EARTHQUAKE COMMISSION
Kōmihana Rūwhenua

Attn: Submission analysis team
Climate Change Commission
PO Box 24448
Wellington 6142

Dear Climate Change Commissioners,

EQC SUBMISSION ON THE CLIMATE CHANGE COMMISSION'S DRAFT ADVICE

Thank you for the opportunity to comment on '*He Pou a Rangi Climate Change Commission 2021 Draft Advice for Consultation*'.

About the Earthquake Commission Kōmihana Rūwhenua

The Earthquake Commission Kōmihana Rūwhenua (EQC) is a Crown Entity investing in natural hazards research and education, and providing insurance to residential property owners from the impacts of natural hazards.

EQC offers two types of cover:

- Building cover - EQC can repair, replace, relocate, or otherwise compensate for damage to a residential building.
- Land cover - EQC can repair damage to land to enable it to continue to be suitable for residential purposes or pay out to cover the cost of relocation.

EQC covers:

- residential property damage caused by a natural landslip, volcanic eruption, hydrothermal activity, tsunami, or natural disaster fire; and
- damage to land caused by a storm or flood.

The contingent liability associated with natural hazard risk in New Zealand is high, and is carried by EQC on behalf of the Crown. EQC therefore has a crucial role in reducing risk from, and building resilience to, natural hazards and climate change in Aotearoa New Zealand, particularly as extreme changes in weather patterns are likely to increase demand for EQC claims and pay-outs.

EQC is concerned about the impact of climate change on New Zealand and the EQC scheme

It is well documented and accepted that climate change will exacerbate existing hazards, such as flooding, landslides and inundation of land due to rising sea levels[1,2], much of which

[1] https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf
[2] https://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/national-climate-change-risk-assessment-main-report.pdf

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is insured by the EQC scheme. Evidence suggests[3] that with the increasing impact of climate change, insurance is likely to become increasingly less affordable in some locations and may not be available at all in higher risk areas.

Research from Motu[4] shows annual liabilities for the EQC to cover future weather extremes will likely increase between 1.6% and 18.1% as a result of climate change. This will necessitate at least an equivalent increase in premiums collected (and potentially more). The researchers note these figures could be underestimated.

The expected increase in intensity and frequency of extreme weather-related events is likely to translate into higher damages and additional financial liability for the EQC. The percent change between projected and past damages (the climate change signal), rises from 7% and 8% in 2020-40 to an increase of between 9% and 25% in 2080-2100, depending on the Green House Gas (GHG) concentration scenario. Overall, liabilities will increase more if future GHG emissions are higher.

Motu notes that the increase in projected EQC liabilities can also inform private insurers, reinsurers, regulators, and policymakers who are assessing the future performance of both the public and private insurers covering weather-related risks in the face of climate change.

EQC is concerned about the resilience of buildings to natural hazards

EQC's mission is to reduce the impact on people and property when natural disasters occur. This mission is supported by having stronger buildings, that protect lives and wellbeing when faced with natural disasters. Our resilience goal is to inform, enable and influence the choices and decisions that reduce vulnerability and the exposure of New Zealand's built environment to natural hazard events. In simple terms the result we want to see is *stronger homes, built on better land, served by resilient infrastructure, supported by affordable risk capital* [5]. Four objectives support this goal:

- more resilient buildings and infrastructure reduces damage and impacts;
- smarter land use avoids the worst risks;
- sustained access to insurance markets funds effective recovery; and
- reducing New Zealand's vulnerability and exposure to natural hazard events.

The resilience of buildings in a natural disaster is directly related to the payout required from EQC.

EQC feedback on the Climate Change Commission He Pou a Rangi 2021 Draft Advice for consultation

EQC generally supports the Climate Change Commission He Pou a Rangi 2021 Draft Advice for Consultation (Climate Change Commission Advice). It is encouraging that much

[3] https://deepsouthchallenge.co.nz/wp-content/uploads/2021/01/Insurance-Retreat-December-2020-Final-Report.pdf
[4] http://motu-www.motu.org.nz/wpapers/20_02.pdf
[5] https://www.eqc.govt.nz/sites/public_files/documents/grants/EQC%20Resilience%20Strategy%202019.pdf

of the advice is also beneficial for managing natural hazard risk, as well as reducing the impacts of climate change. For example, establishing new native forest on steeper, less productive land will also reduce the risk of landslides and flooding.

The Climate Change Commission Advice is focussed on emissions budgets. For the reasons set out above, EQC agrees that Aotearoa needs to take further steps to align its actions with its targets to reduce emissions. This is needed not only for a cleaner, greener, healthier and more sustainable future, but also for a safer and more resilient New Zealand, to ensure the hazards we will inevitably face are less likely to become disasters that threaten our prosperity and wellbeing.

A holistic approach must be taken to reduce emissions, including considerations over the lifecycle of buildings

Aotearoa New Zealand faces some of the greatest natural hazard risks of any country in the world. Constructing stronger buildings enables buildings to withstand the impacts of natural hazards, such as designing for wind loads, liquefaction (through foundations), earthquakes, tsunami, and flooding. This, in turn, reduces premature demolition and reconstruction following an event, which reduces our collective greenhouse gas emissions.

EQC recommends that parts of the advice more clearly articulate the need to consider emissions reductions holistically. In particular, the Climate Change Commission Advice notes that low-carbon construction is one mechanism to reduce emissions. Reducing building sector emissions will mitigate the effects of climate change and in turn mitigate the impacts on the affordability and availability of insurance. However, the potential increase in emissions of low-carbon construction are not mentioned in the advice. For example, “Timber can displace emissions intensive materials such as steel and cement in buildings. This reduces embodied emissions and can lock up carbon for several decades” (p. 68).

Building materials such as steel and cement enable stronger buildings. EQC supports the use of, and is actively funding research on the development of, greener construction materials and techniques. However, at present, equivalents to steel and cement remain rare.

Reducing the use of steel and cement in the construction process, before viable alternatives are available, will compromise the strength of buildings. This will not only result in greater risk to our communities, but also in an increase in greenhouse gas emissions if buildings need to be replaced due to reduced structural integrity from a natural hazard event.

EQC requests that the Climate Change Commission Advice notes that the replacement of emission-intensive materials such as steel and cement in buildings should not be at the expense of resilience. Failing to construct strong buildings in Aotearoa will result in earlier building demolition and reconstruction (similar to that seen in Wellington after the 2016 Kaikōura-Hurunui earthquake), which will result in higher greenhouse gas emissions than the inclusion of emission-intensive materials during original construction.

Increasing the carbon footprint at construction can increase resilience and decrease the total carbon impact

Small changes in building elements can provide significantly greater resilience and reduce damage in a natural hazard event. These can involve the building having a slightly greater carbon footprint at construction, which may come from using increased amounts of materials such as steel and concrete.

It is important to get the right balance between these competing priorities. For example, research in the United States indicates that adding 10% to the steel content of a commercial building can add about 50% to the seismic load carrying capacity of a building, yet only adds 1% to the cost of the building[6]. This additional steel will increase the carbon footprint of the building but will also improve its resilience.

Increased resilience to natural hazards, through adding a small embodied carbon cost at the design and construction stage of a building, provides a substantial reduction in potential life cycle embodied carbon costs in high hazard countries such as New Zealand, by avoiding wide scale but periodic demolition and replacement impacts.

Case study from the Canterbury earthquake sequence

The Canterbury earthquake sequence provides a case study of the carbon impact from reconstructing after a natural hazard event. In March 2011, the government indicated about 10,000 earthquake-damaged homes would need to be rebuilt[7]. These homes were replaced. In the seven years to September 2017, 36,431 new homes were consented in Canterbury. This was up more than 10,000 when compared with the seven years pre-earthquakes, when 25,913 homes were consented[8].

Further, 1,240 commercial buildings were demolished within the central city[9], to be replaced by an estimated 900[10] new commercial buildings in the central business district.

We note additional buildings were demolished, including university and hospital buildings, commercial and industrial buildings outside the central city, and churches. These buildings generated additional carbon cost, as did demolished infrastructure such as roads and bridges.

A standalone house with a floor area of 200m^2 has embodied carbon of approximately 63 tonnes carbon dioxide equivalent over its 90-year life.[11] Technical advice indicates 55% of this carbon is embodied at construction, 5% at end of life (waste), and 40% through maintenance throughout the life of the building.

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6 https://cdn.ymaws.com/www.nibs.org/resource/resmgr/mmc/mmc_workingpaper_porter.pdf
7 https://www.beehive.govt.nz/release/around-10000-houses-will-need-be-rebuilt
8 https://www.stats.govt.nz/assets/Reports/Canterbury-the-rebuild-by-the-numbers/Canterbury-the-rebuild-by-the-numbers.pdf
9 http://www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/66290638/1240-central-christchurch-buildings-demolished
10 https://www.buildmagazine.org.nz/assets/PDF/Build126-34-Christchurch-Rebuild.pdf
11 http://www.level.org.nz/material-use/embodied-energy/

A non-residential building with a floor area of 900m^2 has embodied carbon of approximately 450 tonnes carbon dioxide equivalent[12]. Larger buildings may embody up to five times this amount. 91% of this carbon is embodied at construction, 4% at end of life (waste), and 5% through maintenance throughout the life of the building.

The carbon cost of the Canterbury earthquakes includes:

- embodied carbon “forgone” as the lifetime of buildings was drastically reduced. For example, if a building was built in 2000 with a 90-year life span but demolished in 2010 after the first earthquake, 80 years of embodied carbon is effectively wasted. Or, to put it differently, 90 years of embodied carbon at the construction phase was effectively invested for only 10 years of benefits.
- The operational emissions involved in demolition. For example, fuel burned in the operation of heavy machinery.
- The cost of rebuilding the new buildings.
- The carbon embodied in maintenance throughout the lifetime of the new buildings.

Based on these numbers, the rebuild of greater Christchurch may have generated well over 1 million tonnes of carbon dioxide equivalent, comprising:

- 630,000 tonnes carbon dioxide equivalent from the rebuild of 10,000 houses.
- 405,000 tonnes carbon dioxide equivalent from the rebuild of 900 commercial buildings.
- More carbon dioxide equivalent for the other buildings and infrastructure not covered in the previous two dot points.
- The other costs noted above.

We would support a scheme design that reduces carbon emissions as much as practicable without having a negative impact on resilience. Assurance needs to be provided that efforts to minimise carbon emissions by restricting the footprint of a building does not have a negative impact on resilience and potentially lead to greater carbon emissions if buildings need to be demolished and rebuilt.

General comments on EQC’s role in relation to climate change

As set out above, EQC has a direct interest in climate change given that it will exacerbate and increase the frequency of natural hazard events. This accords with the finding of the Report of the Public Inquiry into the Earthquake Commission[13]: “There are broad and widely validated scientific data that indicate the frequency and severity of certain natural disasters is increasing and will continue to increase in the years to come, as the effects of climate change are felt.”

EQC is similarly keen to be involved in discussions about climate change across government and can provide insights from its distinct niche. EQC has useful data on land stability and is already working with other agencies to influence decisions on land use planning.

[12] https://www.nzgbc.org.nz/KNOWLEDGEHUB/Attachment?Action=Download&Attachment_id=2437
[13] https://eqcinquiry.govt.nz/assets/Inquiry-Reports/Report-of-the-Public-Inquiry-into-EQC.pdf

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Comments on timing and alignment with other work

We acknowledge work is underway to update the National Seismic Hazard Model, as well as preliminary work on any consequent changes required to building standards and performance expectations. These are obviously closely related to this draft advice and we trust these initiatives will be integrated together at an appropriate time.

Comments from the University of Auckland

EQC encourages the Climate Change Commission to engage with Professor Ken Elwood at the Department of Civil and Environmental Engineering at the University of Auckland. Professor Elwood and colleagues encourage a carbon cap that encompasses the entire life cycle of a building, rather than separate caps for operational and embodied emissions. They do not believe operational and embodied emissions are always easy to separate. For example, concrete shear walls may contribute to the thermal mass of the building which will reduce heating, ventilation and air conditioning and operational demands.

Summary

- EQC generally supports the Climate Change Commission He Pou a Rangi 2021 Draft Advice for Consultation (Climate Change Commission Advice).
- Reducing emissions will mitigate the effects of climate change and in turn mitigate the impacts on the affordability and availability of natural hazard insurance.
- EQC recommends that parts of the advice more clearly articulate the need to consider emissions reductions holistically.
- EQC requests that the Climate Change Commission Advice notes that the replacement of emission-intensive materials such as steel and cement in buildings should not be at the expense of resilience.
- EQC encourages the Climate Change Commission to engage with Professor Ken Elwood and colleagues at the Department of Civil and Environmental Engineering at the University of Auckland, to discuss the development of a carbon cap for building sector emissions that encompasses the entire life cycle of buildings.

EQC would be happy to discuss any of the above submission. Please feel free to contact me at the address below.

With kind regards,

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