Homestar v5 Consultation Appendix A

Introduction

Appendix A supports the Homestar v5 Consultation Summary and contains the comments received during the Homestar v5 Consultation period. This appendix covers submissions received via the online survey during the consultation period, responses emailed to the NZGBC, and feedback/questions collected through the webinar on 1 July 2020.

Please note, some comments in appendix have been edited for clarity. In some areas, many respondents made the same, or similar comments in which case we have summarised the main point in the summary document and included a selection of comments cover the point and justifications in Appendix A.

Some of the comments received requested inclusion of aspects already covered in the tool, for instance recognition of Passive House certification which already receives full points in EHC-1. These comments are therefore not included in the summary report, or this appendix. Some comments were feedback to the NZGBC unrelated to Homestar v5 which we have made efforts to respond to through other means.

If you have any further feedback in response to this, please email homestar@nzgbc.org.nz including "Homestar v5 feedback" in the subject line.

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Question 1: Do you think we should simplify the Homestar categories and make clearer how Homestar benefits occupants and the wider environment?

"The relationship needs to be shown between environmental and social wellbeing, I think by having these as separate categories it misses this and implies that they are/can be considered independent from one another - they all intersect"

"re-word to "Health and Comfort" to factor in both extremes of hot and cold as a healthy home may need to be cool as well"

"change "Healthy and Warm" to "Healthy, Warm and Dry"- this is in line with what is being asked for in the market. One of the purposes of ventilation is to keep the house dry so would be strange to leave it out of the name of this category."

"maybe healthy and comfortable is a better phrasing"

""Caring for Nature" sounds a bit fluffy. Some other ideas: Built Sustainably, Green Building, Low Environmental Impact"

""Caring for Nature" is a weak name, suggest "Macro Sustainability""

"Rename some of the old credits in Homestar V4 to make them consistent with the aim of the credit. For instance - MAT 2 – Healthy materials; current name suggests that there are materials that are not healthy. ECH 9 – Sound Insulation; a better name is Sound Reduction or Sound Transmission –sound is related to systems rather than just products"

"Rename MAN-3 Responsible Contracting. Without the AAA Contractor Rating scheme proposed by Construction Accord how would you be able to establish 'Responsible Contracting'?"

"Presume 'Sustainable Materials' equates to embodied carbon?"

"DRE should be embedded into a carbon calculator."

"Low carbon should be in the caring for nature category"

"low carbon categories like sustainable materials should be in a separate category"

"Could be quite wrong if you confuse Carbon zero as equalling low energy use and ignore embodied carbon - better to have two categories for these two things.

"Focus solely on energy, health and comfort, carbon and water. Management and innovation are superfluous as is the DRE"

"STE 1 to 4 should be all in one credit."

"'Caring for Environment' category could also include embodied emissions of the construction materials"

"move the low carbon part of this to the caring for nature area"

"Rule of Thirds could apply. Efficiency, Comfort and Community would be good categories. If each category then has three sub-categories that is nice and easy to understand; such as: Efficiency - Thermal Envelope, Energy Use, Passive Design Comfort - Lighting, Heating, Ventilation Community - Density, Materials (includes Waste), Amenity"

"3 main categories (but with more positive titles): construction impact, operational impact, and occupant wellbeing. Construction impact to include DRE, MAT-1, WST-1, MAN-3 and STE-1 & 2. Operational impact to include EHC-1, 2, 5, 6, 8 & 11, WAT-1 & 2, and WST-2. Occupant heath to include EHC-3, 4, 7, 9 & 10, MAT-2, MAN-1 & 2 and STE-3 & 4"

"3 main groups home Energy Water Waste (recycling) home user guide sound, etc. Site & community (add density & security here) Construction (combine waste, materials and management)"

"environmental effect should be separated into what happens during construction (one-off) and ongoing during the life, which almost certainly are much more over a longer period"

"perhaps WAT-1 is also of benefit to occupants, though? Reduced water consumption (lower water bills in some areas) and reduced hot water heating?"

"Even though the credits are easy to understand, it's can be pretty overwhelming up-front information for clients."

"I think it would make sense to write a separate report that appeals to the homeowner, heavily focusing around the benefits. Use pictures"

"Homestar website needs more and clearer information for homeowners"

"the scores the buildings obtained in each category should be part of the certification.

"I wonder if you're trying to simply quite a nuanced area in terms of splitting out energy efficiency and healthy and warm. Thermal Comfort is the one that probably sticks out the most with regards to this."

"continue to be recognise prominent labels already established in the market such as Declare and ISO 14001. These products offer a more holistic approach to reduce and or warn the market about toxic components like asbestos and lead"

"The relevance of each category, from an environment perspective, should be made clearer."

"The suggested categories in the consultation paper could create confusion; for instance EHC-1 is listed under health and warm but this has a big impact on the Energy efficiency in a home."

"Caring for Nature Category – several items in this area would be difficult for a single dwelling new build versus a new sub-division. Could this area be split for developers and single builds?"

"It would be important to manage perception on the proposed Homestar headlines or categories as headlines like 'Designed for People' can be very open to interpretation."

"Having performance based on per m2 rating seems odd."

"Develop an app for self-assessment so people know where their house sits on the ratings"

"incorporate it with the ISO standards"

"construction milestones and alignment with these would simplify compliance"

"Should be performance based (the only way to determine a home's efficiency). Then innovation points for everything else."

"Do not change scorecard dramatically. These changes, such as reconfiguring the categories, will negate any efficiencies Assessors currently using the tool have gained."

"Energy efficient - Energy efficient what? For products, or for installed and operating outcomes? More efficient lighting is easy to implement but acceptable quality lighting outcomes can get lost in the singular race to achieve very low power densities. A holistic application based approach is required (not only product based) that includes smart lighting controls.

Designed for people – What should this include for lighting? low glare lighting? circadian controlled lighting? colour tuneable lighting? 90+ colour rendering? low stroboscopic visibility? low short-term flicker? There has been much LED luminaire technology advancement in recent years. Homestar is lacking in the lighting area.

Caring for Nature - What should this include for lighting? Light pollution – Upward waste light from residential lighting contributes to astronomical skyglow. General waste light contributes to neighbourhood nuisance. Homestar could include measures to rate these issues."

Question 2: Do you think the current spread of points in Homestar v4 is appropriate?

"the purpose of Homestar in the user's eyes is "Warm, Healthy, dry and energy efficient homes".

"the owners directly benefit from this section"

"These are aspects that are under the direct control of the building company and will make a significant impact on the living costs of the occupants, which is particularly important for lower income households."

"I can have a $600 power bill and still get a good Homestar score - this does not make much sense to me"

"Increased focus and weighting should be placed on occupant health by specifying a minimum of 30m3/hr of ventilation, minimum and recommended temperatures during winter, and requirement that buildings do not overheat"

"this should be very carefully targeted at measures that actually make a significant difference (e.g. hot water heating), versus measures like lighting which proportionally have a much smaller impact on the overall energy use in the home given the prevalence of LED lights in new builds."

"doesn't seem like there is "enough" discrepancy in points between different heating types (e.g. adding a heat pump to heat an additional 20% of a 6 Homestar results in a 0.2 points uplift)."

“environmental benefits are good for the whole population/world, while occupant is only good for the actual occupants, and so perhaps less important?”

“higher prominence of embodied carbon”, “both operational and embodied”

“heavier weighting of points for these aspects which contribute to energy efficiency and reducing carbon emissions for the lifetime of the building”

"Make them all 25%”

“HUG has very little impact for 2 points”

“Less to DRE - doesn't actually provide an incentive to build smaller, the house will be what it is and Homestar points wont change that. homeowners, developers and planning regulations have the final say on that.”

“It is very unclear what would be available/suitable within the Innovation points category - so this becomes a wasted opportunity for points.”

No points for meeting Building Code requirements

“should be centred around ISO Standards”

“If you want to get a high rating, you shouldn’t be able to focus on one area because it’s heavily weighted. Must contribute to all ratings – maybe mandatory minimums in each section?”

“WAT-1: Having a 6/3L toilet as the mandatory minimum might be a bit low. It really isn’t that hard to specify a 4-star WELS – Bunnings has one for $98! Toilets are weighted fairly heavily in this credit, and I’d expect that 99% of projects have a 4.5/3L toilet specified. Then there is the whole issue over actual flow rates versus WELS ratings for taps and showers – how to navigate this? There’s some pretty problematic shower flow rates as well, where the WELS rating doesn’t match neatly to the flow rate as per the table that we provide in the tool.”

“MAT-1: I struggle to get on board with XPS/EPS not needing to be accounted for in insulation. When those products are used for thermal bridging, it is really unlikely that they will make up more than 50% of the total product in the house. When they are being predominantly used for insulation, such as in a SIP construction, then they will make up a large proportion of the house. I’m a fan of SIPs, so this isn’t an effort to undermine their worthiness or presence in the market, but I just don’t think that a SIP house that is walls and roof SIP panels but suspended floor with glass wool insulation should only have to count the glass wool in the floor in order to get points for this.

“MAT-2: I’d be really interested to know how many projects have actually targeted and achieved in adhesives and sealants and also interior engineered wood? Accounting for all the adhesives and sealants in a property is a totally arduous task that no client has ever wanted to tackle, and the other obstacle is that so often an installer won’t provide a producer statement unless they use “their” product, so swapping out a low-VOC alternative isn’t an option. I’m also interested in whether all of these carry equal importance to the indoor air quality, as indicated by their equal weighting in the tool? Finally, on one hand I feel like 50% is awfully low and a bit farcical when it comes to VOCs,

but on the other hand I wonder whether increasing this one would have a deleterious effect on numbers targeting this credit."

"I'd like to see an additional threshold introduced for materials, at the 75%+ mark. I'm finding it awfully easy to get to 10 points on most projects!"

"More weighting to EHC-10"

"bike storage and composting still rate a little high in comparison to the other categories"

"Transportation and location is interesting and useful but has little to do with the design of a building. It encourages worse buildings to be built in better locations, often high density, with 50-100 years without changes."

"wood as directly diminishes the load on the grid right when the grid is struggling."

"wood burners are not efficient in central Auckland but maybe ok rurally"

"WAT-2: How much influence does the run-off coefficient and the % slope (which, by the way, is given as a degree in 100% of plans that I've ever reviewed) actually have on the score in this credit?"

"The Homestar rating tool should have sufficient information and robustness to avoid a requirement to weight scoring. Weighting can be seen as either a help or a penalty to gaining points depending on what you are trying to achieve or bypass in the design and may create unintended consequences which are not favourable."

"Lighting is the least important but still needs to be there – prevent over lighting"

"A holistic application based approach is required (not only product based) that includes the gains achievable from the use of smart lighting controls."

"Too many credits outside control of designer."

"what is of less importance and if its less important why is it there given there is a relationship between each to achieve the outcomes we want?"

"Points should be aligned or weighted by zone and more towards fixtures rather than things that can easily be changed by a new owner."

"relative weightage should be made region specific as performance requirements are contingent upon climatic factors that vary regionally and sometimes even within regions."

"the difference in performance in some 7 star and 8 star homes that I've assessed is substantial; while the star ratings doesn't give that impression."

Question 3: Are there any credits you would like to be removed from Homestar?

"No, but they need to be suited between high-density and low-density projects. Cycling for instance is not as beneficial in some contexts as others. Same for security"

"present weighting for solar energy that produce power at precisely the wrong time of the day, wrong time of the year do nothing to help decarbonise the grid and may in fact make it worse"

"gas heating is bad"

"A strong position needs to be taken to disincentivize the use of gas instantaneous water heaters. This is probably best taken as a point deduction for inclusion of gas water heater as there are viable, cost effective, less environmentally impactful alternatives easily specified. This is to provide a clear signal to the market as it is widely accepted in the hot water industry that 65-70% of new build homes use instantaneous gas water heaters. This is completely contrary to the pathway set out in the NZGBC Roadmap to Zero carbon buildings in NZ, especially given the relative importance of hot water in total domestic energy consumption (45-46% of total annual use). Instantaneous gas water heaters are a completely inappropriate technology in the current environment, especially in HS homes. They are most often installed as an 80% efficient unit, 93% at absolute best when operating in optimal conditions. They burn a 100% non-renewable fossil fuel that is rapidly depleting. In NZ, with an 80%+ renewable electricity grid, gas is not a transition fuel to a lower carbon economy in the domestic context. Instantaneous gas water heaters do not include a hot water cylinder and therefore cost becomes a very big barrier to retrofitting lower energy, more sustainable water heating technologies (solar, heat pump, integration with central heating system). They have a relatively short lifespan and are almost impossible to recycle at end of life due to the multiple materials contained in a low value shell. They are not particularly cheap to run on NG and are a lot more expensive than almost any other option on LPG."

"The entire management category as it doesn't address carbon emission at all"

"responsible contracting is much less successful than we had originally hoped"

"responsible contracting - the provided guidance is for frameworks rather than environmental performance guarantees"

"household waste minimisation - too easy to fool with temporary solutions and therefore can be removed once assessed to easily"

"Storm water management - complex and unnecessary for a condensed version of the tool"

"Native planting - most people do already plant out their new homes"

"Native planting - too detailed and unnecessary for a condensed version of the tool"

"The entire site category doesn't address carbon"

"Planting requirements on overall site is really difficult for dense developments - would have to replace lawn/recreation areas. What about points for overall planting schemes – might not all be natives"

"remove fruit trees and veggie patches"

"Innovation is not required."

"oversizing windows for natural light or ventilation"

"Lighting requirement for sensors outdoors - it's an additional product that doesn't do a heck of a lot especially if you only have a small number of lights"

"WST-2: takes up time and just feels like a placeholder"

"trickle vents"

"good to have some points that are achievable vs some that stretch targets."

Question 4: Are there any credits you would like to be added to Homestar?

"A concrete floor is a common component but comes with a carbon footprint. There is the technology to reduce the footprint considerably with the use of SCM. Set a benchmark GWP for the concrete and then award points if 10 to 50% lower than the footprint. Easy to do and can be verified by EPDs or independently verified calculators."

"Potentially more around achieving lower embodied and operational carbon (but recognise that is hugely complex and may require LCA quick type analysis)"

"Low carbon concrete added to the sustainable materials."

"points for using CLT construction"

"Energy monitoring, POE. Maybe smart meters; this could help with providing feedback with how specific rated homes are performing. It would be great if this information could also be made available to the NZGBC (I'm not sure about privacy issues). This would provide a feedback loop and could help with identifying potential performance gaps and making changes to reduce any that do occur"

"credits to distinguish good daily performance profiles, regionally appropriate designs, systems with low operational risk"

"Airtightness is central to building performance and should be tested with a blower door test"

"ventilation systems and airtightness/infiltration rates to reduce energy use"

"a mandatory requirement for 6 Homestar for thermally broken windows recessed in line with insulation and point and mandatory requirement for foundation edge insulation."

"EHC-5 is a major weak point in the tool, I feel. There is evidence to suggest that hot water heating makes up to 45% of the total energy use in a home – new build and older homes alike – versus the general industry assumption of 25-30%. Put very simply, I feel very

strongly that there aren't enough points in EHC-5 and there isn't enough recognition of the difference between electric resistive versus standard heat pump versus CO2 heat pump versus solar. (As a rather nit-picky aside, it's really annoying to have to select whether or not the cylinder is insulated in the tool – I can't imagine that there are ANY homes that are doing Homestar that have an uninsulated cylinder. Also, basically no-one puts in low pressure systems anymore)."

"The importance of water heating as a consumer of energy is not adequately acknowledged in the HS scoring system. New homes use an average of 45% or 46% (standard or low user) of their total energy for water heating. This is just the average new house, without improved insulation, positioning, solar gain, etc that are required under Homestar and therefore in a Homestar home these percentages are likely to be much higher as total energy consumption drops.

The lines and power companies have this information for all ICPs with a controlled power supply (most homes, but note this is not necessarily linked in to a controlled tariff so may well be invisible to homeowner). NZGBC should make an effort to get this information so you have factual basis on which to calculate weighting of DHW consumption and heating.

There needs to be more distinction between the quality of technologies for water heating, especially in heat pumps. The spreadsheet for solar thermal appears to be reasonably robust when I got a chance to review it a few years ago. Unfortunately this is a lightly regulated market so NZGBC do not have much recourse to government or industry backed information from which to discern the relative merits of manufacturer's HWHP products. There is work underway by E3 for a comparable database between all forms of water heating technology but that is at least 1-2 years away. So NZGBC needs a place holder in the very least if not a robust system on which products can be assessed in the interim and to inform this work by E3.

It would be best if there was a list of manufacturers / products from which a specifier would choose and then be assigned points relative to the actual performance efficiency of the system. This may be too onerous so an alternative suggestion for HWHPs is a baseline point awarded based on having a HWHP and then further point/s being awarded for better performance, which would need to be proved by the manufacturer/distributor. This can take the form of actual COP data at different ambient temperatures which can be modelled in PHP or similar to provide real world COP figures across the year. This will soon separate out the different technologies with relative performance easily defined as some will be loath / unable to even provide that data and if provided it will demonstrate what actual performance is. It will therefore incentivise the specification of better performing systems."

"increased local timber is source of economic development in post COVID 19 times."

"Local procurement - could be a part of MAT category"

"addition of points for local product use – like LBC"

"PV-direct water heaters"

"More consideration (and understanding) of electrical solutions, i.e. EV charging completely misunderstood in building code sectors."

"support EVs to account for their potential to reduce transport emissions as well as to optimise the price and renewable content of grid electricity"

"including high amperage EV power point in houses (not just a dedicated (8amp) supply or a 7kW charger which seems a bit excessive, but just a 16amp one doubles the amount of power handed without the expense of a 7kW installation - And why is this in the renewable energy section - surely it should be in all houses not just ones with renewable energy?) to not only support the use of EVs but also to enable Vehicle to grid supplying power back to the grid from EVs that will lop the top of the peaks in grid demand which reduced the need for additional peak power stations."

"Resilience! because Resilience=Sustainability" & "stronger focus on durability"

"Aotearoa is prone to natural disasters. Have you considered including a resilient home category? i.e. Keeping a house warm during power outages, reduce dependency on automated systems, home flood protection, resilient wall construction"

"consider seismically strong structures"

"STE-1 add run off coefficients for concrete paths "

"greater emphasis should also be placed on collection of evidence such as incorporating photos to support the aspects of the build scoring more highly. This could be introduced for higher score categories and progressively rolled out across other categories over time"

"End of life recycling"

"Biophilia, Beauty, incorporation of Red List & Declare materials."

"Designed with home office which reduces travel. Designed with Wi-Fi for tv, internet etc. to minimise holes being dug and cables run in the street."

"energy efficient appliances"

"Energy purchase agreements – maybe an innovation point?"

"Passive surveillance"

"off site manufacture"

"additional points within grasping range for mid-range projects"

"focus on regeneration of the site or local environment"

"water heat recovery systems for showers"

"Health and safety (for humans, and for the environment)"

"Maintenance: A low maintenance home translates to less energy consumption during upkeep. Reduced maintenance also has financial and health & safety (e.g. less dust and noise) benefits.

"Thermal mass: A dense building material's capacity to absorb, store and release solar energy can significantly reduce a home's space conditioning energy requirements and associated carbon emissions."

"better window location and elimination of thermal bridging within windows and their installation"

"use the ECNZ published a specification for Construction & Demolition Waste Services (EC-59)"

"Homestar would be more appealing if it extended its scope to cost in use and life of building elements, particularly envelope materials which are environmental in nature"

"mandatory minimums need to be more holistic to avoid a design focusing too much on one aspect."

"options to address all or some credits to speed up and reduce cost of the rating process. e.g. an energy only rating, Homestar Energy"

Question 5: Do you agree that Homestar should display further information on how the home scored against the various categories?

"especially if could be linked to information as to why a category might have failed to score more highly"

"more accurate and reflective"

"Will help overcome the misunderstanding that Homestar only assesses thermal performance."

"It's important the actual metrics for measurable categories are published"

"Graphical information is easier to digest and meets the needs of visual learners."

"Keep the certificate as simple as it can be, while still providing information on the 4 different areas. Have the detailed information available in the background so that people wanting more information can find it (and can improve)"

"If a home is designed well it should rate fairly evenly across all categories."

"useful in comparing homes to have this info on the certificate"

"The holistic nature of the Homestar means that obtaining a star doesn't provide sufficient information for the consumer to differentiate between different buildings, displaying further information would highlight an energy hog with a worm farm may not be the best option for a consumer."

"there can also be supporting documentation that goes with the certificate."

"No point in adding information to the certificates as most are not on display and little is truly understood by the general public."

"achieving a Homestar rating should be enough"

"brings about a negative feeling as I believe people will look straight to where the home is scoring low and focus on this as a negative rather than celebrating what has been achieved in totality."

"Perhaps benchmarking this against NZBC minimums can give owners a better appreciation of the 'additional' benefits of the home over min required compliance.? The current system of Homestar 6-10 has little context to the general public as it's not clear what is it bench marked against"

"Would be great to see a potential score as well as the achieved score also as is done in EPC ratings."

"could also demonstrate a compromise. I.e. high points in one area and low in another indicating 'deficiencies'"

"As there are many pathways and credits available, caution is required in how and what information is presented. How the home was designed to be used and how the home is used can be very different. I.e. claims on energy usage could lead to disappointment if these levels aren't met by the occupant."

"Ratings need to be zone specific as climates are different from region to region. An environmental measure needs to be added and there should be a range of ways to achieve it i.e. Declare"

"The rating should be based on what people value (healthy and warm, energy efficient). If this is satisfied by another means (minimum mandatory requirements plus an energy rating), the extra details don't need to be added to the certificate."

"Each individual score should be shown. Then, long term, a new owner can see how they can improve the house and the costs associated."

"More inclusion of the regulated trades, such as electrical and gas, who have standards referred to, but not included in, the building code."

"Also 3 bullet points as to the best scoring features in the building. And highlight any areas where no points were scored."

Question 6: Do you agree that the Homestar certification process would be made simpler and more efficient with the use of a WebApp?

"the current process is incredibly complex and prone to assessor and auditor disagreement"

"right now a dozen different calculators are required, many not supplied by NZGBC, leaving assessors to come up with their own versions."

"It would be nice to integrate auditing within this as well."

"helps standardise submissions."

"if some of the calculators could be further automated and simplified that would be money well spent."

"integrate with BRANZ's Artisan app"

"As long as it was independently verifiable i.e. people could fill out the form themselves to see their potential score, however it would still need verification. There would also need to be a lodgement process for supporting documents"

"should be based on the schedules and potentially integrate with material supply for the building"

"needs to be easy to use and not crash when large amount of information is uploaded."

"Ability to work offline is good, and we'd need to be able to use the tool for design review prior to project registration"

"The main problem is that all the calculations and spreadsheet selections are done outside of the CAD model produced by the architect. It seems that Homestar is designed for the lowest common denominator. Most CAD packages support BIM modelling whereby information can be automatically extracted from the CAD model, such as window/wall ratio, making a lot of the Homestar information automatic. This should be the emphasis and for those that don't have access to good software packages then they can use the NZGBC excel spreadsheets."

"Can take years to gather info for one assessment and submit – so if app get's updated, older versions will need to continue to be maintained.

"it is the contents which determines the simplicity not the delivery package"

"Ultimately this is a great idea but not for this version. Maybe something that could be developed for use in 2-3 years time"

"Feels like a waste of time and money for NZGBC"

"seems like this wouldn't be used for multi-unit developments where the bulk of ratings are done"

"would allow scenario playing - changing things to see what happens more easily than a real assessment."

"would help existing homeowners assess their current home and see how it could be improved by moving to a Homestar rated home or building one"

"should give some other options if required, not everyone use WebApp, have we considered any other options?"

"an online database of all certified homes so people can search and find houses."

"Data security would be the issue"

"apps need to be properly maintained and NZGBC would need to own the code. I have seen several organisations lose a lot of goodwill when they went to update their app (web/phone/other) to add an essential new feature but because they didn't own the code lost a lot of existing functionality in the rewrite"

"app-based reporting has limited options and little room to explain. This results in lower perception of value"

Question 7: Do you agree with the proposal for sample auditing and reduced documentation?

"The cost and time expended applying for and getting certification is at times prohibitive."

"More user friendly"

"This was supposed to already be that way with the previous versions. I have very little confidence in NZGBC to do it with V5."

"The rating process should be robust, or it is devalued."

"Think about liability and risk"

"I review many pre-purchase reports and find those that end up in dispute do so because they lack clarity or overly simplistic e.g. tick the box for good or very good."

"I feel like not requiring an assessor to submit evidence (e.g. Proforma of Credit Compliance) doesn't actually reduce assessor workload all that much because you really still need to verify the evidence when you're doing the scorecards and calculators and it's probably best to save it as you're working on a project in case it does get requested"

"the more experienced you are the less you should be audited. However, this could fluctuate for instance depending on when your last submission was and which Homestar version the projects were submitted under."

"it's important to have it all audited for consistency and making sure standards are reached."

"ultimately the third-party process is what makes Homestar valuable. Convenience should not be made more important than the audit process. That said, some credits can be audited automatically through proforma documentation via the proposed web app. e.g. materials. Others will always need auditing like energy credits. Auditing can be made difficult based on the type of documentation required and the quality of that documentation."

"I'm not sure whether it will have enough of an impact on total cost to be worth the loss of rigour, as the assessor fees won't reduce (we still need to compile the documentation in case it is audited)"

"Being typology based there would appear to be little benefit here for bespoke projects"

"Auditing could be risk based targeting particular areas of critical importance on a build such as energy efficiency, properties of the thermal envelope, airtightness, indoor temperature, ventilation and waste management"

"MAT should have a database under Assessors Resources with all previously accepted eco-labels, similar to envirospec.co.nz. This will also reward suppliers who can produce legitimate support for "green" claims."

"reduce the amount of marked-up drawings required. Verbal descriptions should suffice. For example, showing the area covered by a centralized heating system can be submitted in verbal confirmation and should not require a marked-up drawing."

"How much you actually audit (full or sample) feels like an internal process that's really up to NZGBC. If you were wanting to reduce the amount of documentation, one thing would be to have a good hard look at the documentation requirements for each credit and see if anything could be streamlined there (and also streamlining to remove some credits)."

Question 8: Do you agree that we should remove points available for standard kitchen/bathroom extract and opening windows?

"the assumption that best energy & IAQ can only be provided by full mechanical ventilation is wrong and sets many types of Homestar projects up for operational failure or projects abstaining from Homestar to deliver a better outcome. Higher points should be for assuring good IAQ is delivered, not how. Similarly, the base case window and NZBC extractor fan design can be easily improved upon for different point scales."

"natural ventilation and poorly planned cross ventilation do not provide adequate ventilation to satisfy the occupants requirements or that of the building"

"window offers more than just ventilation" "We still want to be able to securely open windows to listen to the birds without worry of your house being broken into. This is still the case even if you've got the fanciest (and resource intensive) heat recovery ventilation system imported from Germany)"

"Not if this means homes are required to have whole-house systems."

"Important for those that are budget poor"

"I don't think you should be able to achieve a Homestar rating by relying on intermittent ventilation… although intermittent mechanical ventilation has been required under Acceptable Solutions G4 (Building Code) in new homes; it's still possible to avoid this by going down the alternative pathway and taking the natural ventilation approach…need to avoid creating a loophole where this is possible"

"Homestar should expand upon Building Code and keep Bathroom and Kitchen extract ventilation at the lowest base with the addition of a 15-minute run on timer for all extract fans. This will help meet the "Healthy & Warm" objectives without adding huge expense to reach the first Homestar rating"

"Perhaps the volume of air movement considered compared with minimum Code compliance for 1.5 points mandatory minimum under ECH-3 can be reviewed in lieu of removal of the points i.e. higher rates of extract using proprietary solutions not specialist mechanical design. The Code requirement addresses the volume of air, not volume of space. The opportunity to demonstrate an above code requirement remains i.e. right solution for the space rather than an inflexible, one rule fits all approach."

"some form of mechanical ventilation with heat recovery should be added for gaining points."

"MVHR should be the baseline, continuous extract allows the possibility of toxic gases / mould be sucked into the living room, e.g. internal garage or external building cavity."

"MHVR systems do not require opening windows in these rooms and by including them you give the impression that owning windows are a good thing / necessary when there are actually better alternatives in some cases"

"the run on timer requirement is not in the code, we need to keep that"

"should do is give credits to higher performing fans, not just the minimal 25l/s required in the code"

"also include sound (dB)"

"possibly recognise humidity detectors"

"it's clear occupant behaviour plays a big part in the effectiveness of these ventilation methods."

"Perhaps a distinction can be made between certification that includes points for this sort of ventilation and a different (higher?) certification that doesn't'"

"only if the m3 displacement is above the required levels. Several solutions are sub standard and do not provide adequate displacement."

Question 9: Do you agree that we should require more than just opening windows for ventilation of habitable rooms (other than mechanical kitchen/bathroom) in Homestar? Please comment, if yes, at what Star level this should kick-in?

"If you are putting in the ductwork anyway, why not start off with balanced mechanical ventilation, and it's clear this provides good indoor air quality as well as energy efficiency."

"must be considered necessary below 3 air changes per hour as is mandatory in Europe. This will depend on where airtightness sits in the star rating. Research shows that awning hung windows only ventilate a short distance into the room unless good crossflow ventilation is designed into the building by good site orientation"

"level of ventilation/air change rate should be rewarded."

"Balanced mechanical ventilation with heat recovery from level 6"

"6-star - MVHR should be in all homes in NZ, but I understand why that would be an incredibly polarizing stance for Homestar to take."

"6-star - heat transfer ventilation system with heat pump back up, the main unit should be located at floor level for easy changing of filters"

"6-star - require a whole home systems such as continuous extract (with Adjustable passive vents)"

"6-star - Decentralized balanced ventilation should be mandated for 6 & 7 Homestar."

"6-star - Building Code compliance (bathrooms and kitchens) with 15-minute run on timer"

"6-star - avoids poor occupant health, a right for all users of the building as well as the health of the building so building components or structures don't fail."

"6-star - Let's be realistic, who opens their windows in every room everyday during winter?

"7-star - "Building Code compliance (bathrooms and kitchens) with 15-minute run on timer plus humidistat (set humidity levels based on zone)"

"balanced mechanical ventilation for 8 star"

"8-star - Zone 1 and 2– Whole House ventilation system Zone 3A and 3B – Balanced mechanical ventilation with energy recovery"

"8-star - There's no point having a really efficient thermal envelope if you have to open a big hole in it to remove stale air. We need to preserve a 'better than code' level that doesn't require expensive systems to achieve"

"9-star - not as a "requirement", but towards additional points this may still be a consideration given this is subjective and there should be a provision for all preferences."

"9-star - MVHR for 9 & 10 star"

"9-star - Zone 1 and 2– Whole House ventilation system Zone 3A and 3B – Balanced mechanical ventilation with energy recovery"

"I hate the idea that in order to reach the upper star bandings we would be mandating expensive energy consuming equipment regardless of how the house is designed and constructed (it may have a full passive ventilation strategy that works very effectively)"

"Whole house ventilation is too prescriptive - natural can work well if designed properly"

"research indicates that mechanical ventilation and central heating systems do not get used as designed in NZ homes"

"significant drawbacks to this including system cost, maintenance, complexity, and ultimately if people will use the systems as designed. I.e. will the system still work if doors and windows are open – arguably not so it defeats the basic purpose."

"My concern with continuous extract in NZ is the obvious additional heating load required to maintain comfortable indoor temperatures; people are already pretty terrible at heating their homes in NZ (versus in the UK, where central heating is much more prevalent) and this could make it a whole lot worse, leading to some really low indoor air temperatures. But less moisture!"

"I'm not sure that balanced ventilation without heat recovery is even worth including – if someone is going to the effort of putting in balanced ventilation in NZ, they are going to put in MVHR."

"MVHR systems are also typically very expensive and worked on a cost to lifetime benefit don't typically stack up in terms of economics and efficiency. Access and cost for filter changes is sometimes prohibitive and reticulation of ducting is complex to resolve. MVHR system to some extent relies on doors and windows being closed and if these are open then MVHR benefits are reduced. Buyer feedback on developments where we have installed ventilation is mixed. Many comments are received on noise associated with

mechanical supply and drafts from the airflow. Some of the customer feedback suggests they would rather not have the systems at all."

"Need to account for running costs, lifetime, filter changes etc."

"I read a report looking at 4 high performance homes in Christchurch and was struck by how poorly the whole house ventilation system was installed. And poorly maintained. E.g. No alert to owners when filters clog. Initial expense $10k for 140 sq. metre home. So how many standalone certified homes are from people who economically aren't flush?"

"Positive pressure without controlling where the air can escape is not a ventilation system."

"In areas other than those generating moisture internally i.e. excepting kitchen and bathroom areas, the building construction materials should be adequately specified and implemented to ensure openable windows are sufficient."

"It depends on the housing type. Definitely for apartments, possibly also for terraces. Duplexes and standalones should have sufficient ventilation from opening windows."

"encourage buy-in & be careful to not be seen to creating barriers for participation"

"Re-word to focus on assuring good whole house indoor air quality. Strongly disagree there is only one method of achieving higher levels of IAQ in all situations. 'Kick in' at higher level than passive house as they still need to deliver better IAQ and energy performance."

"We agree that airtightness testing should be a mandatory requirement for Homestar. This would lead to much larger number of houses being airtightness tested and lay the ground for industry-wide testing in the future. The ventilation system has to have a verified flow rate post installation. In an upcoming BRANZ study report, we propose setting a particular airtightness level to facilitate the use of a whole-house mechanical system. Technically, we are system agnostic. We acknowledge the arguments against a supply-only system but have yet to see evidence of failures due to exfiltrating air in New Zealand houses. We do not support an immediate mandatory test for Code."

"very location dependent, number of occupants per area and dependant on the airtightness of the house. Number of air changes per hour is a very silly way of measuring, needs to have rates dependent on real factors such as CO2 or humidity sensing"

"stack ventilation if designed right works better to reduce over heating work better than any mechanical ventilation"

Question 10: Do you think that Homestar should have minimum requirements for heating systems in the main living space to be correctly sized and cost effective?

"Heating in the habitable rooms should be mandatory, not just the lounge"

"minimum specifications should be determined on the level of insulation, glazing used etc"

"But, this can be tricky having a blanket rule - Healthy Homes Standards being an example. Calculations would need to reflect the type of building accurately."

"Better provision for the benefits delivered by combinations of heat sources in main living spaces is needed."

"Could use a simple calculation based on sq./m area or volume of room and equate that to a kW heat pump size"

"Needs to match Govt. expectations"

"calculation needs to be kept simple and should be kept in-line with NZBC standards 4218 and 4214. Additionally these calculations should extend beyond the standard climate zone data (i.e. climate zones 1, 2 & 3), and should use NIWA design temperatures for the specific locations."

"yes, unless healthy and comfortable WHO temperatures can be proven"

"cost effectiveness may be more debateable"

"how cost-effective? Is a wood fire ever cost-effective compared to a heat pump for example?"

"energy efficient should be the focus over cost effective, as if energy efficient it should be cost effective in operation"

"it shouldn't be mandatory but points could be awarded for a heat pump as an example"

"building should have higher R values which will eliminate the potential need for heating systems"

"Heating levels yes, but not necessarily heating systems. Tricky calculation to get this right for very situation (size, volume?, cost, occupancy, occupant behaviour, environment, orientation, construction type, space design, peripherals, etc)"

"If Thermal Comfort is already one of the credits achieved, specifying the heating system is unnecessary and is a double up. Thermal Comfort would need to be defined and measurable, and to meet the requirements the home will either have to be very well designed and insulated or include heating."

"there should in fact be "maximum" requirements for heating systems thus emphasizing the need to incorporate passively energy-efficient materials at the outset and which should be rewarded suitably"

"I think the Tenancy Services heating tool is well out of whack. Develop our own heating tool and challenge MBIE to refine theirs. Take into account a mid-temperature of 20C and build in allowance for colder and hotter temps. We need to develop resilience to temperature variability and that starts in the home, but of course it needs to be in a much smaller range than current building stock allows."

"Space heating type should not be non-renewable low carbon methods, i.e.. exclude burning of wood or gas. Both these forms of fuel are both environmentally challenged but particulates emitted by them inside a building lead to greater occurrence of cancer, dementia, heart attacks and strokes"

Question 11: Do you think that Homestar should include requirements for all habitable rooms to be heated, perhaps at the higher levels of Homestar?

"This does not need to be "central heating" as such, but could just be fixed panel wired-in (i.e. built into the house) heating. I think for much of NZ full-house Eu style central heating is quite unnecessary and expensive."

"yes but include the ability to switch off areas that are not used so to keep bills low"

"This requirement would be overly restrictive. Fabric-first optimisation should be the focus. Having a good thermal envelope wouldn't require heaters in every room – a few heat pumps would be sufficient in all but the coldest climate regions. As an aside, we are also concerned about a future increase in duct issues in New Zealand."

"Not a huge fan of keeping whole house at one temperature. Occupancy variability makes this a potential energy waste. Point source heating in bedrooms (and bathrooms) should be sufficient if the building envelope is well insulated. Living areas of course should have fixed and adequately sized heating."

"With regards to the argument of fuel poverty or cultural preference, shouldn't we be ensuring that the thermal envelope of any star level makes it efficient to heat? The only way Homestar can influence occupant behaviour is to make things more economical or easier. A home is more likely to be heated appropriately when the house is well-insulated and has a quiet, efficient system that can deliver heat throughout the dwelling. Cultural or economic barriers to the use of the heating system shouldn't be a reason to include a heating system: as you've pointed out, ownership/tenancy changes and so too does cultural attitudes and economic conditions of those occupants."

"Depending on the house design and location, heating may not be the driving factor, it may be cooling."

"No we need to concentrate on reducing heat loss and relaying on A/C during summer time"

"even if systems are supplied, they could very well not be used due to the cost to run and maintain over time"

"Fully ducted systems are not only expensive, but require significant planning, controls and forethought during design in order to incorporate into build. This adds additional cost and complexity. If homes are multi-level, access for maintenance is difficult, systems require ongoing maintenance, and increased power supplies (for larger homes)."

"a great deal of habitable space isn't always used which counters the argument of sustainability"

"Insisting on heaters in rooms which are very rarely used is a waste of resources"

"To address fuel poverty & carbon emission also need to encourage provision for combinations of heat source equipment and plugging in future technology with minimal retrofit."

"this could be through room to room ventilation and not be required for smaller houses where heat transfers more easily"

Question 12: Do you support assessing summer overheating risk separately from overall energy demand?

"If the building does not have a cooling system then the designer needs to be able to prove they have adequate shading and or reflective low e coatings to ensure that the occupants are not exposed an unhealthy number of hours over a certain temperature range."

"addressing it as a separate category (based on Solar Factor for glass, for example) will ensure greater clarity on it and also avoid getting mixed with thermal efficiency which relates to a totally different type of energy efficiency."

"needs to be combined as the overall solar gains impacts the overall energy usage. I think you need to avoid summer overheating i.e. making sure temperature is not greater than 25 degrees Celsius for less than or equal to 10% of the year"

"Yes but make the calculator easier to fill out!"

"Yes depending on how its assessed – for example, room by room or using the main living area as representative."

"It needs to be separate because "theoretical points" shouldn't be handed out to offset things. Overheating could be assessed and assisted alongside the levels of insulation / glazing / soffit size"

"But I would not award many points in this category as we are not Australia, this can be mitigated with opening windows and doors."

"We are heading towards Auckland temperatures being similar to Sydney, but with much higher UV. We need to think about simply ways of managing heat build up in our homes. We need to start now to be ready. The best solution is thermal mass as New Zealanders will not accept smaller windows."

"This can be done by passive means especially in the roof plane. Reduces the summer energy spike"

"you shouldn't be able to trade off heating & cooling loads"

"Mechanical extract system should be installed in the roof to help summer overheating. This will also help moisture issues in winter. To keep energy consumption to a minimum a solar powered extract fan could be installed."

"on a room by room basis - bedroom vs lounge. If by % of time metric needs to be something like degree hours which gives severity of overheating (which PHPP cannot do)"

"No we do not support assessing summer overheating risk separately from overall energy demand. Overheating potential is often limited to short periods of the summer season and can be subject to specific climate zone and personal preferences. It's also relatively

simple (in most cases) for the home owner to resolve this in a post fit solution. The options of adding a small fan, or additional heat pump (if required), could be significantly reduced using increased thermal insulation which is also complimentary to other credits available."

"Unless you can come up with a Risk Assessment based on Realtime Data at an individual occupancy level"

"Occupant behaviour can deal with this by opening windows, would be an issue with only mech ventilated house"

"You don't seem to consider the use of fans which are a widely used (and much cheaper to buy and run) lower alternative to aircon per se."

"Are seasonal loads not all different/variable? Could the demands not be assessed across an annual cycle to establish a true energy requirement?"

"Ask ALF and design navigator developers to include this in their tools please. this is an easy way to demonstrate compliance"

"I'd rather see this included in the energy tool with a tolerance for x% of overheating, but this would be a good second choice."

"How will Homestar tackle overheating analysis? For overheating assessment, what method of analysis would be adopted? CIBSE TM59 for residential? modelling weather files are only TMY for typical meteorological year. TM59 requires DSY design summer year weather files to be created. I don't believe DSY exist for NZ climate locations yet."

"How would overheating be analysed in general? CIBSE TM59? This requires design summer year weather files which doesn't exist for NZ yet?"

Question 13: Do you think low risk of summer overheating should be a mandatory minimum for any Homestar rating?

"designers need to be able to prove that their designs are low risk"

"Not just summer overheating."

"essential to having a comfortable home"

"It's too easy to focus on solar gain and high insulation"

"what is considered low risk ? is + 5 degrees acceptable ?"

"Do we seriously think "overheating" is as much of a health risk as underheating in winter? Mind you this could get worse with global warming."

"Should be zone and rating specific"

"The accurate assessment of it, however, is problematic."

"I'm not sure how you do that without a model."

Question 14: Do you think the mandatory requirements of EHC-4 should be tightened? If so, how?

"I agree with the insulation of concrete slabs, and with requirements around vapour barriers, but not with the specification of window materials. That is not to say warmer internal surface temperatures should not be pursued, but specifying thermally broken windows is limiting..."

"All windows should have internal surface temperatures that allow at least Category C levels of comfort (ISO7730:2005)"

"thermal bridging leading to moisture build up within the envelope and on internal surfaces below due point are a large and prolific problem with typical New Zealand construction methods. Using windows as an example it is very easy to simulate thermal bridges in windows and around the window installation. Using specific exterior climate conditions it is possible to analyse the risk of condensation forming on a window using the FRsi factor (a scale of 0 to 1) 0 meaning 100% risk and 1 being no risk. If the houses are designed with a certain range of Relative Humidity it is possible to determine an FRsi factor with relatively low risk to condensation. Windows can be modelled to meet this criteria. If the designer chooses not to model their windows and installation for thermal bridges then they can pick generic window types and installations that have been determined prior to have low risk of condensation."

"windows should be positioned in line or recessed from the frame" "there really needs to be better recognition of the benefits of recessing windows."

"note that aluminium window framing is where most condensation forms in housing. moving to thermally broken frames will result in that moisture being trapped elsewhere in the house if the ventilation is not adequate."

"most cost effective & easiest way to get performance up but might change when Tiwai smelter closes"

"There could be a possible credit for smart vapour retarders, but these should not be mandatory. They don't automatically fix a problem, and other materials could perform the same function in terms of reducing the rate of diffusion. We think it is probably of greater importance that they also perform the air barrier function."

"Moisture retarders require very careful specification, and average home builders should not be pushed into using them without very careful examination of the detailing."

"Vapour retarders, or an acceptable demonstration of what they are not required should occur at the higher levels of Homestar."

"Wouldn't install without a full ventilation system – they go hand in hand"

"as mentioned the research done by BRANZ several years ago showed that interstitial condensation was not a common problem in NZ. It is a good to have on high spec' houses but shouldn't be mandatory for 6 star rating houses"

"warmer internal surface temperatures should be pursued but specifying thermally broken windows is limiting."

"The cost and complexity in doing so is prohibitive and depending on climate zone the benefits could be marginally noticeable. For example, there is also no benefit in installing thermally broken windows and leaving the windows open, but there is either 0.5 or 1 point available for TBW, the cost differential is approximately 35% on an average house lot of joinery. We do not support making thermally broken windows mandatory as the financial impact is significant and this will not assist to make Homestar more attractive as a ratings tool. By way of example, the mandatory requirements of EHC-4 in Climate zone 1 for any rating below Homestar 8, delivers a negligible cost/benefit but is a significant impact. A better outcome for example could potentially be installing a low E Coating to the glass. The cost uplift with Low-E is generally less, and the benefits still realized even with open windows. An additional benefit would be to address summertime overheating and heat retention in winter months depending on selected coatings."

"There should be higher performance requirements, rather than mandating specific products required for the whole building."

"thermal bridging needs to be better addressed"

"Vented roofs should be considered"

"Yes & No. Doesn't matter much for most NZ projects if IAQ and comfort assured."

"condensation and thermal bridging are real issues, designers are often not educated sufficiently to address these issues in the envelope detailing. Guidance is required."

Question 15: Do you think we should have mandatory minimum energy and/or carbon performance levels for each Star rating?

"There will be significant work required to produce the right bandings but I do think this is the right approach. Need to account for smaller footprint homes being penalised if done on a kWh/m2 basis (smaller homes being inherently more sustainable but having tighter heating and cooling constraints)"

"Star rating should be based on the EPC performance for energy and carbon, like in Europe. 10 stars = class A etc."

"It should be a whole of house approach and align with EECA."

"Not having minimum energy consumption standards or minimal carbon footprint standards removes essential quantifiable measures to use in achieving overall environmental goals."

"For gross kWh imported for heating & cooling. However, only provides rough reference as not all kWh's are worth the same so this must be addressed elsewhere."

"Ideally, yes, but these kinds of targets are somewhat arbitrary and may have unintended outcomes. For example, a Homestar 10 house in a cold climate will cost more than in a milder climate, and having targets based on a floor area basis leads to a small house penalty. The schedule method is potentially useful although not really consistent with these kinds of energy ratings. We suggest that a carbon budget per house could be used

as a metric as this would cover the essential elements. This would require education for homeowner interpretation."

"A minimum energy standard should definitely be used. It supports international and local objectives about energy use and emissions and it will help to normalise inquiry into energy use/emissions generally."

"Otherwise we will have high Homestar rating on houses that burn lots of gas"

"Yes to energy rating, but not on a per m2 basis. yes to carbon performance based on energy use, as relatively easy to assess and check compliance."

"Energy Yes, this has a direct affect on the owner"

"Energy consumption is already documented so could transfer easily"

"mandatory minimums need to be more holistic to avoid a design focusing too much on one aspect."

"Gives the homeowner better understanding of what to expect from their home."

"While carbon performance is hugely important I think it should be kept separate from Homestar requirements specifically. The reason for this is that if you start giving mandatory minimum carbon levels you might as well not worry about any of the energy/thermal categories as they are covered off under the carbon performance. In future (depending on how the Building Code develops) this may become a moot point anyway."

"sounds good in theory, just not sure if in practice these levels are appropriate/achievable"

"This should be linked to passive and or active design, as heating and or cooling may not be required with an efficiently insulated home including the glazing."

"Why make it less user friendly"

"If the tool allows the broader sustainability goals, then people should be able to choose their targets."

"Too many high performance features will make it too expensive to do at scale"

Question 16: What do you think are the best metrics for minimum performance (energy, cost, carbon emissions, primary energy etc)?

"heating demand (kWh/m2), cooling demand (kWh/m2), overall energy consumption (kWh/m2), Primary Energy (kWh/m2)"

"could be metric measurement and or % of efficiency"

"kW-rating during network peaks, alongside kWh, may make kWh of primary energy more meaningful."

"kWh per m2 per person based at different levels for different sized homes"

"The annual energy use over the lifetime of the building as this is greater than embodied or deconstruction energy. It could be used to determine the carbon emissions."

"Homestar star ratings and certificates should explicitly state a home's performance on energy and embodied carbon, e.g. "This home has 6 stars Homestar with an energy use of X kWh/m2 a and embodied carbon of Y t CO2"."

"PER carbon emissions (kg.CO2eq/m2)"

"Tools such EPD and LCAs are preferred if they include cradle to grave coverage, not just from border to grave and combine with EECA type measures."

"CO2 per m2 per person"

"not keen on the carbon emissions metric in NZ, which again disadvantages distributed energy generation over gas fired generation, and is so changeable as we move to electrifying the vehicle fleet as to be irrelevant"

"carbon maybe not measurable"

"There is a cost to supply material vs a cost to run. Lifetime cost needed to measure the install cost as well as the long-term running cost"

"That's a metric that rewards gas."

"overall running costs ($ per year per m2)"

"An additional category could be "overall comfort" - especially from a glass perspective, it being uniquely different in addressing this - based on the combined requirements of thermal, solar control, glare as relevant performance indicators."

"Pressure/Temperature Test to see how long it holds the air for and to how long it holds the heat"

"for Homestar as the focus for minimum performance metrics should be on the end consumers and growing their awareness of performance rather than just the industry. The main outcome from this should be to educate and raise awareness with the general public over time."

"Energy and cost can vary greatly depending on the efficiency of the heating source and the price that is charged"

"Many of these questions seem geared towards competing with Passivhaus standards - which is pointless. Homestar should aim for something more than minimum Building Standards, but with practical/cost effective/achievable metrics."

"Star ratings of appliances (already documented)"

"cost or emissions could be derived at a point of time from cost per kWh or CO2 per KWh (emissions from the grid and cost of energy are likely to change over time)"

"using a comparison is much better i.e. 60% less carbon than NZBC minimum house of equivalent size"

"kWh/m2 Global Warming, Ozone Depletion, Acid Rain, Eutrophication, Tropospheric Ozone Formation, Mineral Depletion, Fossil Fuel Depletion"

"A healthy indoor environment 18-25C, RH 40-60% for an affordable energy bill (relative)."

Question: 17: Do you support combining all of the energy credits into one holistic energy/carbon credit supported by the development of a new calculator?

"does make it easier to explain and having a calculator will be ideal as it can simplify the process"

"We support this idea provided that there are still minimum targets for space heating/thermal envelope. This would prevent trade-offs between elements – for example, a poor thermally performing house being acceptable as long as all the energy came from low-carbon sources."

"Important all combined. Note recent work by BRANZ demonstrated that the plug load from non-heating/cooling related energy use is a large proportion of the total energy use and cannot be ignored if we want more energy efficient homes."

"Combining all of the energy credits into one loses the relative importance of each type of energy credit as also difference in respect of relevance. A single credit is beneficial from an overall outcome perspective, yet lessens transparency on the need to ALSO maintain minimal standards across each/different construction materials and how these together contribute to performance requirements across the specified categories in homes."

"this will be irrelevant for alterations"

"If it is made into a category then it's probably unnecessary to further condense into a single credit."

"This would take us even further from quantifying and explaining main energy, carbon and fuel poverty issues to house owners, architects and engineers."

"'Open book' policy - show all information"

"If for specific development reasons certain criteria cannot be met under one credit, this could skew the overall score. Credits should be kept separate e.g. heating and lighting should be measured and allocated separately."

"This may not be able to give a true indication of what is happening unless it could predict energy use at design stage and be verified by in use data. Software like 'energy plus' may be able to be simplified. It is currently complicated to use but a good level of accuracy."

"Electrical and Gas for example have very different specialities and cannot be assessed in a combined manor effectively. It is much clearer if the total figure is categorised to ascertain where the gains can be made."

"By having it split out by heating, cooling, domestic hot water, appliances and total energy it is easier to compare buildings as well as areas for improvement over time such as changing to a more energy efficient form of hot water heating. Consumers are able to make more informed decisions about each of these areas and also how they contribute to

the overall total energy use making trade-offs or decisions to most cost effectively achieve reductions in energy use."

"Embodied carbon should be kept separate Energy generated on site should be kept separate from energy efficiency as at least with PVs we know that will do nothing for climate change and may actually make emissions worse (see Concept Consulting report that the Parl. Comm. for the Env. recommends)"

"Too vague and would discredit energy modelling results."

"A dwelling could be amazing in all available credits but poor in one particular, that will negate all the good work with a poor rating overall. Need to maintain flexibility"

"Could it work to have this as another metric added to the separate ones?"

"modelling should be room specific, bedrooms have particular needs (re condensation for instance, lounges in respect of over heating)"

"would need to account for smaller footprint homes being penalised if done on a kWh/m2 basis – especially the case if looking at wider energy use than just heating and cooling (e.g. a large 2 bed home with hot water cylinder for family of three compared to small 2 bed home with same cylinder requirements …)"

"Yes, so long as space heating demand was separate criteria."

"I'd include EHC-1 in this as well, because it's more about reducing heating & cooling energy demand than occupant health."

"should separate the heating & lighting"

"There needs to be a check against reliance on the grid as buffer where renewable energy is included."

Question 18: Do you support the inclusion of appliances in an overall energy calculator?

"I have seen volume home builders change their mind on the appliance they use and choose one with higher stars to get credits – so it is having an impact!"

"they are part of the energy demand"

"These are no doubt important in absolute terms (of energy efficiency, carbon ratings), though relatively less significant other than mainly the efficient use of water and cooking gas (a clean fuel)."

"It's consistent with other aspects that may or may not be taken up by subsequent owners, e.g. EV charging, cycling. The certificate may need to state that it is based on the home having appliances of the specified ratings installed."

"Would drive inclusion of heat pump dryer and the like into building. People won't flinch at $1k extra on the price of the home or $1k off the profit, but will choose old tech dryers to save $500"

"Not moveable appliances. I think this proportion of overall energy use in the home figure is potentially over-stated/out-dated, and I'm uncertain whether it takes into account the prevalence of gas hot water heating affecting this figure, and also that Kiwis generally don't heat their homes. It's just too messy when the appliances move with the occupant. Fixed appliances could be included (this usually includes a dishwasher, but doesn't address the problem child of refrigeration!)"

"if they are changed it needs to be easy to re-asses the Homestar rating"

"For higher rating levels"

"include appliances as a separate credit and report on their predicted energy use separately"

"if plug-in appliances are going to be assessed, only refrigeration should be considered due to its dominant energy use, and hot water/space heating plug-ins should be excluded. (For higher-performing Homestar houses, hot water is likely to be the dominant energy user.)"

"Plug loads predominate, not heating is what Berg and Dowdell of BRANZ found. Its crucial to reduce plug loads and part of that is appliances"

"Passive House energy modelling takes care of this."

"the water-efficient and energy-efficient appliances innovation challenges award way too many points and I'm struggling to see how it is innovative to have "mid-range" performing appliances. I have clients achieving 3 additional points for their washing machine, dishwasher and fridge/freezer and yet, for example, the points uplift between intermittent extract ventilation and MVHR is 1.5 points!"

Question 19: Do you support the inclusion of water efficiency (shower WELS rating) in an overall energy calculator?

"Very topical with the Auckland drought"

"Also allow for different types for shower waste heat recovery in the calculator. Outputs should not be used to encourage a reduction in hot water storage sizing."

"include Shower Waste Water Heat Recovery as this can reduce the energy used for a level of hot water to 50%"

"New Zealand should protect its natural resources"

"Good way to ensure the water efficiency is properly designed in."

"HEEP is totally out of date and is now a historical artifact. It bares little resemblance to current trends. WAT-1 and EHC should be integrated"

"WELs rating should not be part of the energy calculator, but the performance of hot water system should."

"seems counterintuitive as shower flow has water saving benefits too"

"Council should consider their Water Efficiency before you position culpability on Rate Payers"

"I support keeping 9L/min as a mandatory minimum, but not in including this in the energy calculator. I also support rewarding points for the installation of a Shower dome as this contributes to wise-water use."

Question 20: Do you agree that the Homestar certificate should display data on the home's predicted energy performance?

Comments are included in question 21 and 22 below

Question 21 and Question 22: If you do agree, what information would you like to be displayed? (Pick as many as you like). Please comment on your above choices

"Consumers understand overall running costs. This is also easier for banks to look at and see that lower expenses could equate to a higher lending capacity."

"it will become obsolete too quickly"

"will rapidly go out of date"

"consumer can work this out on their own based on the their current suppliers pricing"

"Overall running costs is irrelevant as it is so vague"

"if someone sees that they only save $500/year (as in your sample table), they might say "why bother going to all the extra effort/cost?", but if they only see a percentage improvement (e.g. 32%), then that looks impressive!"

"Running cost could be complicated and subject the energy supply cost and the actual heating system"

"I would like to see all predicted costs taken out of NZGBC literature as the published figures have not corresponded to experiences or costs down in Central Otago, which limits our usage of NZGBC material and undermines its credibility."

"suggest that the overall GHG emissions are also presented on a gross basis to avoid larger houses appearing to perform better."

"Seems logical both carbon emissions and energy demand be displayed on a m2 basis for easy comparison across all buildings."

"Space heating and Carbon emissions on 'gross' basis would not penalise large volume spaces."

"Should also have number of rooms and the occupancy rate."

"Cooling costs should be an added category. This will factor in solar control for windows in particular."

"Space heating impact on country (kW-peak periods)"

"should be heating, cooling, water and appliances."

"Should include energy generation"

"It would add value to the tool (I already use my EHC-1 calculations this way to show home builders the cost implications of alternative specs)."

"Will depend on how this can be displayed as benchmarked against standard home designs – but knowledge for the consumer is more power – and provision of most of these metrics shouldn't be too challenging…"

"Enables end users to compare various building types."

"KWh vary and a per m2 figure is easily transferable and easier for a homeowner to grasp the concept"

"Something tangible and able to be compared apples for apples would be best."

"Cost depends on supplier, but I think energy use and thus cost if what will be important for the homeowner - and sorry, carbon much less important."

"Will be good for the owner to have a list of the data (as much as possible), for them to understand the results of the process."

"I like a % comparison with building code for consumers – it's kind of non-specific but makes them see that it's "better". "

"there's no perceivable way to accomplish this based on a check list schedule. This requires extremely detailed energy modelling which Homestar isn't equipped for."

"Designing for low kWh on an annual bases does not fit with designing for a renewable economy. Different electric profiles should have different $, CO2-e and regional network factors "

"with comparison to NZBC baseline displayed" "Should also display percentage improvement over the NZBC"

"Carbon emissions should be kg CO2eq/m2"

"total energy use is occupier dependent so possibly meaningless"

"Need to be very careful here as claims on performance and usage could be subject to claims and is highly dependent on how the home is run. It should be guidance only. What would be more helpful is to have on a scale similar to your water/power bill i.e. compared to other homes of era and size for relativity."

"comparison needs to be made with where the proposed dwelling would fall in the range between a passive house and code minimum. If clients & Architects knew this information, they could make informed decisions and could make them rethink about quality over quantity i.e. the size of the house."

"energy consumption per m2 tends to favour big houses, whereas very minimal buildings requiring minimal resources such as Tiny houses have very small total areas so their emission/m2 might be quite high and give a misleading interpretation of how efficient

these buildings actually are. What is more important is the energy efficiency per person accommodated."

"scale should be zone specific and encourage more efficient homes the larger they are."

"How would it be possible to maintain accurate up-to-date running costs information? And if it were not maintained, the certificate would become redundant quickly."

"It does not add much value to homeowners - people don't really understand what the figures mean in real life, nor does it affect their purchasing decisions"

"energy models using very averaged climate data will not result in useful ratings, ie. NIWA climate zones should be used to generate energy metrics otherwise ratings won't be comparable."

"Space heating & overall energy demand probably needs to be compared against both a house of the same design but NZBC-minimum specs AND a 'typical' design with the same number of bedrooms."

"keep it simple! tidy and normalised data, any nerds can read the full dataset in a report rather than on the certificate"

"I believe that you should be weary of using dollar amounts and separating the home star and energy rating. The Homestar rating itself is a holistic rating that takes into account multiple variables and is now recognised by the public. Also the amount of extra work it would take to prepare the additional information would suck and it would put me off remaining an assessor"

Question 23 and Question 24: Do you think Homestar should produce energy/carbon bandings similar to appliance energy labelling (A-G)? If you answered "yes" to the above, what is the best way for us to do this?

"Energy rating similar to the Netherlands"

"A-E as per international EPC's"

"use the EPC (certificate) BRANZ is developing, the tool will be unbiased"

"Issue with HERs bandings/ratings is that not many homes will make an A grade which makes it awkward if you're handing over a C"

"EPD's which cover cradle to grave"

"Leverage EPC but in kWh (energy) rather than cost and based on NIWA climate zone data rather than a single or limited number of points in the country. Alternatively leverage NABERSNZ for the banding and further developed for the inclusion of appliances."

"as per v5 consultation paper - band rating and kWh/m2"

"Having a required energy/carbon target means an additional A–G rating is probably unnecessary"

"It should also be considered how this would tie in with a future EPC scheme."

"Find a way for these bandings to be relevant to value, to the insurance market, to funders and to the government's procurement system."

"retire lower star ratings. The aim of the game in my opinion is to raise the standard of building, NZGBC should lead the pack and as the government catches up, acknowledge that as the min standard"

"It should be the second line under the star rating. The scale needs to allow for the future, e.g. 15kWhm2 should not be A+ otherwise a 20year old house cannot be compared to a new one."

"The successful scheme must not discriminate on house size, or habitable space size - a dwelling may have a few bedrooms but a large garage, or many bedrooms and no garaging if the dwelling may support a multigenerational family for example."

"Expected running cost based on the location, both summer and winter. A large passive or active designed house might use less energy that a smaller poorly designed house"

"Two things and its crucial they are separated: Embodied carbon emissions per person accommodated Energy Efficiency per person accommodated"

"Use an ISO Standard"

"The building code relates to energy efficiency so we need a process of evaluating this. It should be for all energy use not just heating and cooling. It needs to be robust so that it can be defended when tested in court."

"A 'multi-dashboard' label showing rating within each key measure (e.g. energy, water,)"

"Consultation with relevant experts in the differing sectors of construction, building, electrical, plumbing/gas, insulation"

"Include the scores from each category on the certificate"

Question 25: if you answered "no" to the above, are there other ways we could visually show how the home compares?

"needs to be a government mandated scheme to be effective"

"Two labels in the market might create confusion on a topic that should be extremely clear and easy to align"

"A private sector national energy/carbon label encroaches on the existing role of EECA as NZ's government energy performance regulator."

"DEC system in UK does not do this well"

"energy and carbon measures could still be displayed"

"State/designate the ideal standard to achieve on a net zero carbon basis and rate against it in accordance with the requirements."

"Overall Running costs per Year in $"

"Develop a system and pressure govt introduce it. could be automated through water and energy meters in urban areas"

"Holistic energy & water consumption compared to a baseline of a NZBC minimum home"

"Maybe similar to the EPC energy efficiency rating graph used for homes in the UK."

"a combination of the breakdown of scores and displaying the energy data will do the job - Homestar needs to remain holistic"

"Facilitating objective performance quantification using absolute energy performance metrics (kWh/m2/Yr) and carbon metrics (tonnes CO2e/m2/Yr)"

"visual representations of carbon use"

"complexity of envelope more critical than simple m², a larger but more cubic home may be equally energy efficient"

Question 26: Do you agree with the idea that larger homes (with the same number of bedrooms) should find it harder to get a good energy label? *

*All comments have been included in report

Question 27: Do you agree that Homestar should develop (and mandate the use of) a single modelling tool? *

"NZGBC should not develop and mandate the use of an umbrella energy assessment tool. A key reason is that the climate in warmer parts of the country (Zone 1) does not lend itself to easy thermal simulation in either cooling or heating assessment. Developing a web-based model that simplifies assessment of water heating, lighting and appliances does have merit. Instead, a reference building could be used as a benchmark/comparison, having the flexibility to accept a range of thermal modelling tools by requiring the proposed design to demonstrate a percentage improvement above Code. Alternatively, NZGBC and a consortium of interests (MBIE, BRANZ, Beacon, Super home Movement etc.) could develop a simulation tool for multiple purposes (Homestar, EPCs, NZBC etc), which would be a multi-year project."

"Do not create a new thermal modelling tool. This is too much effort in the wrong direction and may even result in a flawed tool as it will take time to test against the performance gap."

"This is anti-competitive. NZGBC should harmonise the required parameter inputs and assumptions, but let commercial competition deliver suitable software tools."

"Sam mentioned in the webinar that a simplified, front-end of the tool may be used in Homestar, which sounds great, especially if assessors get some training on how to use it."

Question 28: Please tell us about any improvements you would like to see to the existing Homestar thermal modelling protocol.

"Thermal bridging - would this be measured somehow or just calculated by adding up every single element? Or using thermal imaging."

"measure of airtightness will complicate the tool more, maybe is a good idea for high levels of Homestar rating."

"look at how openings are treated to determine how airtight the thermal insulation is. This relates especially to the practice of putting pipes and electrical cables through the insulation layer and reducing its effectiveness by compressing the material."

"focus should change from thermal modelling to energy and comfort modelling"

"the capacity of thermal mass to reduce a home's space conditioning energy requirements and associated carbon emissions for should be accounted for in the Homestar thermal modelling protocol"

"The thermal modelling should be changed to "energy modelling", taking into account not only heat losses and the need to address through thermal efficiency towards reduced heating, but also solar heat gains and the need to address through solar control towards reduced cooling. The improved framework should factor in region-specific climatic factors and consequently the suitable combination (and relative weightage) of thermal efficiency and solar control required. Ideally, the modelling should not only assess the home on an overall basis and also from a perspective of minimal requirements per construction material type."

"Useable outputs… Peak day kWh, Peak kW and total winter kWh (May-Sept) heating loads. For 24/7 heating and occupancy to WHO recommended temperatures."

"I have stopped undertaking as many assessments because I don't have the right software to undertake thermal modelling. I think that there should be an opportunity for the training to use one tool which will be recognised and accepted with any application. But I also believe that if an Assessor wishes to use an alternative tool that provides sufficient data than they should be able to use it."

"would be good to include energy modelling software easily available that runs from CAD models such as Sefeira - this should be the main way forward as it means architects don't have to employ engineers or specialists and can use what they already have"

"eliminate the schedule method. retain ALF for standalone homes. Require energy modelling for attached housing and apartments."

"This needs to work in relation to the abilities of the standard CAD software and how BIM data can be extracted automatically"

"there are issues with applying European weather data to NZ due to for example, higher humidity. Manufacturer's data sometimes not relevant or not from NZ"

Question 29: Do you agree that Homestar should no longer support the use of schedule/NZS 4218 methods in EHC-1?

"in the future maybe the move can be done once that both designers and builders are more accustom to use, live and breath the rating tool and understand the benefits of them. Creating another tool that designers will have to use and learn might slow the process of adoption and as far as I know the idea is to expand the concept and use of the rating."

"should still be an option for straightforward designs that meet the standard criteria e.g. max 30% of walls glazed. The schedule allows for a simple checklist assessment without requiring specialist design or assessment, which is important and should be retained."

"the schedule allows us to use the simple checklist"

"NZS 4218: 2009 allows compliance with a thermal modelling. (there are 4 methods of compliance with H1) I would like to see this way of compliance be the only one approved for a Homestar rating."

"That method both under and overstates different types of heat loss. Does not allow for the relationship between heat capacity and conduction."

"Orientation and shading are very important factors, not currently accounted for?"

"Calculations can be biased."

"Homestar needs to set a target beyond the legal minimum which NZS 4218 sets."

"ignoring non-thermally broken windows is asinine. They account for 40-60% of the heat loss. Slab edge thermal bridging 30% reduction. Infiltration losses 10-25% of the heat loss"

Other

"no- it becomes support data for the ISO Standard"

"replacement modelling tool would need to be equally quick & easy to use."

"material specific values in the schedule should be updated to reflect available materials and evolving performance capabilities"

"The schedule method in NZS 4218 is paramount in defining minimal performance standards per material / application type and should be prescriptively used to qualify materials to begin with. As a subsequent step, a calculation or modelling towards a combining of minimally-qualified materials can then be used to examine potential trade-offs across materials but without then deterring from the minimal performance enabled by any specific material type."

"none of the proposed changes to Homestar V5 look at ACTUAL performance – which might encourage insulation to be properly installed in a decent thermal envelope with lack of thermal bridging etc."

"I'm not actually convinced that the thermal modelling gets an actual better real life result when compared to 4218 schedule methods"

Question 30: Do you think the thermal performance requirements of Homestar should be tightened, particularly at the lower Star levels and in Zone 1?

"at least 10% better than code requirement"

"We agree provided overheating doesn't become problematic. We propose that the metric should be sub 3ACH@50, verified by test."

"Particularly for slabs - people can get away with anything."

"current 6 Homestar is not sufficient for South Island climate"

"do not over cater for warmer zones. Still get cold in Auckland."

"Performance of Homestar 6 home should be the same across all climate zones."

"requiring windows to be thermally broken and recessed would make a difference. Also the detailing around the window needs to avoid thermal bridging such as metal sill tray flashing under a thermally broken frame in contact with the inside aluminium behind the thermal break; as this will bypass the thermal break making in it ineffective."

"Building Costs should be kept at a reasonable level to encourage volume builders. The only offset would be if banks would lend more based on overall cheaper running costs."

"Our thermal performance standards are terrible. This is the easiest way to boost NZ home performance for a small % of the construction cost."

"No we do not think the thermal performance requirements of Homestar should be tightened at the lower Star levels and in Zone 1. Arguably NZ homes are poorly insulated when compared to other parts of the world, that said the climate in NZ is typically more temperate. Perhaps instead of increasing R value in specific elements we should look at a complete envelope value including garages, which are often used as habitable spaces or flexi spaces and midfloor where we currently have a 'thermal break' in the envelope? This would effectively also increase full envelope thermal performances as a default. I.e. insulate full perimeter and ceilings/roofs."

"We should create barriers to joining at the lower end"

"It would be good to be able to see a path to improve a homes ratings"

"How do you propose to achieve this on Existing State Housing 40 years plus"

Question 31: If you answered yes, what aspects should be tightened and by how much? (Pick multiple).*

* This question had no comment box.

Question 32: We are also interested in evidence that the cost of (and skills to design and build) better performing products and systems is reducing/improving, for example slab-edge insulation and higher performance glazing. Please use this comment to provide any evidence you might have.

"This is fantasy. There is no evidence with existing material technologies. Adding materials/performance = added cost! Yes there might ultimately be a reduction in the added cost as time, processes and volumes reduce, but the cost over the base line performance will still be more."

"The cost to maintain high performance is high and out of reach of many. Good, solid performance is achievable by many, instead of high performance by few."

"payback periods are still too long to be attractive."

"High performance glazing is still expensive. Added cost of time and flashings to weatherproof install of high performance joinery sourced from Europe to meet building code adds significant cost to the build."

"Costs are still significantly higher than code-compliant dwellings. A recent ~80m2 duplex development has the additional costs: Design process = +10% on architecture costs Homestar fees (including assessment etc) = ~$2,000 Slab-edge insulation = $6,000 additional cost Glazing = $3,500 per duplex unit additional cost for Homestar 6* rating) Insulation = $2,000 extra cost per duplex unit FSC structural timber = extra cost of $1,500 for frames & trusses, per duplex unit Additional value able to be passed on to buyer = $0. While our buyers appreciate our quality build - they are not willing to pay the extra for it, so we end up wearing the cost as a "social good" experiment."

"cost are not reducing. For slab edge insulation some have exited from the market due to product failure."

"Costs have been increased due to Compliance Standards"

"Payback periods are typically short & we should encourage improvements in these areas"

"The cost of higher performance glazing will come down as demand goes up - this is not a skill issue"

"More energy efficient building components such as timber tripled glazed windows are more costly initially, but their contribution to lower running costs mean a lower total cost of ownership. When NZ included double glazing in the building code it was more expensive, but now it is common place its cost has reduced."

"In the glass industry high performance glass products have transformed over the last 6 – 7 years and are more accessible. Our company has been able to change the entry level Low E product to a higher performing glass type (more energy efficient) but hold the same price to market. As technology of the glass is improving, global trends are driving more demand, and this is creating cost savings through economies of scale. Specific Data available."

"From a glass perspective - the use of high performance glass has been progressively increasing globally, better economies in scale have enabled better performing glass products at more-or-less the same prices than was previously possible. As a technical specialist / professional in high performance (coated) glass, this is consistent with my experience spanning >20 years across the Middle-East, Indian, South-East Asian and (now) Australasian markets."

"Supplies of higher performance products in NZ is improving. Cost will improve if volume increases. We see this happening when government mandates higher performance from housing. Our building team are perfecting the art of implementing these principles onsite, again scale will help efficiencies."

"Yes, slowly but surely things are changing"

"I can only speak from the window industry perspective. Costs for thermally broken window systems vary as there are many different system for different applications. Standard residential thermally broken window systems can be anywhere from 10% to 20% more expensive that non thermally broken frames. If the average house lot of windows is $18,400 for 40sqm of glazing then to upgrade to a thermally broken window system is between $20,240 and $22,080. Aluminium window frames make up less than 2% of the buildings entire envelope surface area but account for slightly over 15% of all energy lost and are all at extreme risk of condensation."

"There is more awareness however there is still resistance from the trades because many things are new and therefore a risk to their pricing systems"

Question 33: How should NZGBC deal with possible improvements to the Building Code as and when performance requirements are increased?

"Additional categories must continuously be incorporated towards a dynamic process. The standards and targeted objectives must progressively be changed for the better, this is necessary not just towards making NZ carbon neutral but globally towards reducing the carbon footprints per country and region - to "pass on" a more environmentally-friendly planet for future generations."

"When shifting the goal posts it will be important that the dates of the changes and the dates of the certification given are easily available."

"Assessments would need to register the 'version' a project was assessed under, such that the attainment could be relativized with future shifts."

"if it doesn't always increase then it will get overtaken and become redundant."

"Prefer to see 6 Homestar cease, otherwise there's a whole lot of barely adequate housing out there claiming to be environmentally sustainable"

"It follows the same principle that you don't give a 5 star option because it is the same as code"

"an 8 star home built in 2020 should be similar to one built in 2030."

"The rating levels need to be given a wide range e.g. 0 > 20+"

"introduce higher Homestar ratings as product innovation increases."

"Don't shift the goal posts from benchmark or it undermines the history of Homestar."

"Increase the Homestar requirements now to best practise so that no matter what the building code might change to then Homestar will not be outdone and therefore standards can remain the same without shifting the goal posts"

Question 34: Do you think that Homestar should include recognition for low global warming potential refrigerants?

"heat pump CFC gas should be counted in the Co2 emissions, if the HP are not decommissioned properly"

"like the star rating on appliance and the heat pump stays with the house"

"better solutions are now in market"

"Include heat pump heating, DHW generation and clothes dryers"

"We need to be realistic about the reason for failure and real world end of life disposal for most heat pump systems in NZ, especially all in one cylinder heat pumps which are almost impossible to recycle and are therefore landfilled. They almost always lose their refrigerant to the atmosphere, negating a portion of any energy savings made during their lifetime. Therefore the choice of refrigerant becomes an important factor in the total carbon impact of the system."

"The wide adoption of heat pumps with the extreme global warming potential of their refrigerants needs to be accounted for, all refrigerants leak. Low GWP options are available e.g. Co2 they just need to be communicated."

"Project drawdown sees refrigerants as one of the most important (and most overlooked) means of reducing climate change"

"Homes should be disqualified for using refrigerants. They are a lazy solution to a bad building envelope."

"Yes, but in doing so there is potential to increase costs for cooling and heating systems in the home as well as appliance cost / compliance. This needs to be done being conscious of cost and with alternatives readily available and in a cost-effective manner."

"Hard to come by service agents for some of these in NZ, so could be very location biased."

"but low points value as this is very small contribution to a green building"

"but so many other aspects of the building do not have end-of-life assessment requirements."

"outside our control"

"Limits options for installation in average homes and only high performing/budget homes become applicable"

"appliances have their own energy rating scheme and should therefore be accounted for separately"

Question 35: Do you support introducing a credit for reducing the carbon footprint of main assemblies in Homestar?

"having credits available that encourage the use of reporting these figures would be a great incentive for these businesses and others to follow."

"keep in mind is depending on your accounting method some people treat timber as negative, you don't want people trying to install extra timber in their homes just to make the numbers look good"

"It would be easier to focus on greenhouse gas emissions rather than multiple environmental indicators, so we suggest climate change is the focus. BRANZ is developing an Excel-based carbon footprint tool. It provides an easy reference guide that shows constructions based on R-value and life cycle materials-related greenhouse gas emissions, so it lends itself to this credit. A limitation is that not all constructions are currently covered by the tool (no strawbale, staggered stud or SIPs walls, which may be added in the future if the tool is popular), so consideration will need to be given to how to deal with these cases."

"only on a holistic/life-cycle basis" "Support a LCA assessment vs point in time"

"should be more than main assemblies. Carpet has the second highest carbon footprint in BRANZ modelling"

"Yes, carbon footprint should exist in parallel with eco-labels, giving the assessment the choice of how to pursue credits in this area, especially as this area does not get addressed at all in Passive House. This is the area in the Homestar tool that most complements PH."

"Some NZ lighting suppliers are already using LCA studies to model luminaire use and communicating with standardised EPD formats."

"I don't think people would recognise carbon over cost"

"initial steps should focus on operational carbon emissions and then introduce embodied carbon due to the complexities of calculation and verification."

"There could be credits for using minimum amounts of metals and concrete."

"could reward lower carbon materials but not necessarily include an embodied carbon calc"

"sometimes using materials with a higher carbon footprint will be more cost effective in the long run. Think concrete homes vs timber"

"Only if the tool is flexible enough to accommodate a range of construction assemblies and not overly onerous to use"

"a timber floor home clad with timber weatherboards coming from Declare, Red list and FSC may be seen as much friendlier to build initially. However, when compared in

lifecycle one could argue that the increased painting, maintenance and replacement of deteriorated elements may not be as 'green' or 'friendly' as perceived."

"Will it distinguish between locally-produced vs. imported versions of the same product?"

"comparing to a 'reference building' will be a difficult task as there are so many housing types e.g. triple glazing might save energy in Queenstown but be a waste of materials in Tauranga. Also, there are lots of trade-offs in buildings e.g. open plan means less concrete to make walls but HVAC system has to heat the whole space; and there would be a requirement to keep updating the reference buildings to account for newer building styles. Just focusing on the carbon footprint of main assemblies can also be questionable e.g. the energy used to produce insulation is outweighed by the energy saved by insulating a house correctly. During the development of ECNZ specifications, the lifecycle approach is used to identify and understand environmental issues (adverse or beneficial impacts) across the whole life of a product. This information is evaluated to identify the most significant issues and from those, to identify the issues on which it is possible to differentiate environmentally preferable products from others available in the New Zealand market. Criteria are then set on these significant and differentiating issues. Criteria are set in a form and at a level that does differentiate environmentally preferable products, are attainable by potential ECNZ licence applicants and are able to be measured and verified. As a result of this approach, criteria may not be included in an ECNZ specification on all aspects of the lifecycle of a product. If stages of a product lifecycle are found not to differentiate environmentally preferable products, or to have insufficient data available to allow objective benchmarking in New Zealand, those stages will not generally be included in criteria in the specification."

Question 36: Should Homestar explicitly recognize and reward net zero carbon (ready) homes?

"a Homestar category in and of itself"

"As otherwise it is likely the house will need to be retrofitted later which may be challenging and/or at considerable cost"

"agree with: (1) Have very low energy demand, (2) Be fully electric (no on-site fossil fuels), (3)Have low global warming refrigerants (4) facilitate the transition to 100% renewable energy supply by flattening demand for electricity throughout the year. This might include on-site generation, battery storage, intelligent EV charging and other technologies. 23 (5) stimulate industry to manufacture, supply and specify low/zero carbon products and materials. Ultimately true zero carbon homes would also have to be zero carbon at the construction stage."

"Go fully electric. Wood is not effective for whole house heating and got nitrogen and methane emissions."

"MBIE has included embodied Carbon in scoping paper which pushes things in that direction."

"This will enhance visibility on the ultimate goal of net carbon zero homes and incentivize the drive to promote materials that steer us towards such homes in the future."

"should be built into an overall energy rating"

"Yes but more open minded solutions and allow retrofits plans for the wider 2035 energy context. NZGBC can achieve this now by making better quantifiers. Currently it should not be assumed to have carbon zero electricity at all times within GXP's or Homestar designs it will not help it be so."

"Only at 10"

"I think this is really important, but perhaps should live as an Innovation Challenge for v5?"

"If we go to low energy requirements, buildings will be net-zero ready."

"not at the cost of efficient "Health & Warm" and running costs"

"But Homestar should recognise that some of the products required are not yet readily available, and often come with a reduced durability or increased maintenance requirement as noted in Q35. So being able to employ this might be some time/years away. One may also need to assess if the materials are available domestically or if tons of fossil fuels were used in transporting those materials to NZ or the building site."

"There are substantial benefits in keeping options open when setting the requirements for net zero carbon ready homes. These benefits come in the form of potentially lower costs to households (maintaining affordability) and higher quality homes (warmer, drier, healthier). Significant investment is already taking place to develop green hydrogen, biogas and bio-LPG as realistic zero carbon alternatives to electricity."

"we do not support the proposed Homestar standard for net zero carbon homes, which requires highly rated houses to be fully electric. This requirement restricts unnecessarily the choices that will be available to homeowners to reduce their carbon footprint, in line with New Zealand's target of becoming net zero by 2050. Specifying electric-only for the highest rating homes is the NZGBC "picking a winner" now. This is contrary to the many studies that have been done on how best to achieve the net zero carbon target, including studies carried out for NZ. A common theme in those studies is that Governments should keep all energy options open as long as possible. This is because it is not yet clear what mix of fuel and technologies will best achieve the carbon zero goal."

"diverts focus from reducing demand by improving energy efficiency."

"If it doesn't include embodied carbon its ridiculous."

"the problem with net-zero is there is a disconnect between peak demand and peak generation. There is a lot more demand in the winter. For instance a building may be net zero but have a shortfall during winter that wouldn't be covered by photovoltaic. The extra energy produced during the summer is difficult to store for usage over the winter. Although, in New Zealand we are lucky with hydroelectric power. Anyway, I think the focus should be on reducing operational energy usage as much as possible and preventing performance gaps."

"Go to ISO Standard, and then maybe"

"monitoring during occupancy - this should happen on some level (perhaps voluntarily, perhaps to be rewarded with an extra star if performance is better than anticipated) at all levels to more accurately verify whether the claims of Homestar benefits bear out in reality."

Question 37: If yes, should Homestar require homes at higher star levels (say 9 and 10) to be net zero carbon (ready)?

"also have this available as a point in the lower ratings category as to not discourage innovation or uptake."

"kick in at Star 9 and Star 10 should be -ve carbon. i.e. it should generate more electricity than it uses etc."

"Perhaps start with homes rated as star level 10, and potentially move down levels over time (next 30 years, given the targeted 2050 timeline)"

"it should not compromise other requirements i.e. light, ventilation etc."

"as long as net zero carbon is defined as nett zero embodied energy. This is crucial as net zero energy often means putting power into the grid at precisely the time that the grid doesn't need it and taking power out of the grid when the grid is struggling. It is crucial you take on board the Parliamentary Commissioner for the environments recommendation that on site PVs do nothing to help climate change and may actually make things worse - we need to look at the science pin this not fall back on reconciled ideas and assumptions - as the science has evolved you need to completely overhaul your points allocation."

"Unless 'net zero carbon (ready)' include houses designed to be easily and cheaply retrofitted for a 2035 energy context. Rather than limited to fully electric options which can be proven to be less sustainable."

"Too complex"

"I think this is too vague and goes against the grain of being able to customise how you achieve a Homestar rating. If this does become a requirement (much like with a minimum carbon performance) you might as well not bother with the rest of the Homestar energy and thermal assessment categories."

"Think it should incentivise but not require it, as generating all power renewably on site could more easily achieved by switching power company that is 100% carbon such as Ecotricity NZ and a more significant reduction in carbon would be achieved through the use of electric public transport or personal EV."

"There could be an NZ* (net Zero) star. good marketing potential all NZ homes should be NZ*"

Question 38: Do you agree that we should increase the number of mandatory minimums for the different Homestar levels?

"Better holistic approach that is achievable and applies to all vs small market segment of high value homes."

"On the basis that we want to continually improve"

"I would include the following; windows to be thermally broken and positioned in the wall correctly as per previous comments. I think that for 6 & 7 star you should require a whole home systems such as continuous extract (with Adjustable passive vents) and balanced mechanical ventilation for 8 star and MVHR for 9 & 10 star."

"Airtightness - 7 Stars <3ACH, 8-9-Stars <1ACH, 10 Stars <0.6ACH Slab edge insulation every star level MV - 6-7 Stars, MHRV 8-10 Stars All windows thermally broken and aligned with the insulation layer."

"Suggest increasing the mandatory minimums for Homestar levels 7-10. If it was increased for Level 6 the build cost would increase too much."

"The mandatory minimums should be a combination of compliance with certain requirements as well as minimum number of points. Similar to what has been suggested."

"In some ways I think Homestar 6 and 7 might as well be all mandatory minimums (as per the checklist but without any of the options). This would simplify it at least."

"more in the way of materials and water consumption."

"Yes, but it needs to be really carefully laid out and worded because it can get really confusing. Maybe an eligibility checklist for each star band would be easier for people to understand? Or at least for 6 Homestar?"

"If you do not you have different performance levels for the same star rating=confusion."

"Not yet"

"They do not need to be increased, but elements (like airtightness and ventilation) need to be added to the star levels."

Question 39: We are sure that many of you will have your own ideas about how Homestar could be improved. Please use this section to give us any remaining thoughts.

"Windows R-values is based on a average windows size, refer to NZS 4218:2009 appendix C2. This method is far from being accurate, this should be acknowledged."

"Moisture issue is a serious consideration. If the window composition changes to include a thermally broken frame, without adjusting the insulated glazing to include more thermally efficient glass, this would be an increased risk for condensation on the large area of glass. This would not only be a health issue but would also prevent visibility out the window,

which is its primary purpose. The condensation from the glass could also affect its surrounding framing as it collects and slides down to the sill. Surface area of the glass is much larger part of the building envelope than just the framing. Improved thermal performance of the window and therefore comfort and energy efficiency of the home can be greatly improved by improving glass performance."

"there is tremendous potential in the use of better performing glass products already in use globally towards overall outcomes in NZ homes (health, comfort, energy bills etc.). As the only (or key) transparent material whose desired coverage in homes is only increasing by popular demand, it is important to configure future homes from available energy-efficient glass options (especially Low E glass). The prescriptive need for "thermal break framing" enabling framing with U-Values less than that of all-clear-glass double glazing in homes risks making glass the weak point in windows and consequently the risks of "weeping glass" in homes - an outcome that will not be beneficial for health, durability of adjacent materials, internal comfort and need for clear vision through the glass... apart from lower energy efficiency governed by the much larger area cover by glass relative to area covered by framing."

"There needs to be some reward for those cases that utilise demand-controlled ventilation –when indoor air quality sensors are utilised and heat recovery systems run only when needed. These systems have shown to be considerably more energy efficient than standard systems."

"Total waste should be the focus and not just diversion from landfill. We all know the issues with effective recycling. Minimisation of total waste should be the goal."

"Getting builders to use providers is challenging for sorting, monitoring and reporting of waste. Bigger challenge in regions"

"Definitely there are issues with regions not being able to achieve targets currently, but also the requirement is giving an investment signal to waste contractors that improving their offering is worthwhile – perhaps regional targets could work. I think more flexibility in the points system would be one way to deal with this. Also, if I am reading correctly, it is very prescriptive in terms of the materials that have to be recycled. More flexibility so that points can still be achieved, even if not all materials listed are recycled, would make compliance more realistic."

"Is there anything to indicate the % of waste vs recycling/repurposing of the Homestar project for when/if the building is replaced or demolished in the future? reason being there is so much waste of materials being sent to landfills in the residential sector and this needs to change"

"needs to be more rewards for pre-fab construction"

"I wonder if there is something around providing information/induction/education around what local services are available for waste minimisation – linking in with the waste minimization officers at a Council level."

"building needs to be designed well for collection. Size of waste room can be biggest problem. Large scale townhouses, apartments choosing private recycling rather than Council so areas designed so that Council cannot access bins kerbside. Private collectors will service developments. There is some risk that residents end up paying twice."

"Compost is tricky. In Christchurch, they collect green & food together. In Auckland, not so."

"Home composting is an issue for bio-diversity – attracts rats if not done properly"

"recognise and be align with prominent labels already established in the market such as Declare and ISO 14001. These products offer a more holistic approach to reduce and or warn the market about toxic components like asbestos and lead. They are also gateways to encourage companies to start the journey into the sustainable building space and enable more building better homes. Companies looking at improving their practices can find it off-putting and difficult to navigate the different options and NZGBC offers a good service showing support of the labels that make a contribution, scaling that using the point system. E.g. Declare 0.5 point, ISO 14001 1.0 points, Environmental Choice 2.0 points. It is important this stays in the system."

"EHC-7: Natural Lighting As the physical footprint of homes becomes smaller in some locations due to cost, there has been an increase in the number of terraced/semi attached/ three level homes built. This can result in the reduction of the number of standard vertical windows installed due to common internal walls. Plus, the security/privacy issues. The health benefits of natural daylight are well known and documented. Therefore, Homestar should include the introduction of higher minimum lux levels for habitable spaces. Currently the Building Code (G7) requires habitable spaces to have natural light of no less than 30 lux at floor level for 75% of the standard year, and for transparent openings in certain buildings. This is equivalent to a 3W LED (45W incandescent) This can be achieved by using Tubular daylighting devices as they can be installed in multi- level dwellings by using a service shaft and access panel which are standard."

"I highly recommend simplifying the process of pursuing already approved Innovation points."

"Make the Homestar assessors verifications clearer, for example some ask to check the insulation standards on site, some just want the supplier's invoices, and some just the drawings, the same applies to other categories. This needs to be consistent and made clear to the client before starting the project. It's difficult to collect all this information at the end of the project, maybe NZGBC could create a verification requirement document?"

"In multi-unit dwellings inter-tenancy noise is a real shortfall, need better than code minimum. Best solution a masonry wall, gap and then timber framed wall. Only system which gets built correctly and delivers on good quite homes."

"Calculation Method Transparency - The Homestar performance parameter (e.g. energy) rating methods and details are not disclosed. This opacity is not healthy and undermines the building of trust that this programme is an objective, accurate and balanced process. Calculation method transparency is required in order to reduce "closed-shop" perceptions of Homestar in the marketplace, and to allow the programme to flourish."

"With land, construction, development and compliance costs increasing throughout the country, perhaps a better way of measuring success is to have more homes designed in the mid ranges meaning more benefit to occupants, communities and general population. A design rating is enough, a built rating is not required. More advantageous or bespoke projects with time, customer drive, educated customers etc can and will always reach for the higher ratings. This is also great as they pioneer innovation, education, better

consultants, design and outcomes but also have greater budgets. These projects form a far smaller percentage of the annual build programme in NZ, thus holistic global outcomes don't have the same impact to our 'national sustainability objectives'. We need to target and enable the many and pioneer the few. Homestar needs to recognize and support this far more."

"Is ongoing maintenance requirements of a building (e.g. painting) covered? And what is the lifespan of a building in your calculations?"

"We question the rationale for offering ratings that potentially lock in poor outcomes for people and the planet for the foreseeable future."

"Inclusion of the standards for regulated trades that are cited by but not included in the building code such as electrical and plumbing/gas"

"Homestar needs to re-evaluate are how it balances building typologies (standalone housing, town house, high rise residential), and how these are evaluated in the tool"

"Transport emissions are a huge contributor and, for most households, far exceed any emissions from the operation and amortised construction of their home. Homestar doesn't give much consideration to this, but given the evidence, should homes in central areas have a much easier pathway to getting good star ratings than those in remote car-dependent areas?"

"How to account for smart timers for hot water cylinders, to avoid evening peaks? Same for electric vehicle chargers with timers to avoid peak periods. How to include on-site generated biogas (from a small waste digester)?"

"Should align to Living Standards Framework vs just SDGs"

"Home Control Systems – There is no apparent recognition of the role of control systems for home services functions (including lighting). Lighting controls such as central ICT based systems as well as simple presence sensors have a marked positive impact on energy and carbon performance."