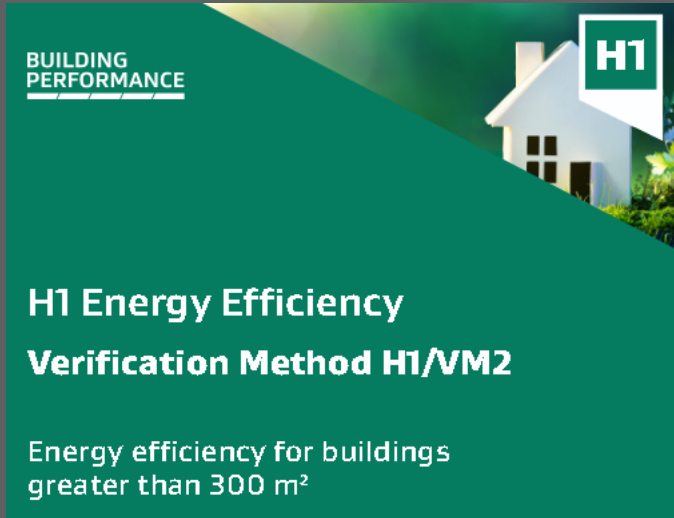


Building Performance Readiness in Aotearoa New Zealand

Ruth Williams BEng PhD CEng MCIBSE MSFE

New Zealand Context - mandated



- New Zealand Building Code
 - E3 – Internal moisture
 - G5 – Indoor environment (not all buildings)
 - G4 – Ventilation
 - G7 – Daylighting (housing)
 - H1 – Energy efficiency (not all buildings)
- Residential Tenancies (Healthy Homes) Regulations

New Zealand Context – partially mandated



- Carbon Neutral Government Programme
 - Government organisations only
 - Mandated (Government property office – under Property Functional Lead Mandate)
 - NABERS NZ for large offices (>2000m² owned, >5000m² tenancies)
 - Achieve 4 stars and target 5 stars (5 stars for new buildings)
 - Uncertain mandate
 - Greenstar five star >\$9M new builds (Government procurement)
 - Depends on the revised Government Procurement Rules (5th edition) – not yet published but NZGBC believes the requirement may be removed
 - Emissions reduction and reporting (Ministry for the Environment)
 - Inventory reported annually
 - Targets aligned with 1.5°C pathway
 - Carbon neutral by 2025

New Zealand Context - optional

BUILDING
PERFORMANCE

Building for
Climate Change



- Building for Climate Change
 - Embodied and operational carbon
 - Uncertain development timeframes
 - No targets
 - Embodied carbon reporting not mandatory but invited to be emailed for showcasing
- Sustainability benchmarking tools
 - Greenstar NZ
 - NABERSNZ
 - LEED
 - Living Futures

Imagination to Reality



"Everything that is real
was imagined first."

~ *The Velveteen Rabbit*

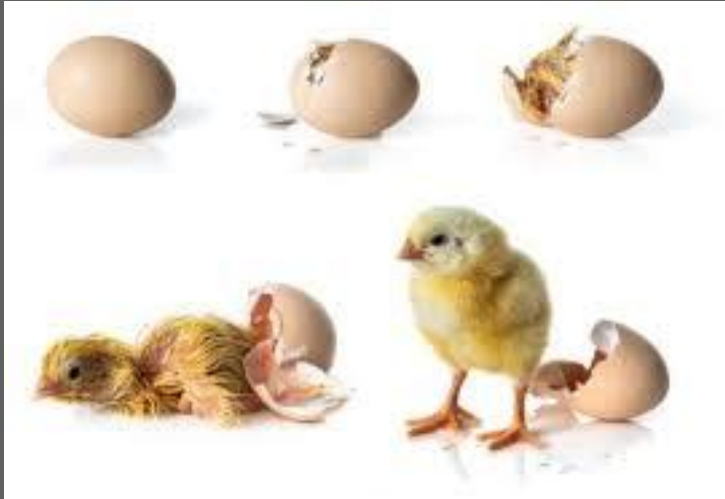
- Working with very little
- Regardless of the national context how do we make it wonderful?
- Hearts and minds
- Not impossible, just a bit imaginary

Buildings that work



- Every building can be better
 - No building left behind
- Make the building work for itself
 - Efficiency, comfort, and control
 - Passive survivability
 - Climate response
- A building that doesn't work for the people is a sculpture

Cracking open the offer



- Above and beyond
 - Regardless of expressed requirements what can we offer the client?
 - More than the RFP
 - Listening and understanding
- Who are the occupants and what are the needs?
 - Now and in the future
 - When it all goes wrong

Taking people with you



- Expect more
 - Encourage clients
 - Keep talking
 - Build trust
- Good for business
 - Material costs – budget, stewardship
 - Risk reduction – carbon, climate, overheating, condensation
 - Operational ease – robustness, complaints
 - Productivity – 10 minutes a day is 2% of useful time

135 Victoria Street



135 Victoria Street



- 1980s commercial sealed blue glass building
- Change of use to apartments
- Design ethos
 - Health and comfort
 - Affordability
 - Mixed occupancy profile
 - Homestar 7
 - Developer retains ownership
- *Worked with McKee Fehle and Stapleton Elliott*

135 Victoria Street

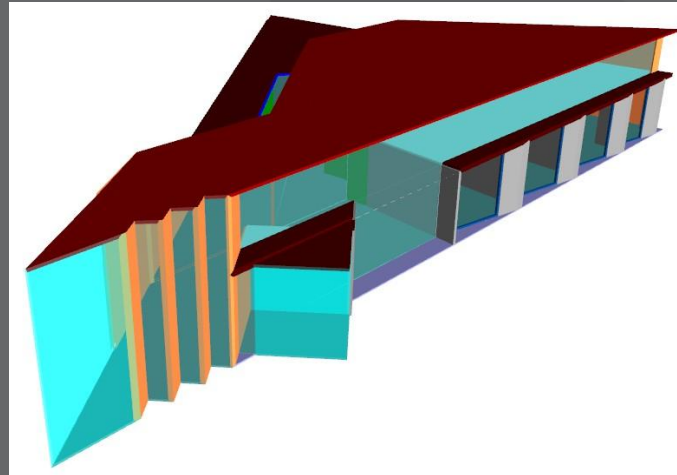


- Thermal envelope
 - determined and adapted the expected level of thermal comfort and risk of overheating
 - supported energy efficiency for ongoing operation beyond NZBC Clause H1 (Energy Efficiency) compliance
 - aided in the selection of suitable glazing and insulation and design of window openings for passive cooling and ventilation
- Daylighting
 - assessed borrowed light spaces (CBDM and DF)
 - advised on floorplate redesign to remove wintergardens and achieve NZBC Clause G7 (Daylighting) compliance

135 Victoria Street

Scenario	Insulation				Glazing	Window opening
	Wall	Spandrel	Floor over carpark	Roof		
A	R1.9 approx. 90mm classic batts (H1 schedule)	R1.9 approx. 90mm classic batts (H1 Schedule)	R1.3 approx. 45mm polystyrene (H1 Schedule 2009 Z2 & Healthy Homes)	R2.9 approx. 140mm batts (H1 Schedule 2009 Z2 & Healthy Homes)	LowE #2 5-12-6.38 clear laminated IGU; (Metro LowE Plus Lam) Air cavity	1 pane in a bay open; 100mm stay 22-23°C
B	As A	As A	R2.5 ~ 90mm polystyrene H1 Schedule 2022 Z3	R6.6 ~285mm batts H1 Schedule 2022 Z3	As A	As A
C	As A	As A	As B	As A	As A	2 panes in a bay open; 150mm stay 22-23°C
D	R2.8 approx. 90mm ultra batts	R2.8 approx. 90mm ultra batts	R3.0 approx. 115mm polystyrene (H1 Schedule 2022 Z5&6)	As A	As A	As C
E	As D			As A	LowE #2 5-12-6.38 clear laminated IGU; (Metro LowE Xtreme Lam) Argon cavity	As C
F	As E					All closed
G	As D			As A	Single grey tint (10.38mm lam) (to approximate existing glass)	As C
H	As D			As A	4-12-6.38 Ultra NII clear lam air filled	As C

Rakiura Museum and Heritage Centre



Rakiura Museum and Heritage Centre



- New build, heritage and culture building
 - Asset rich, cash poor
 - Design ethos
 - Flexibility – exhibitions and events
 - Affordability – not a burden for future generations
 - Low energy and peak loads
 - Durability and robustness
 - All power must be generated on the island and all materials must be shipped there
-
- *Worked pro bono with Opus Architecture and Consultants (now WSP)*

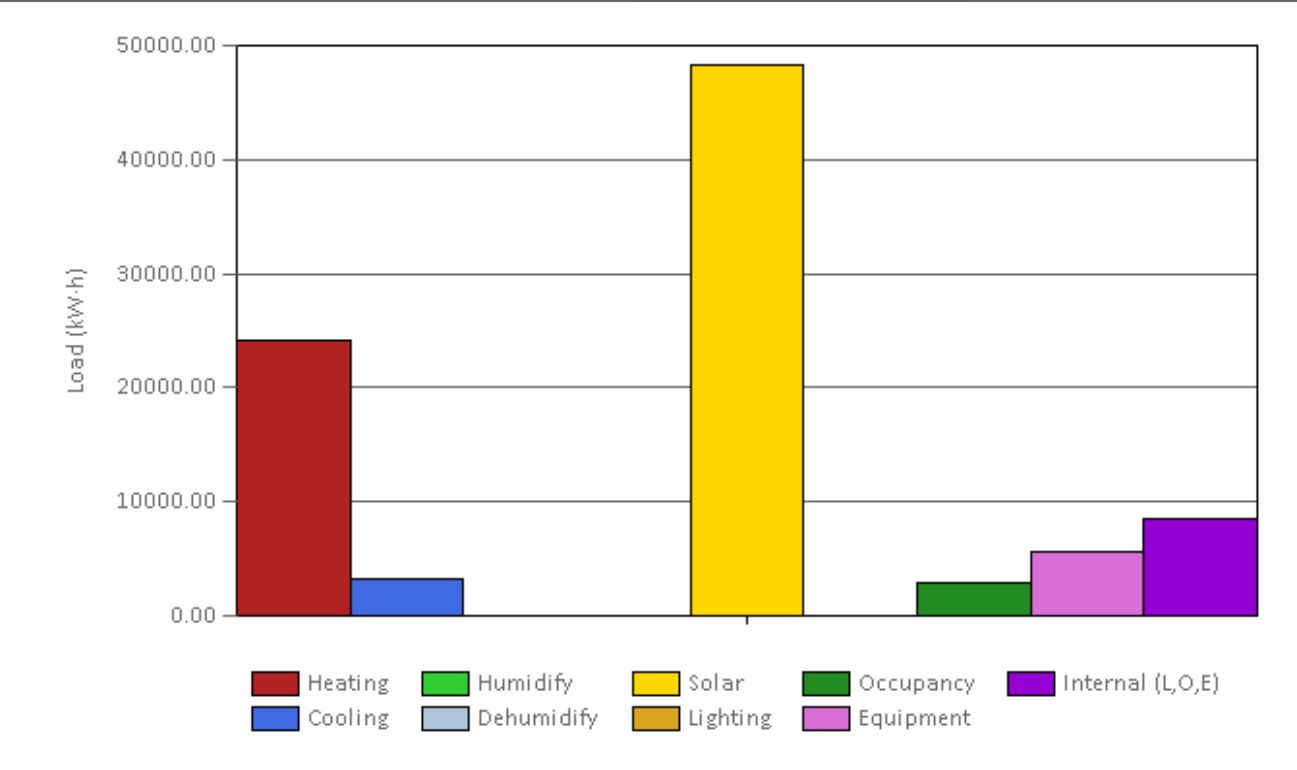
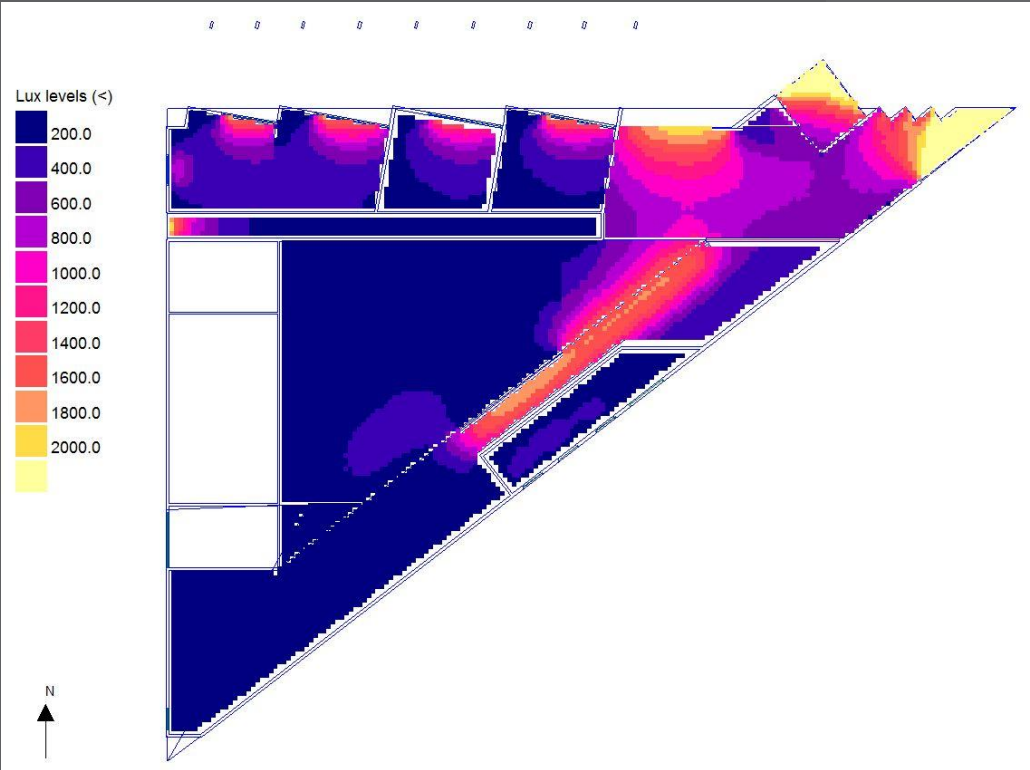


Rakiura Museum and Heritage Centre

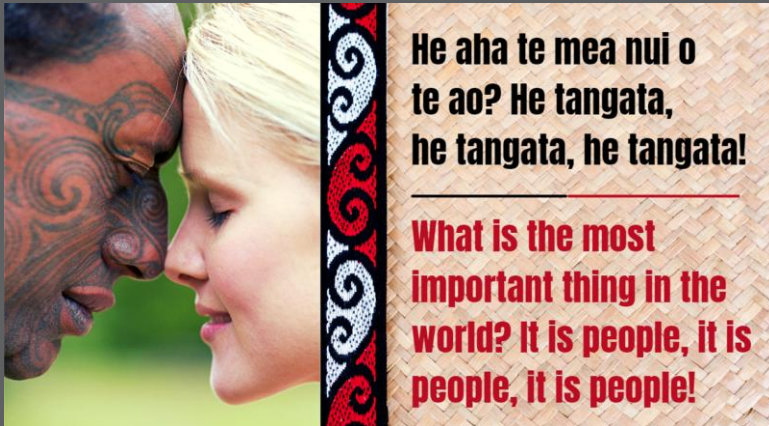


- Thermal envelope
 - insulation and glazing specifications
 - skylight dimensions reduced by 50%
 - slab thickness reduced by 1/3
- Energy
 - power generated from diesel (at 3 times the cost of the grid)
 - underfloor heating (diesel boiler modified for used shipping oil)
 - heat pumps for all year use and speedy comfort
 - solar hot water
- Indoor environment
 - humidity analysis for artifacts
 - thermal mass for passive cooling
 - tempered fresh air with heat recovery
 - appropriate daylight

Rakiura Museum and Heritage Centre



What others have said



- **Fiona Cousins** Not about raising the sky but about getting the floor to come up
- **Annie Tennant** Don't forget people occupy buildings, and different people – engage with them and ask what they want
- **Rob Brimblecomb** How do people want to use the buildings? We need to be working on energy reductions but buildings are there for the people so do not mess with comfort

Readiness is YOU



- Be possibility
- Learn and apply
- Work together
- Respond to each other and events
- Be willing to change and change others