New H1 insulation standards can cost as little as $2,200 extra

New research has shown that the cost of H1 building regulations, which focus in particular on improved insulation of Kiwi homes, is far lower than has been reported.

Industry organisation EBOSS and New Zealand Certified Builders (NZCB), with design input from Architects Designgroup Stapleton Elliott (DGSE), have teamed up with quantity surveying firm YourQS to put real numbers to the cost of the increased insulation standards, which were introduced in 2023.

The results reveal that the cost of improved insulation for Kiwi homes is far less than the $40,000 - $50,000 cited by some — and can even be as low as $2,179 for a 3 bedroom house built in Auckland or Tauranga (Climate Zone 1), if factored in during the design phase of a project.

With the government considering whether to revert to older (and lower) pre-2023 H1 insulation standards, NZCB, DGSE, YourQS and EBOSS hope their research will help inform this discussion, by showing that warmer, healthier, cheaper to operate Kiwi homes can be achieved with relatively small cost increases to homeowners.

The group analysed two real-life standardised plans designed by architects DGSE that will form part of a new NZCB Studio range of designs. Although the designs prepared by DGSE significantly exceed the H1 regulations, the group looked at the minimum costs required to meet H1 requirements using two different methods:

- **The ‘schedule method’** — where architects and designers follow a standardised table outlining the minimum insulation values required for each key building element (floor slab, roof, walls and glazing) in a particular climate zone — currently the most common method used; and
- **The ‘calculation method’** — where architects and designers work out the total heat loss of the proposed building from all the areas and construction R-values (thermal performance) for that building, which is then compared to the heat loss of a reference building to determine compliance

The results were then costed by YourQS using their 3D Visual Costing System, taking into account labour times, materials and subcontractors, and applying a typical cost rate and mark-up for a small-medium residential builder. The YourQS software uses accurate pricing, fine tuned from actual costs of over 3,000 recent house builds. This enabled calculation of the cost of insulating the house under the current H1 standards compared to the lower standards that were in force before 2023.

Using the schedule method, H1-compliant insulation added $10,609 to pre-2023 build costs for the 3-bedroom 140m² house plan, but brings all the health benefits and savings on heating that comes with having a properly insulated home.

The research found that these additional costs could be reduced to just $2,179 over the pre-2023 build cost by using the more sophisticated calculation method.

“In our view, the debate about the costs of H1 has been hampered by a reliance on anecdotes and very rough guesses about how much these regulations add to the cost of building,” says Malcolm Fleming, New Zealand Certified Builders Chief Executive.

“This cost analysis on the 3-bedroom NZCB Studio design provides much-needed hard data to inform this discussion. The findings confirm that the cost impact of H1 is considerably less than this anecdotal reporting, and it also validates the industry view that using a more sophisticated calculation method rather than a blunt schedule method reduces the H1 cost impact significantly.”

The report also analyses a 2-bedroom 92m² house — with results showing the increased insulation standards would add $11,417 on pre-2023 build costs if using the schedule method. Using the calculation method would actually make the home $1,334 cheaper to insulate than under the pre-2023 standards, with superior insulation.

NZCB, DGSE, YourQS and EBOSS believe that reverting to outdated insulation standards would be detrimental for Kiwi homes. They believe the value of insulation is well worth the costs, particularly if designers use the calculation method to keep the cost down.

“We’ve got two good examples here where the cost increase is marginal, so we know you can spend a little more money and get much greater thermal performance — contributing to drier, healthier, warmer homes with reduced energy consumption,” says Matthew Duder, Managing Director, EBOSS.

“We understand that the government has a focus to bring down the cost of construction to make it more in line with costs in Australia. We don’t believe the new H1 needs to add a lot of cost to building, and the expected gains in energy efficiency will offset the minimal outlay quickly,”

“If the wider industry was to adopt this approach, then we don’t see the need for the government to roll back the standards, or make the new standards optional. This exercise demonstrates that the industry is capable of designing buildings with higher thermal performance without the need for greater expense.”

Furthermore, the cost analysis from YourQS demonstrates the flexibility architects and designers have to balance insulation levels and cost, with the calculation method providing pathways to meet minimum requirements or to develop higher spec builds that offer greater thermal performance and energy efficiency.

Analysis of cost impacts on the changes to section H1 of the Building Code

Performed by YourQS Ltd on behalf of EBOSS with support from NZ Certified Builders with design input from Designgroup Stapleton Elliott.

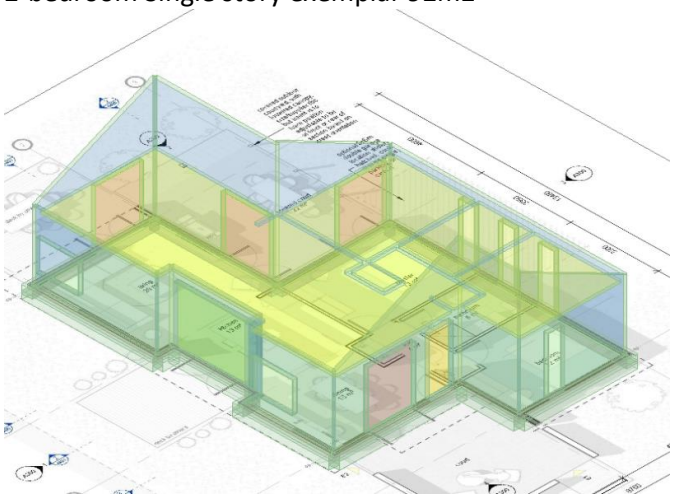
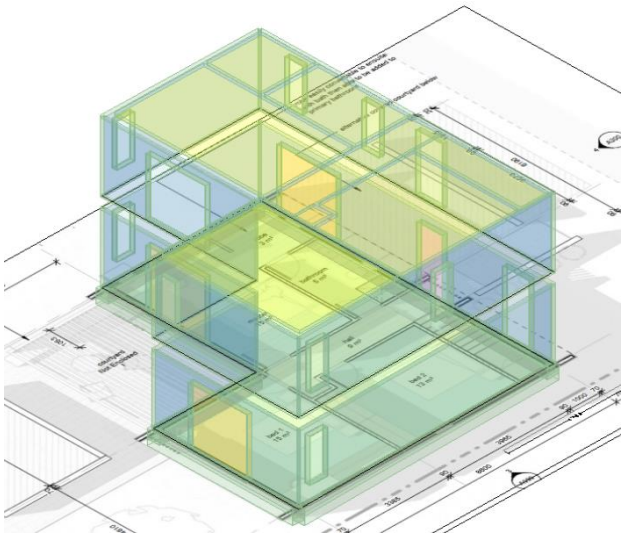
Background

With construction costs coming under media focus over recent times the cost impact of the 2023 changes to the H1 section of the building code EBOSS and YourQS decided to do an exercise comparing the costs of a residential home under various design scenarios.

- Base Case – using a specification typical of a design before the 2023 H1 increases
- Schedule Method – compliance with post 2023 standard using the schedule method
- Calculation Method – using the calculation method to achieve compliance

Methodology

1. Model two standard plan houses currently under development for NZ Certified Builders using the YourQS software system.

2-bedroom Single story exemplar 92m2	3-bedroom two story exemplar 140m2
	
Flat ceilings, 2.7m high walls	Flat ceilings, 2.4m stud, 2.8m inter story height

2. The areas calculated from the model for the two designs are:

(m2)	2 Bed	3 Bed
Slab	92.0	70.14
Roof	92.0	70.14
Walls	91.8	152.9
Glazing	34.4	29.39

3. Input the building measures into the BRANZ H1 Schedule method. Try R rates to identify a pass for each scenario.
4. Clone the models and adjust change the component settings to reflect the pass settings for each scenario
5. Cost each scenario using the YourQS 3D Visual Costing™ system

Scenarios

These are the scenarios considered in this exercise:

Typology	No	Scenario	Notes
2 Bed	1	Pre 2023	Typical design pre2023
	2	Schedule	Schedule method
	3	Better	Higher performing home
	4	max Slab	Maximising the slab
	5	max Walls	Maximising the walls
	6	max Windows	Maximising the windows
	7	Just Pass	Minimum settings to pass aiming for lowest cost
3 Bed 2 Story	8	Pre 2023	Typical design pre2023
	9	Schedule	Schedule method
	10	Just Pass	Minimum settings to pass aiming for lowest cost

The selections to achieve a pass and resulting heat loss for each scenario are:

2 Bedroom	1	2	3	4	5	6	7
	Pre 2023	Schedule	Better	max Slab	max Walls	max Windows	Just Pass
Slab	1.30	1.50	2.24	2.71	1.30	1.50	1.88
Roof	3.35	6.60	6.60	3.70	3.35	4.47	3.70
Walls	1.84	2.09	2.09	2.09	3.39	2.09	2.09
Glazing	0.33	0.46	0.46	0.37	0.46	0.46	0.46
Heat Loss	**252.22**	**193.87**	**173.61**	**195.58**	**199.99**	**200.52**	**192.4**

3 Bed 2 Story	8	9	10
	Pre 2023	Schedule	Just Pass
Slab	1.30	1.50	1.50
Roof	3.35	6.60	3.35
Walls	1.84	2.09	1.84
Glazing	0.33	0.46	0.33
Heat Loss	**247.03**	**194.42**	**239.84**

Using these construction system choices and resulting R values:

Windows	**R**
Non-thermally broken Std Glass	0.33
Non-thermally broken High Performing Glass	0.37
Thermally broken High Performing Glass	0.46
Floors	
Conc 50mm EPS under, 400x300 ring foundation	1.3
Raft Edge Ins	1.5
Raft EPS 100mm under	1.88
Raft EPS 50mm under Edge Ins	2.2
Raft XPS 75mm under Edge Ins	2.71
Ceiling batts	
R3.2	3.35
R3.6	3.7
R4.5	4.47
R5	4.89
R3.2x2	6.61
Wall batts	
R1.8 90mm frames	1.84
R2.2 90mm frames	2.09
R4.0 140mm frames	3.39

Resulting Costs

Each scenario was costed using by YourQS using their 3D Visual Costing system. The determines the labour times, materials, and subcontractors and applies a typical cost rate and mark-up for a small-medium residential builder.

Component	01 Pre23	02 Post23 Shed	03 Better	04 max Slab	05 max Walls	06 max Wind	07 H1 Just
Slab	$37,726	$39,872	$42,806	$42,928	$37,726	$39,872	$29,162
Roof	$1,861	$3,514	$3,514	$1,861	$1,861	$2,711	$1,861
Walls	$24,803	$24,813	$24,425	$24,425	$31,180	$24,425	$24,425
Glazing	$28,719	$36,327	$36,327	$31,756	$36,327	$36,327	$36,327
Total	**$93,109**	**$104,526**	**$107,072**	**$100,970**	**$107,094**	**$103,335**	**$91,776**
Variance vs Pre 23		**$11,417**	**$13,962**	**$7,860**	**$13,985**	**$10,225**	**-$1,334**
Variance vs Schedule Method			**$2,546**	**-$3,556**	**$2,568**	**-$1,191**	**-$12,750**

Component	08 3B Pre 2023	09 3B Sched	10 3B Just
Slab	$29,374	$31,553	$31,553
Roof	$1,519	$2,849	$1,519
Walls	$35,077	$34,674	$35,077
Glazing	$27,756	$35,259	$27,756
Total	**$93,726**	**$104,334**	**$95,905**
Variance vs Pre 23		**$10,609**	**$2,179**
Variance vs Schedule Method			**-$8,430**

The slabs were not engineered so actual results may vary depending on design.

These costs include a builder's mark-up of 20% (16.7% margin) and GST.

NZ Certified Builders Member Survey

NZCB did a survey of their members and asked them to provide feedback on recent builds. The survey was anecdotal and asked the builders to select from cost ranges then averaged so provides a broad indication of their views. The results of this survey were consistent with our theoretical results above.

Average square metres*	213 sqm
Average total build cost	$748,613
Average extra costs due to H1	$18,125
Average extra H1 costs per sqm	$85 per sqm
Average extra H1 costs as percentage of total cost	2.4%

*This result excludes two outlier projects that were build values over $6m.

Conclusion

That the introduction of the higher H1 standards increased the build cost of the 2-bedroom exemplar by $13,962 when using the schedule method but also a building with a markedly reduced heat loss. Careful selection of the system components and using the calculation method allows this cost premium to be reduced or potentially eliminated.

The two-story home performed better thermally as there is reduced roof to wall area ratio meaning lower R values systems could be used to achieve a pass with the calculation method. The cost premium on meeting H1 via the schedule method was $10,609, dropping to $2,179 with optimum calculation method settings to achieve a minimum pass.

The component systems used were generic designs, it is possible that specific proprietary systems could exceed the performance of these providing the designer with further options to optimise their designs.

About YourQS

YourQS assist builders and designers understand the cost of residential building projects using their innovative in-house developed 3D based estimating system. Based in Onehunga Auckland, their team of 11 work with 300 plus builders nationwide helping them prepare estimates for their clients as well as working with architects and designers estimating early-stage concept design costs. Since starting in 2018 they have completed over 3,200 renovation and new build projects. They recently started providing the same services to clients in Australia.

Their technology won the 2024 NZ Institute of Building Technology award.

Nick Clements MNZIQS
Managing Director
YourQS Ltd
nick@yourqs.co.nz
027 433 732
www.yourqs.co.nz

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