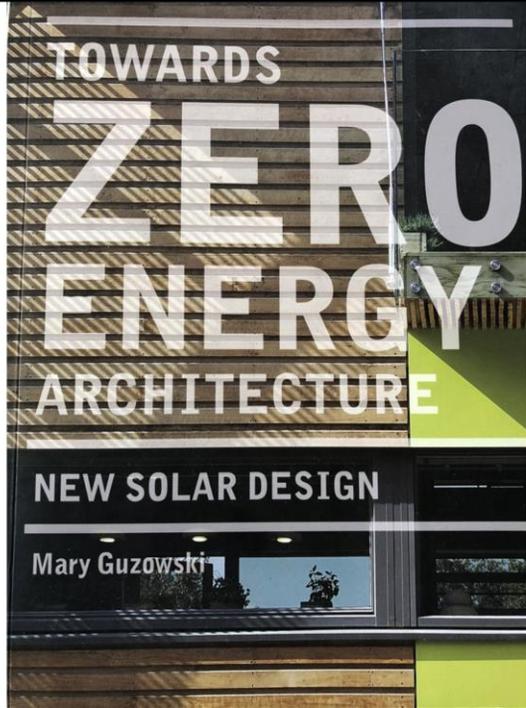
To boldly go where no one has gone before

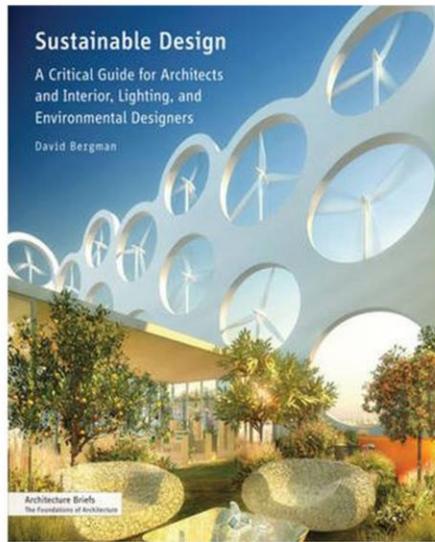
What should we do ? Explore strange new worlds

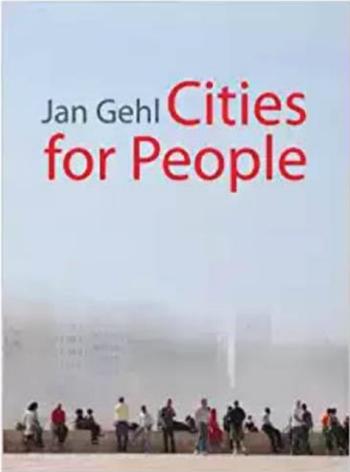
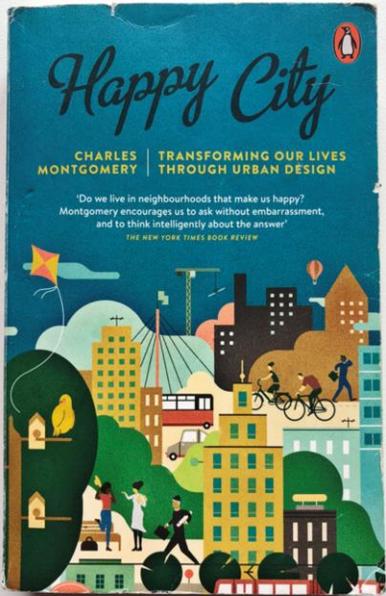
Why are we doing it? To find new life

How should we do it ? Boldly

It's all there It's all clear



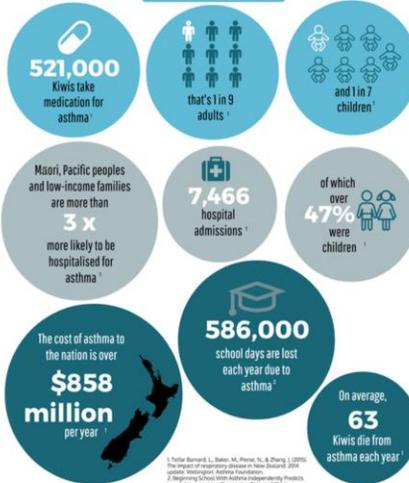






NZ has the highest asthma rate in the world, 30% of 7 year olds in NZ have asthma, directly attributed to mouldy houses.

ASTHMA IN NEW ZEALAND



1. Taylor, S., Salter, M., Pearce, N., & Zhang, J. (2015). The impact of respiratory disease in New Zealand 2014. Auckland: Wellington: Asthma Foundation.
2. Beginning School With Asthma: Independent Products. Case Report from the Respiratory Centre of Children, Katherine A. Liberty, Philip Fawcett, Janice Reed and Michael James Gosselin. (2013) (pp. 1-15).

For more resources, to get involved or to donate visit asthmaandrespiratory.org.nz or call 04 499 4592

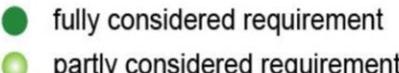
**Asthma
Respiratory**
FOUNDATION NZ

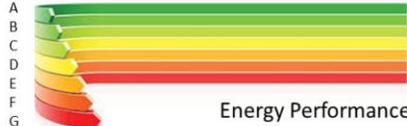
Christchurch City most suicides in the world

90% of residents say homes too cold

Most waste going to landfill per/cap

Ratings / Certification or Validation by monitoring	Energy use	Airtightness	Integrative process	Location + transport	Sustainable sites	Inspiration + education	Water efficiency	Energy + atmosphere	Materials + resources	Indoor environment	Innovation + design	Urban agriculture	Net zero water	Net zero energy	Civilised environment	Health +happiness	Biophilic environment	Red list chemicals	Carbon footprint	Living economy	Net positive waste	Responsible industry	Equity	Beauty + spirit	Resilience + Longevity	Validation/Monitoring	Open source culture	Local Govt. collaboration	Lobbying Central Govt.
LEED	●	●	●	●	●	●	●	●	●	●	●	●	●			●	●				●								
DEAP	●	●																											
Homestar	●	●		●	●	●	●	●	●	●	●	●	●			●	●				●								
Passive House	●	●																											
LBC Living Building Challenge	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Superhome Movement	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●





EPCs

Energy Performance Certificates

Ratings Or Validation by Monitoring. Only 1/1000 projects get any sort of rating. It's a talkfest and very few are walking the walk. It can be a bit of a pissing contest for the industry instead of driving transformational change for the industry and community.

Rating tools theoretical predictions of designs and monitoring measured validation of the built buildings. Rating tool alone don't go far enough and are not having enough influence due to low voluntary up take.

Road Map

~~Code~~ - Community Policy Makingwhat does it look like

- NZS 3604:1978 Code of practice for light timber frame buildings not requiring specific design
- NZS 3602 Timber and wood-based products for use in building
- NZS 3603 Timber structures,
- NZS 3604 : 2011 Timber-framed buildings
- **NZS 3605 : 2020 Healthy Homes**



The Garden City : The Greenest City 2020



Lack of awareness, education and outreach strategies
BRANZ – bursting the bubble

Skills Gap, CPD, accreditation
Impediments, consenting acceptable solutions / approved alternative solutions
Targets, Incentives, Actions
Sponsor Events and Projects

Expertise and advice shared the CCC...council projects...sharing knowledge internally
Building Consent Levy – partly for home inspections not just BRANZ uncontested

Exemplars - Demonstration projects – (very powerful tools eg. Church Square)
SuperReno – case study deep retrofit



Targets, pathways, impediments, incentives

Net zero carbon 2030

Net zero energy 2030 (new builds)

Net zero energy 2050 (existing buildings)

V.C. City Code – Greenest City Zero emissions 2025 new bldgs. 2050 all bldgs

Ca. Inspections \$20m

Construction R Values (and comparisons)	Superhome Movement thermal ratings			Building Code	Building Code	International Com	
	2019- 2020	2025	2030	NZ 1992-2004-2019	NZ 1992-2004-2019	Los Angeles	Se
year introduced / targets	Baseline	Better	Best	Christchurch	Wellington		
Floor	R3.0	R4.0	R4.5	R1.3	1.3	4.76	4.7
Walls	R4.0	R4.5	R5.0	R2.0	1.9	3.45	3.4
Roof	R5.0	R6.5	R8.0	R3.3	2.9	8.53	8.4
Windows	R0.55	R0.75	R1.0	R0.26	0.26	0.55	0.4
	minimum	preferred	exemplar				

NZ has the second largest homes in the world
And is one of the few countries in the world
Where house sizes are still trending upwards
NZ is also 2nd most expensive place to build

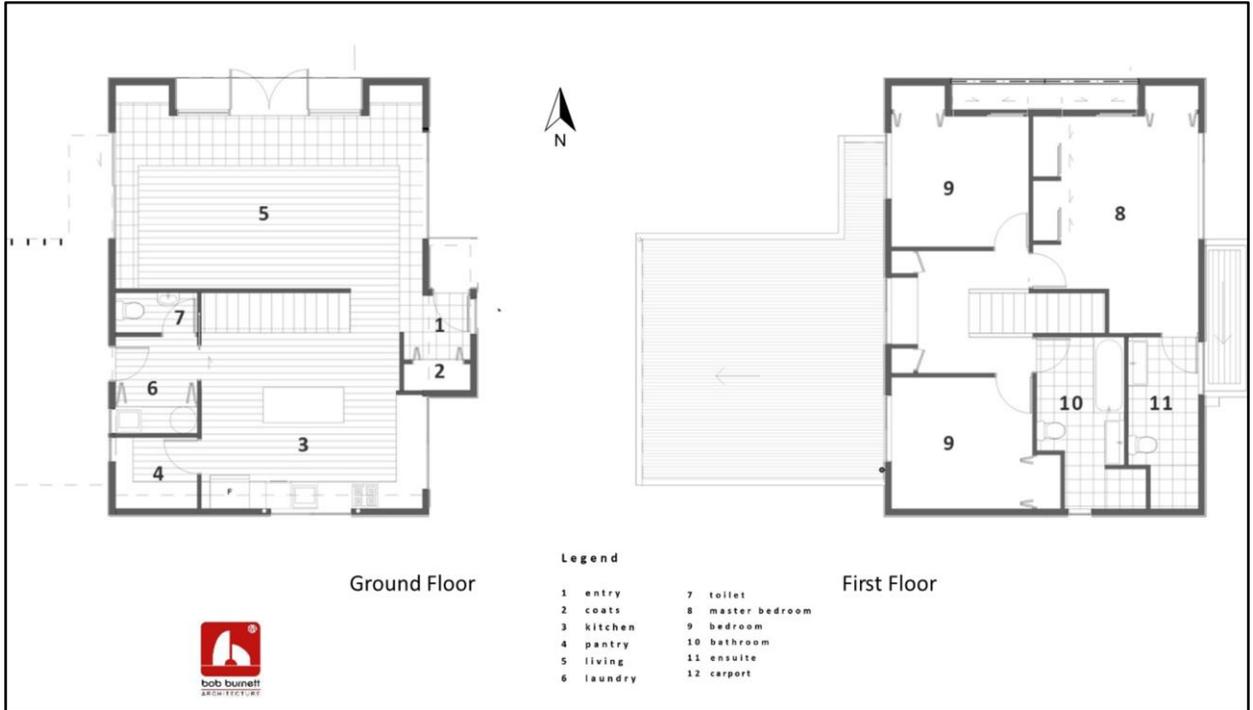


But in NZ they continue to rise in size

It may surprise you to know NZ houses are bigger than American on average

NZ have the second biggest houses in the world, 2nd to Canada but they are cold and inefficient, eco-unfriendly

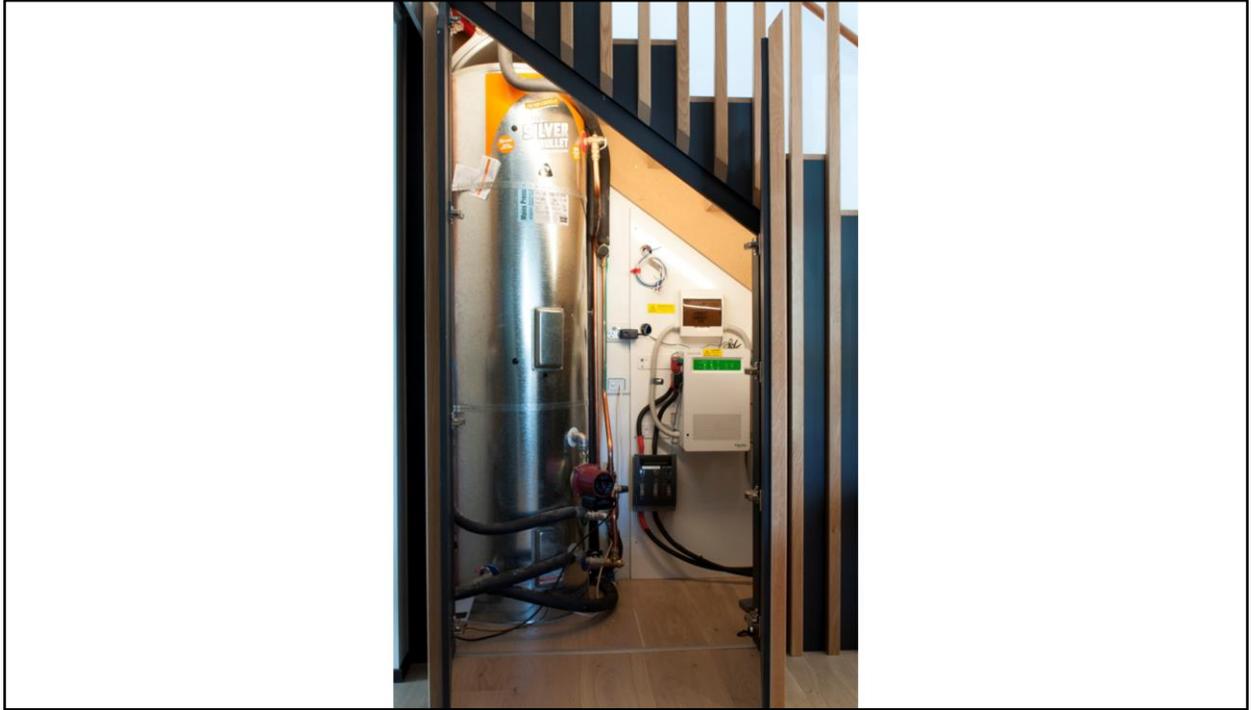
Another disturbing statistic is NZ have the second most expensive house building cost in the world.

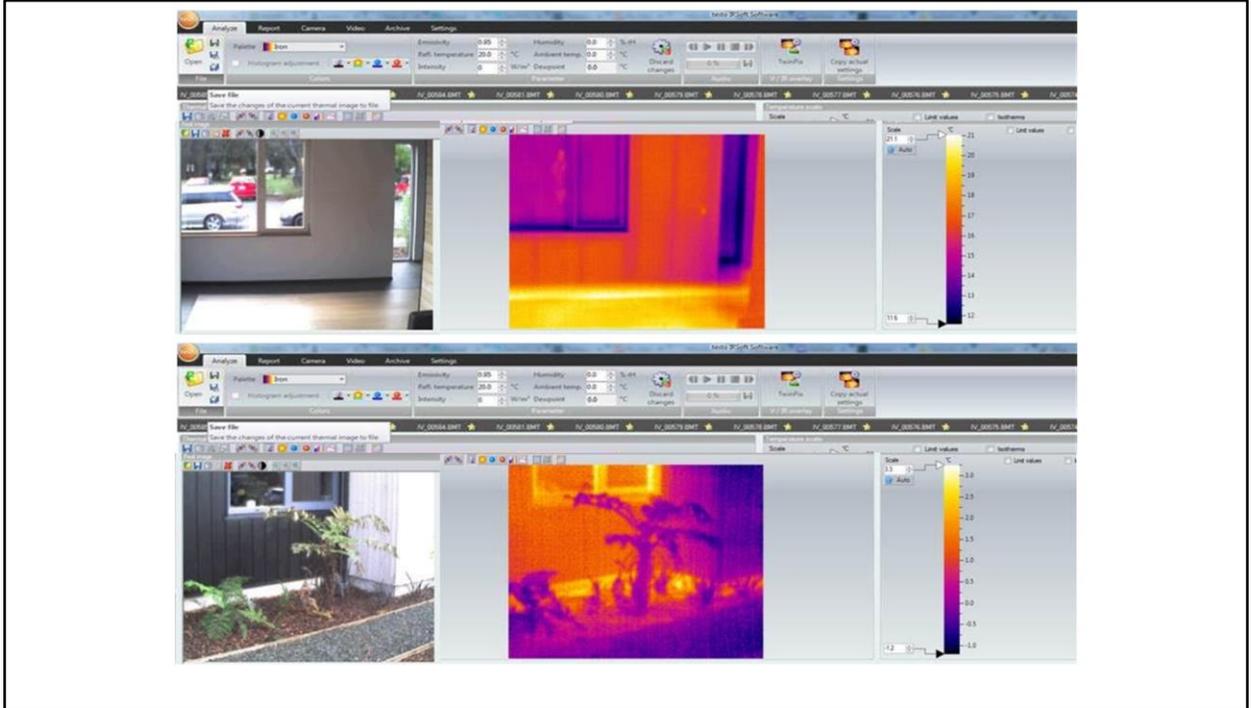


This first 10 star is a :
 2 stories. > 3 Bedrooms > 137 sqm > 70sqm on each floor
 Tiny > no second lounge > carport no garage.









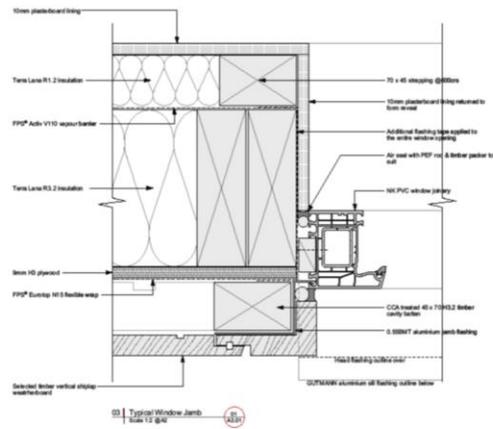
Same piece of wall view with a thermal camera:
Inside > average temperature 17degrees
Outside > 1 degree
> No heat loss, not heat lick.



WINDOWS

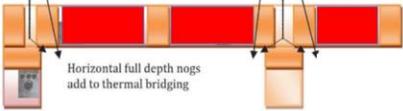


- Double glazed
- With right spacer (thermex)
- PVC frame (non conductive)
- Low E Xcel (best Low E) +30%
- Argon filled +10%
- R value 0.53 **> 0.70**
- Recessed into the wall



PVC or Thermally broken aluminium windows
Rating system now available for windows.

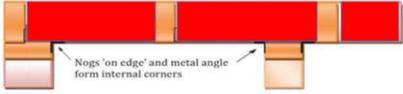




Horizontal full depth nogs add to thermal bridging

Figure 1: Current Framing Practice

This literature challenges current framing practices and proposes an alternative, as illustrated in Figure 2. The alternative aims to improve thermal efficiency and minimise joint imperfections commonly resulting from linings being fixed to multiple timber frames independently with moisture changes or when the building is subjected to wind or earthquake forces.



Nogs 'on edge' and metal angle form internal corners

Figure 2: Proposed Framing Practice

GIBFIX framing system

LVL 140mm wide no dwangs > 1 point (innovation)



- Because LVL is stronger > we've got less timber.
- Less timber at the corner > because of the way it is fixed
- Less timber for wall junctions > 3 studs replaced with 'frame saver' by metal angles.
- Dwangs 'on edge' to allow continuous insulation without thermal bridging.
- less timber > more insulation > for a better external envelope
- Application in the Homestar tool > 140 frame and an innovation point



GIBFIX framing system

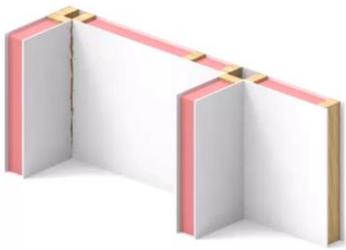
LVL 140mm wide no dwangs

> 1 point
(innovation)

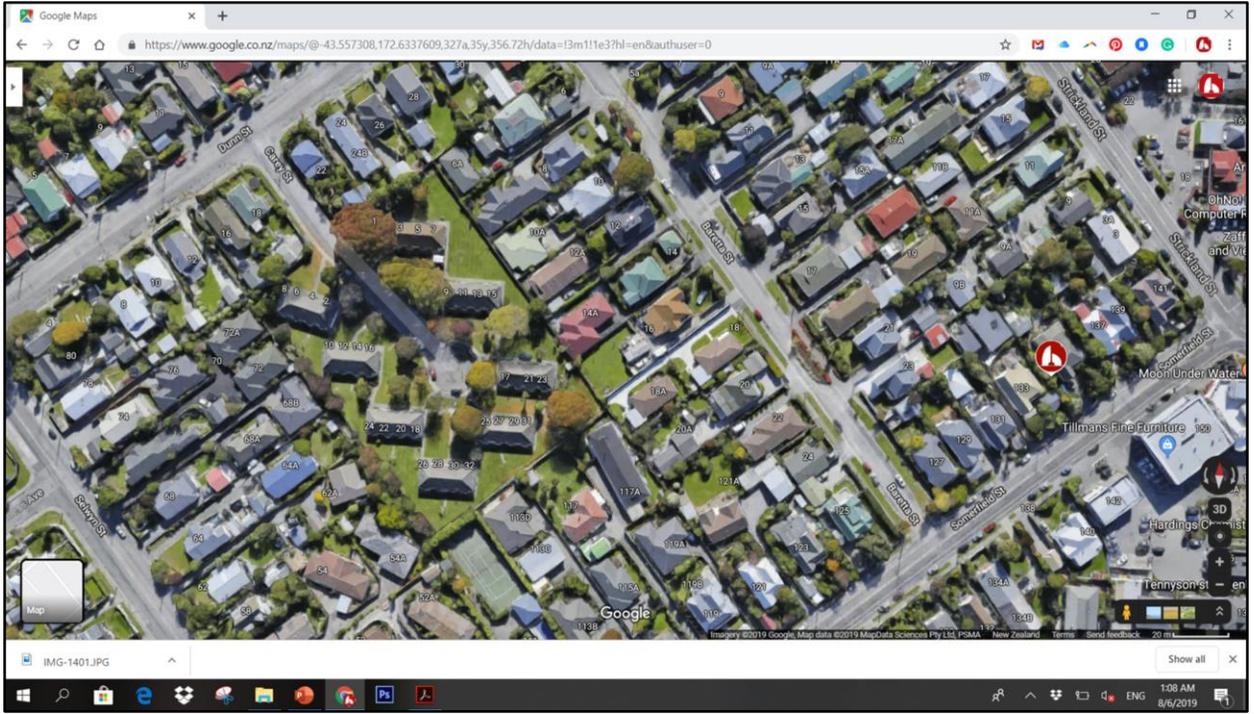
California Corner

Stud Save

T-Stud





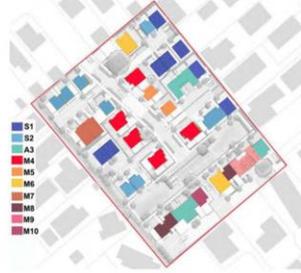




Housing Tenure



Unit Typologies



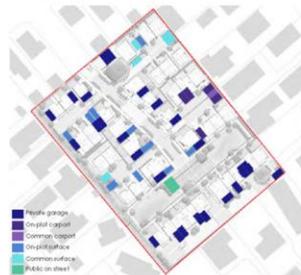
Storey Heights



Public and private access



Car parking



Cut fill





- OUTLINE SPECIFICATIONS (Preliminary)**
- 6***
- 1 Floors: T/C3 Raised Wall/ Slab Edge insulated foundation system.
 - 2 Walls: 150x45mm GSBFC framing system, with non-essential cleat/p removed.
 - 2.1 Exterior walls: General designer series cladding, colours range within cost 45mm structural cavity battens on Proclima wrap on H1.2 M503 150x45 Timber framing @ 600 max on OSBFC framing system. R2.8 Ronglex batt insulation.
 - 2.2 Interior walls: Naval powder coated aluminium cladding over 45mm structural cavity battens on Proclima wrap on H1.2 M503 150x45 Timber framing @ 600 max on OSBFC framing system. R2.8 Ronglex batt insulation.
 - 3 Roof: Heritage coloured on Proclima roofing underlay on roof trusses. 75x45 timber purlins. R5 Pink Batt insulation. 15mm OSB board ceiling on 55mm metal Rando battens @ 1000mm attached with extended clips. 6mm #108 required for additional depth.
 - 4 Windows/Doors: Thermally broken aluminium frames or UPVC frames with clear double glazed, Low E, argon filled with thermal break spacer. 10.1. Casins unless table sills.
 - 5 Sillits & Facias: James Harde Handicrafts, CDL.
 - 6 Gutter: Coloured box gutter with concealed brackets with half gull.
 - 7 Flooring: Coloured concrete to Ground Floor areas, except Carpet to bedrooms, non-slip vinyl to bathroom.
 - 8 Heating: Integrated dual heat Central Heating and Solartec Hydrolux system.
 - 9 Hot Water: HVAC Hot Water Cylinder. Instant. Collec solar ready. Integrated dual heat as above.
 - 10 Ventilation: TBC.
 - 11 Site works: refer Bufile.

Ground Floor Area	88.77 m ²
First Floor Area	65.57 m ²
Deadling Total Floor Area	154.34 m ²
Garage	- m ²
Total building area	154.34 m ²
Deck	12.51 m ²



