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3 June 2015

Climate Change Contribution Consultation  
Ministry for the Environment

**Submission: Government's consultation on setting New Zealand's post-2020 climate change target**

OraTaiao: NZ Climate & Health Council thanks the Ministry for the Environment for the opportunity to submit on the post-2020 climate change discussion document.

OraTaiao: The New Zealand Climate and Health Council (OraTaiao, The Council) is an incorporated society of over 300 health professional members who understand that climate change is fundamentally a threat to human wellbeing and are concerned by this, but also understand that well-designed action can bring benefits to health and fairness.. Within its membership, OraTaiao has some of the world's leading climate-health experts, and is consolidating linkages with health bodies and other climate-health organisations in New Zealand and internationally.

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We would like to make an oral submission if this opportunity arises.

**Attachments:**

- 1. Appendix: Supporting arguments**
- 2. Bennett et al. NZMJ 2014**

**Summary of recommendations**

In summary, climate action protects and can improve our health. The [government's INDC discussion document](#) frames climate action as costly – ignoring the greater costs of climate inaction and the real gains to our health and economy by taking action now. We know that New Zealand can gain from being part of the global solution.

We therefore ask that the Intended Nationally Determined Contribution (INDC)

1. includes health and fairness in the assessment of costs and benefits
2. commits to a global zero carbon target by 2050 - with NZ gazetting this zero carbon target now to replace our current 2050 target, and setting annual steps from 2015 to get there well before 2050 and stay within the overall global carbon budget

3. pledges at least 40% cuts by 2030 in our gross domestic greenhouse gas emissions compared with 1990, towards at least 95% by 2050
4. places an immediate moratorium on fossil fuel exploration, and pledges to phase out existing extraction in the next decade
5. includes credible cross-party plans in the INDC, with a legislated independent Climate Commission to ensure NZ meets its targets and stays within the global carbon budget
6. protect health in the climate-vulnerable Pacific region from the preventable impacts of climate change

In addition, the Council calls **for adequately resourced, transparent, evidence-based consultation with NZ civil society over the next three months on NZ's final contribution to the global agreement on timely climate action.** We consider this INDC consultation with NZ civil society as totally inadequate on timeframe, publicity and misleading non-transparent information grounds. Consequently, the Council has concluded that this can only be the start of consultation on what NZ's climate contribution will be and we call for adequately resourced, transparent, evidence-based consultation with New Zealanders over the next three months. The future health and well-being of New Zealanders demands no less.

Health and wellbeing need to be at the heart of cross-party climate policy. From a health perspective we also call for the following actions to contribute both to the development of New Zealand's INDC and further climate change policy:

1. Commitment by the Minister of Health to attend the International Climate and Health Summit (which is planned alongside the Paris climate negotiations in December);
2. A Parliamentary climate change and health summit;
3. Health sector leadership on mitigation and adaptation to locked-in climate impacts on health;
4. Involvement of public health expertise in climate mitigation policy development to maximise opportunities for health and fairness and minimise negative unintended consequences;
5. Health (including equity) Impact Assessment (HIA) used routinely to inform key climate-relevant policies.

## OraTaiao submission

The Council agrees that that climate change is a serious, potentially catastrophic emerging risk to public health, sustainable development and equity. Health equity is one of OraTaiao's core values, and so the Council supports approaches that explicitly incorporate fairness. Our stance on the setting of greenhouse gas emissions reductions targets is that New Zealand needs to rapidly reduce its greenhouse gas (GHG) emissions - substantially more than its targets in international commitments to date.

This submission is structured as follows:

- Comments on the consultation process
- Climate change as an issue affecting the whole of government
- Responses to the Ministry for the Environment's consultation questions
- Further detail and arguments in support of this submission are provided as an appendix.

## Comments on the process

The Council is deeply disappointed at the failure to meaningfully consult with New Zealand's civil society over our contribution to the international climate agreement. The requirement to submit New Zealand's contribution (preferably by March 2015) has been known by the New Zealand government since November 2013, yet public consultation was announced via email on 7 May 2015 with 12 days of 12 NZ-wide public meetings starting a week later, and public submissions closing in just 18 working days on 3 June. Meeting venues were added - and changed with just hours' notice as public interest (despite no public advertisement) has been much greater than expected. Ministers with relevant portfolios have been conspicuously absent from all public meetings, leaving government officials to defend political decisions.

The official discussion document is deliberately misleading to the public, providing only partial information on the implications of climate change and our policy capability, and omitting the benefits of action and costs of inaction.

It is difficult to see how this process can be described as 'public consultation' - especially when compared with a whole year and millions of dollars of publicity allocated to the current consultation over NZ's flag. The late release of information by the Ministry, and the modelling itself, so late into consultation, questions the credibility of the consultation itself - with inadequate consultation material, hence public discourse that is uninformed, which the government may easily dismiss. It is also difficult to see how NZ will be able to meet the international obligation to furnish a contribution that is transparent, given the failure to date to share assumptions and methodological approaches with the NZ public.

The Council considers this token consultation is symptomatic of the wider government failure to acknowledge the well-established scientific evidence of human-caused climate changes and the implications for New Zealand's adaptation, and to take a [whole-of-government and whole-of-society approach](#) that maximises the opportunities for New Zealand's equitable transition to a zero emissions future.

**We call for adequately resourced, transparent, evidence-based consultation with NZ civil society:** The Council considers this INDC consultation with NZ civil society as totally inadequate on timeframe, publicity and misleading non-transparent information grounds. Consequently, we have concluded that this can only be the start of consultation on what NZ's climate contribution will be and we call for adequately resourced, transparent, evidence-based consultation with New Zealanders over at least the next three months. The future health and well-being of New Zealanders demands no less.

### **Climate change affects all aspects of humanity and government**

The discussion document has been released by the Ministry for the Environment. This continues the government's pernicious framing of climate change as a fringe environmental problem. Although the discussion document identifies climate change as a serious global threat, including identifying some of the impacts on New Zealand in the short to medium term, the document also implies that New Zealand will somehow be insulated from the global societal and economic impacts ("we are likely to be better off than many other countries") and therefore fails to come clean about the larger significant indirect implications for New Zealand (such as rising food prices, Pacific migration, diminished demand from trading partners, and potentially increasing global unrest related to resource scarcity).

Furthermore, the document clearly aims to persuade the reader that action on climate change will incur significant economic cost and that New Zealand's greenhouse gas emissions are too difficult to deal with. The economic modelling undertaken is biased towards finding the costs by failing to calculate benefits from timely climate action and relying on economic analysis that excludes forestry and agricultural sectors, assumes no behavioural, regulatory or technological change within NZ, and assumes that NZ will only meet obligations by purchasing international emissions credits. By framing action as an economic debate, underpinning values and ethics by which decisions might be made are entirely absent from the document. Finally, the discussion document frames targets for greenhouse gas emissions reductions as politically negotiable. We respond to these issues of framing one-by-one below.

It is clear from the international and national science that climate change is not an "environmental" problem. Rather it poses a serious threat to human well-being, social stability and the economy in New Zealand, as well as globally. As a small open economy with environment-dependent export sectors, unabated climate changes pose huge risks for New Zealanders' jobs and overall well-being - from the impact of more frequent droughts and flooding, to ocean acidification threatening fisheries, to our trading partners' capacity to buy ultimately non-essential products such as milk powder and tourism. These threats are becoming increasingly salient to the majority of New Zealanders, about 87% of whom are at least somewhat concerned about the effects of climate change on society in general<sup>1</sup>.

The global carbon budget, from which emissions reduction targets for developing countries are derived, is determined by the Earth's physics, indifferent to humanity, and is not

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<sup>1</sup> [http://www.motu.org.nz/news-media/detail/majority\\_of\\_new\\_zealanders\\_are\\_concerned\\_about\\_climate\\_change\\_and\\_taking\\_ac](http://www.motu.org.nz/news-media/detail/majority_of_new_zealanders_are_concerned_about_climate_change_and_taking_ac)

politically negotiable<sup>2</sup>. A global average temperature rise of about 2 degrees centigrade will devastate human society for generations already alive, and those to come after<sup>3</sup>. Keeping to less than 2 degrees of average temperature increase requires all developed countries to meet a zero carbon target before 2050, as well as reducing significantly other potent but shorter acting greenhouse gases, including agricultural methane and nitrogen dioxide. These, therefore, are not points for political negotiation.

The government needs to make clear in its framing that the targets are therefore a given, and steer the public debate towards the combined science and values based discussion about interim steps, policies to reach the targets and how we might fairly distribute the costs and benefits of a transition to a zero carbon society with significantly reduced other greenhouse gas emissions.

The Council is seriously concerned to learn, from the Ministry's public meetings, that neither the health gains ('mitigation co-benefits') from well-designed climate action, nor the health costs from climate changes, have been included in the economic analysis of the costs of New Zealand's climate action. The government's INDC needs to express to the public how climate action will protect human health and wellbeing, as well as summarise the currently available evidence for emissions reduction policies that provide health and social co-benefits in the short and medium term.

Scenarios for the costs of inaction on climate change can be modelled with as much validity as the economic modelling used to underpin the discussion document. Variable levels of information do not excuse presenting only the costs of action, without attempting to outline the benefits. The discussion document could have easily undertaken scenario analyses rudimentary in any public policy setting, examining a matrix of four scenarios - (i) neither the world nor NZ takes adequate climate action, (ii) the world doesn't act/NZ does, (iii) the world acts/NZ acts, and (iv) the world acts/ NZ doesn't.

Global scenarios for different levels of action are readily available from the IPCC without needing to know what actions the rest of the world is taking. These can be combined with (at a bare minimum) the likely cost implications of direct impacts such as increased probabilities of droughts, bush fires, flooding, sea level rise and extreme weather events. The government has already made such estimates for single events such as the 2008 drought, which cost almost \$3 billion (<http://www.beehive.govt.nz/release/drought-costs-nz-28-billion>). Consistent with [Treasury CBA guidance](#), it is better to manage uncertainty – being explicit about precision and uncertainty – than discard major factors and destroy the model's construct validity.

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<sup>2</sup> IPCC. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge, UK: 2013.

<sup>3</sup> McCoy D, Montgomery H, Arulkumaran S, Godlee F. Climate change and human survival, 2014 11:58:40. Hansen J, Kharecha P, Sato M, Masson-Delmotte V, Ackerman F, Beerling DJ, et al. Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature. PLoS ONE. 2013;8(12):e81648. <http://dx.doi.org/10.1371/journal.pone.0081648>

The discussion document is silent on the direct and indirect implications of climate change on health in New Zealand, despite good evidence for likely impacts<sup>4</sup>. Likewise, there is an absence of consideration of the potential co-benefits of well-designed mitigation policies. The Ministry for the Environment's description on their website of [the health impacts of climate change in NZ](#) as 'more heat stress counterbalanced by fewer colds and flu in winter' is specious, misleading and ignores extensive literature on health impacts, health equity implications and potential climate action co-benefits in New Zealand. New Zealand based assessments, including monetary cost-benefit analyses, have already been published for inclusion in the public debate. These are described in more detail below above, under the heading *Important and likely opportunities*.

### A healthy post-2020 climate change target

The Council's responses to the [Ministry for the Environment's consultation](#) and its questions, in brief, as follows:

#### Questions 1a and 1b: Objectives for the contribution

We urge the government to re-word and prioritise the proposed objectives for the INDC as follows:

**1. It must guide New Zealand's rapid transition to a zero emission economy and society**

Real steps need to begin, starting this year, so that New Zealand's carbon emissions peak and begin reducing within this government's term. Regardless of what happens in Paris, the world faces a limited carbon budget so New Zealand must future-proof our economy by taking steps now to rapidly and fairly decarbonise towards a zero carbon future - and ultimately zero total emissions. Our INDC must include all-sector actions that centralise health and fairness, build on our clean energy strengths, improve housing and transform transport, resulting in a resilient, fair and healthy zero carbon economy and society by 2050. Agricultural greenhouse pollutants must also reduce now through agricultural diversification and widespread adoption of current best farming practice, followed by ongoing reductions through technological developments.

**2. It is a fair and ambitious contribution that meets our globally assessed responsibilities**

Secondly, NZ's contribution must be fair, ambitious, credible and sufficient – most importantly as an **international citizen** helping stay within the safe global carbon dioxide emissions budget. NZ's economy relies on world climate cooperation. We are also influential. Our contribution must therefore be convincing and not discourage stronger commitments by other nations.

**3. Costs and benefits need to be distributed fairly within New Zealand and between countries**

Healthy people depend on a healthy climate – we can't afford **not** to take real climate action. Ambitious climate action is the best investment in our future health, wellbeing and resilience as a nation. The costs of climate change are much greater than the costs of responsible action – and climate change will affect our most vulnerable households the most. The important health gains ('mitigation co-benefits') from climate action must be included in the calculations. We need to share the costs and benefits of action fairly, both between countries and within New Zealand.

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<sup>4</sup> Bennett H, Jones R, Keating G, Woodward A, Hales S, Metcalfe S. Health and equity impacts of climate change in Aotearoa-New Zealand, and health gains from climate action. The New Zealand Medical Journal (Online). 2014;127(1406):16-31.

## Question 2: What would be a fair contribution for New Zealand

Current and future human health and wellbeing depends upon not exceeding our global carbon budget. We need to call for a global zero **carbon** target by 2050 – and NZ needs to demonstrate the annual, credible steps needed from 2015 to reach this target well before 2050. Further, we need to keep up with other wealthy nations in pledging at least 40% cuts in our **gross domestic greenhouse gas emissions** compared with 1990 emissions, by 2030, towards at least 95% by 2050.

Given the lack of transparency around the analysis in the discussion document and the likelihood that contributions to date will be insufficient to secure a ‘safe’ level of climate changes, NZ must be open to the possibility of a more ambitious target to play its part in global climate action. In any case, given the uneven trajectory of NZ’s future emissions with forest harvesting, the overall priority is to not expend our share of the global carbon budget over the next thirty-five years.

Importantly, the world has five times the amount of fossil fuels in reserve as we can afford to burn<sup>5</sup>. We need to immediately commit to zero new fossil fuel exploration and phase out existing extraction in the next decade.

To be successful, our INDC needs to commit to the cross-party agreement and national policies needed to achieve these targets.

## Questions 3 and 4: How will our contribution affect New Zealanders

### ***What level of cost is appropriate?***

The Council challenges the premise of this question. The economic modelling in the discussion document is flawed where the costs of inaction and the benefits have not been factored in. The costs of climate inaction far exceed the costs of taking action and we need to account for this in climate calculations. The sooner we act, the more likely we will see overall gains not costs. Encouragingly, we can significantly improve short- and medium-term health and equity (‘mitigation co-benefits’) – especially by shifting from cars to active and public transport; better housing energy efficiency; climate-friendly home heating; reducing red meat and dairy intake; phasing out coal and lignite mining. NZ must include these co-benefits when calculating costs and benefits of action. A fair transition means policy designed to especially support changes by vulnerable households.

### ***Important & likely opportunities?***

The document focuses heavily on agriculture, but half of our emissions are long-lived carbon dioxide from transport, housing and other energy use which have to rapidly reduce to zero. We already have the technology and policy ideas to reduce these emissions - what is needed now is the cross-party political will to put them in place.

**Transport:** Significant reductions in transport emissions do not require new technology, rather re-balancing transport investment. Shifting investment from new motorways to infrastructure and supportive policies that make walking and cycling safe, convenient and attractive should be a first priority. Cost-benefit analyses for investment in cycling

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<sup>5</sup> Hansen J, Kharecha P, Sato M, Masson-Delmotte V, Ackerman F, Beerling DJ, et al. Assessing “Dangerous Climate Change”: Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature. PLoS ONE. 2013;8(12):e81648. <http://dx.doi.org/10.1371/journal.pone.0081648>

infrastructure suggests that every dollar spent on best practice urban infrastructure can bring tens of dollars in benefit for health and the climate<sup>6</sup>.

Investment in low-carbon public transport (e.g. electric trains, light rail and buses) accompanied by progressive planning and policies can also bring significant social, health and economic benefit through improved equitable access to education and employment for low income households (reducing long-term unemployment); increasing physical activity; reducing road traffic injury; and improving air quality. Transport policy-makers are already able to provide monetary values for many of these health and social benefits<sup>7</sup>.

Shifting heavy freight from trucking to electric rail and low-carbon coastal shipping would also bring health co-benefits that can be estimated and monetised, using New Zealand's existing Vehicle Emissions Prediction Model. Benefits of shifting freight off trucks that can be assessed and monetised include improvements in air quality and reductions in road traffic injury. Encouragement of the uptake of electric vehicles and other new vehicle technologies (including for freight) can then be used to address the vehicle trips that are not able to be transferred to healthier, more climate-friendly modes.

**Housing:** The Warm Up evaluation studies in 2011 and 2012 demonstrated health co-benefits of insulation and clean, energy-efficient household heating of between 3.6 and 4 dollars return for every dollar spent<sup>8</sup>. These analyses were limited to mortality savings and hospitalizations from a limited number of conditions. Cost-benefit estimates are therefore conservative.

**Agriculture:** We will also need to reduce our economic reliance on ruminant livestock farming. Rebalancing the diversity of our agricultural economy is vital for resilience in the face of climate changes and fluctuating global demand with dairy price volatility, as well reducing climate-damaging emissions. There is also an urgent need for rapid plantation planting on marginal land to mitigate the financial fall-out from harvesting during the 2020s.

Although dairy emissions intensity per litre appears to be gradually dropping, any positive change is overwhelmed by increasing dairy farming. There is much in the sector that unnecessarily increases emissions (or supports emission increases) and undermines NZ's clean green identity - including coal-powered milk treatment (such as the new Darfield plant), 'land-farming' fracking waste-products, importing palm kernel and applying nitrogenous fertilisers at exponentially increasing rates, and failing to fence all animals away from waterways.

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<sup>6</sup> Macmillan A, Connor J, Witten K, Kearns A, Rees D, Woodward A. The Societal Costs and Benefits of Commuter Bicycling: Simulating the Effects of Specific Policies Using System Dynamics Modeling Environmental Health Perspectives. 2014;122(4).

Lindsay G, Macmillan A, Woodward A. Moving urban trips from cars to bicycles: impact on health and emissions. Australian and New Zealand Journal of Public Health. 2011;35(1):54-60.

<sup>7</sup> NZTA 2013 Economic Evaluation Manual page 2-8 <http://nzta.govt.nz/resources/economic-evaluation-manual/economic-evaluation-manual/docs/eem-manual.pdf>

<sup>8</sup> Howden-Chapman, P., & Preval, N. (2014). Cobenefits of insulating houses: Research evidence and policy implications. In R. Cooper, E. Burton & C. L. Cooper (Eds.), *Wellbeing: A complete reference guide (Vol. II): Wellbeing and the Environment*. (pp. 607-625). Wiley-Blackwell. doi: 10.1002/9781118539415



Taking immediate steps to change the intensity of dairy farming has the potential to significantly reduce agricultural emissions, and improve profits and working lives of farmers. Intensive dairy farming means higher input costs including more regrassing, more herd replacement, more veterinary costs, more fertiliser use, more supplementary feed and more farming labour. Although less intensive dairy farming reduces outputs, because less inputs are needed, this has the potential to be easier and more profitable for farmers. There's also a strong argument for more resilient farming practices for climate resilience.

NZ needs a healthy climate partnership with the farming sector as the export backbone that funds the health sector. Current best practice needs to become universal now - to easily reduce emissions and to ensure that future technological breakthroughs are adopted quickly, and to help farming manage climate changes. Furthermore, we understand that three-quarters of future NZ emission growth will be from agriculture. This year NZ needs to agree immediate steps to reduce all three gases in the agricultural sector - including nitrous oxide which, like carbon dioxide, is dangerously long-lived.

**Fossil Fuel Extraction:** Low carbon energy generation and rapid phase-out of fossil fuel extraction needs to happen in a planned and managed way, described as a 'just transition' where sustainable clean energy, low carbon jobs are created. When supportive, resilience-based planning occurs with communities, there is emerging evidence that long-term social benefits accrue from moving away from a "boom-and-bust" economy to more sources of income that can be sustained over time. In the shorter-term, the health harms of fossil fuel extraction are immediately removed. These include direct occupational hazards and harms as well as community-wide impacts on air and water quality. Again, these harms are already able to be measured, modelled and monetised<sup>9</sup>.

*"Many people argue that we must continue to open new coal mines because of the social and economic benefits the jobs bring. That argument places limited short term jobs ahead of the long term detrimental climatic effects of digging up and burning more coal. It also overlooks the social disruption that results from coal mining's boom and bust economy. The boom and bust nature of coal mining delivers social disruption to their communities."<sup>10</sup>*

#### Question 5: Summary

##### **Taking into account future uncertainties of technologies and costs in setting a target?**

The precautionary principle and the level of evidence already available, compel us to act now. Risks of further delay are very high, while we have reasonably good certainty about potential short to medium term gains of well-designed emissions reductions policies. We need government to give clear, strong, consistent signals to spur both behaviour change and rapid technological development. More than technology, we need bold leadership.

The fact that the economic modelling in the discussion document assumes no technological changes leads to exaggerating the estimated costs of action and means any proposed action

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<sup>9</sup> Epstein PR, Buonocore JJ, Eckerle K, Hendryx M, Stout III BM, Heinberg R, et al. Full cost accounting for the life cycle of coal. *Annals of the New York Academy of Sciences*. 2011;1219(1):73-98. <http://dx.doi.org/10.1111/j.1749-6632.2010.05890.x>

<sup>10</sup> Baxter C, Campbell J, Eyre, R, et al. Jobs after Coal. A just transition for New Zealand Communities. 2015 [https://coalactionnetworkaotearoa.files.wordpress.com/2015/05/jac\\_2015\\_final-low-res2.pdf](https://coalactionnetworkaotearoa.files.wordpress.com/2015/05/jac_2015_final-low-res2.pdf)

will be less ambitious than it should be. We are in a period of rapid technological transition, where, for example, renewable energy is vastly more effective and more affordable than it was even five years ago. So any “future uncertainties of technologies and costs” are only uncertain in magnitude - what is clear is that technological change will make future emissions reductions substantially easier and cheaper than they currently are. An assumption of ‘no technological change’ makes no sense and biases suggested action towards the status quo. However, regardless of the opportunities that new technology may bring, there are actions already available to us - as outlined above under “Important & likely opportunities” - that can reduce emissions, improve health and create economic benefits. These are actions that NZ should be taking right now.

#### **Question 6: Other comments**

##### ***Further information for our government to consider?***

**Human health and wellbeing need to be at the heart of cross-party climate policy.** From a health perspective we also call for the following actions to contribute both to the development of New Zealand’s INDC and further climate change policy:

1. Commitment by the Minister of Health to attend the International Climate and Health Summit (which is planned alongside the Paris climate negotiations in December);
2. A Parliamentary climate change and health summit;
3. Health sector leadership on mitigation and adaptation to locked-in climate impacts on health;
4. Involvement of public health expertise in climate mitigation policy development to maximise opportunities for health and fairness and minimise negative unintended consequences;
5. Health (including equity) Impact Assessment (HIA) used routinely to inform key climate-relevant policies.

**Further detail and arguments in support of this submission are available in the attached appendix and New Zealand Medical Journal article.**

## SPECIAL ARTICLE

## Health and equity impacts of climate change in Aotearoa-New Zealand, and health gains from climate action

Hayley Bennett, Rhys Jones, Gay Keating, Alistair Woodward, Simon Hales, Scott Metcalfe

### Abstract

Human-caused climate change poses an increasingly serious and urgent threat to health and health equity. Under all the climate projections reported in the recent Intergovernmental Panel on Climate Change assessment, New Zealand will experience direct impacts, biologically mediated impacts, and socially mediated impacts on health. These will disproportionately affect populations that already experience disadvantage and poorer health.

Without rapid global action to reduce greenhouse gas emissions (particularly from fossil fuels), the world will breach its carbon budget and may experience high levels of warming (land temperatures on average 4–7°C higher by 2100). This level of climate change would threaten the habitability of some parts of the world because of extreme weather, limits on working outdoors, and severely reduced food production.

However, well-planned action to reduce greenhouse gas emissions could bring about substantial benefits to health, and help New Zealand tackle its costly burden of health inequity and chronic disease.

Human-caused climate change is a serious and increasingly urgent threat to human health and wellbeing.<sup>1–5</sup> Climate change will cause higher temperatures, extreme weather such as heatwaves, heavy rainfall events and/or drought, intense tropical storms and sea-level rise. It is projected that rising levels of carbon dioxide (CO<sub>2</sub>) in the atmosphere will increase the acidity of the oceans by 150–200% by 2100. These changes result in many risks to human health that are recognised by world health and science authorities, New Zealand health bodies, and leading medical journals alike.<sup>2–11</sup>

Globally and in New Zealand, leading health threats include high temperatures and extreme events (direct impacts), changing patterns of infectious diseases and water/food shortages or price changes (biologically mediated impacts), and risks related to economic change, loss of livelihoods and forced migration (socially mediated impacts).<sup>3,12–16</sup>

Without rapid global action to reduce greenhouse gas emissions (particularly from fossil fuels), the world will breach its carbon budget and may experience high levels of warming (4–7°C or higher by 2100).<sup>1,6,17,18</sup> At such levels of warming the Intergovernmental Panel on Climate Change (IPCC) warns that normal human activities (e.g. growing food, working outdoors) will be increasingly compromised in some parts of the world during parts of the year; there will be large risks to global and regional food security; and higher risk of crossing ‘tipping points’ (thresholds for abrupt and irreversible change) in the earth and interlinked human systems.<sup>6</sup>

However, if well-planned action to reduce greenhouse gas (GHG) emissions were undertaken globally and in New Zealand, there could be substantial positive impacts not only for limiting future climate change, but also for health, equity, and wellbeing.<sup>2–4,19</sup>

This paper reflects the recent Fifth Assessment Report of the IPCC (AR5), and the increased urgency indicated for action to avoid worsening human health impacts from climate change. It also updates both Metcalfe et al’s Special Article on climate change and health in the *Journal* in 2009,<sup>12</sup> and Phipps et al’s paper on the climate change challenge for General Practice in New Zealand in the *Journal* in 2011.<sup>13</sup>

## Global health impact of climate change

Climate change is already contributing to global disease, disability and premature death—most seriously affecting people in poor countries, and the most disadvantaged and vulnerable within all countries.<sup>2,6,7,20</sup>

By the 2050s, the projected health impacts are extensive (summarised in Box 1).<sup>2</sup> Levels of risk will be influenced by population vulnerability (population health status, age, gender, health infrastructure) as well as the degree of social and economic development within populations during this timeframe.<sup>2</sup>

### Box 1. Expected global health impacts with projected climate change to 2050<sup>2</sup>

Health Impact	IPCC Level of Confidence*
Higher risk of injury, disease and death from more intense heat waves and fires	Very high confidence
Higher risk of food- and water-borne diseases	Very high confidence
Higher risk of under-nutrition from lower food production in poor regions	High confidence
Health impacts related to lost work capacity/lower labour productivity in vulnerable populations	High confidence
Higher risk of vector-borne diseases in some areas	Medium confidence
Modest improvements in cold-related mortality and morbidity in some areas	Low confidence
Reduced capacity of disease-carrying vectors (from exceedance of thermal thresholds) in some areas	Medium confidence

\* Confidence: IPCC qualitative assessment of evidence (type, amount, quality, consistency) and the agreement of evidence.

Box 1 includes some possible health gains from climate change (e.g. reduction in cold-related morbidity and mortality), but the IPCC has concluded that any positive effects from climate change will be outweighed globally by negative effects.<sup>2,3</sup>

It is important to note that many climate-health risk assessments to date remain conservative (based on lower-range warming scenarios of around 2°C) and consider relatively near-future timeframes (e.g. by 2030 or 2050).<sup>20</sup> However it is becoming increasingly likely that higher levels of warming may occur by 2100.<sup>1,2,17,18</sup> This would lead to environmental conditions (e.g. periods of extreme high temperatures; inability to raise food crops) that threaten human health and wellbeing in large parts of the world.<sup>2,21</sup> Under such scenarios, resources would become scarce and populations may be forced to migrate to other regions, creating risk factors for violence and conflict.<sup>2,22</sup>

## Health impacts of climate change in Aotearoa-New Zealand

New Zealand is already experiencing climate change, and more change is expected.<sup>23</sup> According to the projections reported in the AR5, New Zealand will continue to warm over coming decades, and will be wetter in the west and drier in the east and north. Heavier and more frequent extreme rainfalls are expected (with increased flood risk), along with more drought, the duration of drought in the north and east is projected to at least double by 2040.<sup>16,23,24</sup>

There is expected to be more extreme heat (up to 60 more days >25°C in the north by 2090), with increased wild-fire risk. Some of these trends (e.g. increases in heavy precipitation) have already been observed.<sup>16,23,24</sup>

**Table 1. Expected health impacts of climate change in New Zealand**

<b>Food security and nutrition:</b> Increased global food prices, affecting a large number of locally produced and imported food staples in New Zealand, are likely to reduce the ability of some groups to afford a variety of nutritious foods, further compromising nutritional outcomes for those groups. <sup>2,30-32</sup>
<b>Mental health and suicide:</b> Increased stress and mental health issues (e.g. farmers with drought, victims of extreme weather). Young people may suffer anxieties about catastrophic climate change, not unlike those experienced by children growing up with the fear of nuclear war. <sup>2,33-36</sup>
<b>Housing and health:</b> Healthiness of some housing will be affected by extreme weather, for example, indoor moisture (with heavy rainfall, flooding), high indoor temperatures (during heatwaves in poorly insulated houses). <sup>37</sup> It is also likely that people will arrive in New Zealand from climate-change affected areas. This may put further pressure on availability of low income-larger family homes, potentially impacting household overcrowding and the incidence of some infectious diseases. <sup>14,38,39</sup>
<b>Injury and illness from extreme weather events (e.g. flooding, storms, landslides, storm surges, drought):</b> Immediate trauma, and indirect health impacts in weeks to months after extreme events (e.g. mental health problems, exacerbation of pre-existing medical conditions). <sup>2,40-42</sup>
<b>Heat-related deaths and illness:</b> Increases in heat-related deaths and illness, particularly for those with chronic illness and those aged over 65 years. Heat stress for outdoor workers. Winter deaths may decline, but this is uncertain as winter deaths may be influenced by seasonal factors that are unrelated to climate. <sup>2,43-50</sup>
<b>Vector-borne and zoonotic (animal to human) disease:</b> Increased likelihood that mosquito vectors could establish in New Zealand, which could lead to local transmission of mosquito-borne diseases (e.g. dengue, Ross River virus). Also possible impacts on other vector-borne diseases (e.g. tick-borne) and zoonotic diseases. <sup>2,51-56</sup>
<b>Food- and water-borne disease:</b> Heavy rainfall can lead to contamination of drinking and recreational water/shellfish with faecal pathogens from animals and humans. Both high and low rainfall, and higher temperatures may impact on bacterial and parasitic diseases causing gastroenteritis (e.g. giardiasis, salmonellosis). Dry conditions could affect continuity of household water supplies, impacting diseases influenced by hygiene. <sup>2,56-59</sup>
<b>Ultraviolet (UV) radiation:</b> Climate change may delay recovery of stratospheric ozone. Warmer temperatures could promote increased or decreased outdoor time, affecting exposure to solar ultraviolet (UV) radiation—with possible impacts on rates of skin cancer, eye disease, and vitamin D levels. <sup>2,60-63</sup>
<b>Physical activity:</b> Warmer temperatures, and either increases or decreases in outdoor time, may impact on levels of recreational physical activity—an important determinant of health. <sup>64</sup>
<b>Cardio-respiratory disease from air pollution:</b> High temperatures can exacerbate photo-chemical air pollution with impacts on respiratory disease. Hot, dry conditions increase potential for bush/forest fires, where smoke impacts on people with cardiorespiratory disease. <sup>2,65-68</sup>
<b>Allergic diseases, including asthma:</b> Possible impacts on allergic conditions with changes in plant distribution, flowering, and pollen production. <sup>2,69</sup>
<b>Indoor environment:</b> Climate change may affect the healthiness of indoor environments (e.g. overheating of buildings, changes in indoor air pollutants, flood damage and indoor moisture). <sup>37,70</sup>

Sea-level rise is expected to continue, with an increase in the frequency of extreme high tides and their associated risks, including coastal flooding, inundation, and erosion.<sup>16,23,24</sup>

These climate and related environmental changes have multiple implications for health and wellbeing in New Zealand (Table 1). The magnitude of health impacts will depend on the existing burden of climate-sensitive diseases, the extent and rate of climate change in New Zealand, the capacity of individuals and society to adapt, and the policies chosen to reduce and adapt to climate change.<sup>25</sup>

New Zealand is already affected by a range of diseases that are sensitive to climatic factors,<sup>26–29</sup> and climate trends may well be affecting New Zealanders' health and wellbeing, although such effects are not yet well quantified.<sup>25</sup>

Furthermore, given that global greenhouse gas emissions are continuing to track near the upper end of projections, it will be important to gain a better understanding of the health impacts in New Zealand under high-end scenarios of climate change.<sup>2</sup>

## Effects on the determinants of health in Aotearoa-New Zealand

In addition to the health issues listed in table 1, climate change will impact on the broader socioeconomic determinants of health in New Zealand.<sup>14–16</sup>

The economy will be influenced by global climate change.<sup>15</sup> Reduced export income due to, for example, effects on agricultural production (or overseas markets) could lead to higher unemployment, less household money to secure the basics for good health, and a reduced tax-base for health and social spending. An analysis prepared for the Ministry of Primary Industries in 2013 showed that under a high end warming scenario (4.4°C average temperature increase by 2100) there would be a significant decline in dairy pasture production, along with increased dairy cow heat stress in many dairying areas of New Zealand.<sup>71</sup>

However, some positive effects on agriculture/horticulture in New Zealand are also possible.<sup>16,23,71</sup> Thus forward planning and adaptability within the sector will be required to safeguard the economic output of climate sensitive primary industries,<sup>72</sup> which many New Zealanders rely on for good health and wellbeing.

Furthermore, responses to mitigate climate change also have the potential to adversely impact on health. For example, mitigation policies that raise costs for fuel and energy (and therefore increase costs of goods and services) without compensatory measures, could place extra financial burden on people, particularly for low income families, thus affecting ability to afford the basics for good health.<sup>73</sup>

## Risks of climate change to health equity and Māori health in Aotearoa-New Zealand

Climate change will cause different impacts for different population groups depending on geographic location, age, ethnicity, health status, and socioeconomic circumstances.<sup>2,25</sup> Māori, Pacific, and low-income groups in New Zealand are at risk of greater adverse health impacts from climate change.<sup>10,14,74</sup>

Māori are at risk of greater impacts (compared with NZ European people) because of a disproportionate burden of disease across many of the health conditions affected by climate change: infectious diseases (e.g. gastrointestinal infection),<sup>75,76</sup> chronic conditions (e.g. cardio-respiratory disease),<sup>75,77,78</sup> and mental ill-health.<sup>75,79,80</sup>

The disproportionately high number of Māori living in deprived circumstances<sup>78,81</sup> means that climate change effects on food security<sup>30,82</sup> and vulnerable infrastructure and housing<sup>25,83,84</sup> will be more difficult to prepare for and recover from—meaning that important determinants of health (such as healthy nutrition, safe drinking water, healthy homes) are undermined.

Any additional pressure on the availability of low income and/or larger family homes resulting from arrival of climate migrants in areas with existing housing pressures (e.g. Auckland region)<sup>14,85,86</sup> would also disproportionately affect Māori who have higher levels of household overcrowding and crowding-related infectious diseases.<sup>87,88</sup> Previous experience in New Zealand has shown that factors that affect the ability of low income families to buy or rent adequately sized houses can lead to families co-habiting, with resultant household overcrowding.<sup>89</sup>

Additional factors which increase climate-health risks for Māori include indigenous relationships with the environment, greater exposure to food-borne disease risk through customary practices such as collection of kaimoana (seafood),<sup>90</sup> greater exposure to outdoor heat whilst undertaking outdoor labour (Māori are overrepresented in semi-skilled/unskilled workforces),<sup>91,92</sup> and poorer access to and through health and social services.<sup>93-100</sup>

Perhaps even more significant are the implications for the economic determinants of health for Māori. The Māori economy is heavily invested in climate-sensitive primary industries;<sup>23,84</sup> and policy responses that place extra financial burden on low income families (disproportionately Māori), without counter-balancing measures, would exacerbate Māori experience of poverty and poverty-related diseases.<sup>73,76</sup>

It is important to note that while this section has focussed on the equity impacts for Māori, many of these issues are also relevant to Pacific peoples in New Zealand and to low income New Zealanders.<sup>10,14</sup>

## Health benefits of climate action

The other important link between climate change and health is the substantial opportunity to improve current population health and wellbeing through well-designed policies to reduce greenhouse gas (GHG) emissions.<sup>2-4,19</sup> Knowledge in this area has increased substantially in the last five years, and the health chapter in the recent Fifth Assessment Report of the IPCC included, for the first time, a dedicated section about the health co-benefits of climate action.<sup>2</sup>

Health and health equity gains are possible for heart disease, cancer, obesity, musculoskeletal disease, Type 2 diabetes, respiratory disease, motor vehicle injuries, and mental health, with resultant cost savings for the health system.<sup>2-4,19.</sup>

These co-benefits arise because some emission reductions measures impact on important determinants of health, especially energy intake (nutrition) and expenditure (physical exercise). For example:

- Active transport (walking, cycling, public transport) in addition to reducing CO<sub>2</sub> emissions, improves physical activity and can reduce air pollution and road traffic injuries.<sup>2,101-107</sup> Walking and cycling are inexpensive, and public transport is used proportionately more by people with lower incomes. Thus improved active and public transport infrastructure has the potential to benefit health, climate and equity.<sup>101</sup>
- In New Zealand healthy eating, including increased plant and less red meat and animal fat consumption, would reduce agricultural GHG emissions, and likely lead to reduced rates of bowel cancer and heart disease.<sup>2,108-111</sup>
- Improving indoor environments (e.g. energy efficiency measures such as home insulation) can reduce illnesses associated with cold, damp housing (e.g. childhood asthma and chest infections which are leading causes of hospital admissions, particularly for Māori and Pacific children).<sup>112-114</sup>
- Increasing energy efficiency and/or moving away from fossil fuels would reduce health-damaging air pollution (e.g. particulates) from fuel combustion, in both indoor and outdoor environments, with health gains.<sup>2</sup>

Thus well planned climate action could contribute to significant reductions in the large burden of chronic disease and health inequity in New Zealand, leading to large cost savings for the health sector and society as a whole. This could offset a great deal of the early costs associated with climate change mitigation measures.<sup>2,3</sup>

The New Zealand research community continues to make a strong contribution to the body of knowledge on the health co-benefits of climate action. The housing and health programme (University

of Otago, Wellington) has led the way in quantifying the costs and benefits (including health) of insulation and clean heating.<sup>112,113</sup>

Research at the University of Auckland, using novel modelling techniques, has indicated that transport policy that enables safe commuter bicycling in Auckland has the potential to yield benefits (with respect to injury, physical activity, fuel costs, air pollution, and carbon emissions) that are 10–25 times greater than costs.<sup>107</sup>

## The way forward

Rapid and sustained global action to reduce GHG emissions is required to avoid the worst health effects of climate change.<sup>2,115</sup> It is possible to limit the degree of future climate change and to improve health, if the world rapidly upscales carbon-neutral energy production to replace energy production from fossil fuels, along with reducing energy usage, increasing carbon dioxide sinks (e.g. forests) and curbing rising levels of methane and nitrous oxide by modifying our waste management and agricultural/food systems.<sup>4,115</sup>

All individuals, groups, businesses and organisations have a role in reducing emissions, reducing investment in fossil fuels, and demanding that local and central governments act to reduce climate risks in ways that improve health and equity.<sup>4</sup>

Some New Zealand health organisations are beginning to take a lead in addressing their climate-health responsibilities, with action to measure and reduce organisational carbon footprint (Counties-Manukau District Health Board, Canterbury District Health Board), and employment of Sustainability Officers (Counties-Manukau, Waitemata, Auckland and Canterbury District Health Boards). A national network of health professionals interested in collaborating to improve the environmental sustainability of the New Zealand health sector was established in early 2014.<sup>116</sup>

There is much untapped willingness amongst health professionals to improve environmental sustainability within their workplaces (with large potential for operational cost savings),<sup>117,118</sup> but as yet no national framework or mandate to support this, despite a growing international movement and ample international expertise.<sup>119</sup>

There is also a need for the health sector to plan for the inevitable health impacts of climate change in coming decades. Health services should plan for more climate-sensitive diseases, extreme weather events and their casualties, and climate migrants with new and challenging health issues.<sup>10,14,120</sup>

Public Health Services should be strengthened to enable planning and response capability for impacts on drinking water, sewage systems, and civil defence emergencies. Public health surveillance systems need to be in place to detect new and emerging illnesses.<sup>10,120</sup>

It is essential that planning prioritises those population groups most in need of health support in the face of climate change—Māori, Pacific, people on low incomes, migrants, rural people, children, and the elderly.<sup>10</sup> Other events (e.g. Christchurch earthquakes, Hurricane Katrina) have shown that planning is required to avoid an inverse equity pattern in post-disaster responses and outcomes.<sup>121–123</sup>

Outside the health sector, effective public policies are required that both lessen climate risk, and improve population health and health equity. These policies should include an effective carbon pricing system (to replace the largely ineffective Emissions Trading Scheme),<sup>124</sup> while ensuring that financial costs do not adversely affect those on low incomes.<sup>4,73</sup>

Greater investment is required in programmes that both decrease GHG emissions and improve health, such as healthy housing modifications (insulation and clean/efficient heating), active transport infrastructure, and interventions that encourage increased plant and less red meat and animal fat consumption.

One way to encourage this is to ensure that public policy decisions include a health impact analysis, so that potential adverse health impacts can be avoided and positive effects maximised.<sup>125</sup> It is also



critical that any such decisions incorporate an equity analysis, to ensure that the resulting interventions contribute to reducing social and health inequities.

New Zealand must also consider its role in international climate change negotiations and responses. As a high (and growing) per-capita greenhouse gas emitter,<sup>126–128</sup> New Zealand has a responsibility to both increase its own ambitions with respect to greenhouse gas emission reductions, and to promote fair and equitable approaches to emissions reductions globally that take into account historical responsibility and capacity to mitigate.<sup>129,130</sup>

New Zealand, as part of the Pacific, will also need to play a role in supporting the health, wellbeing and adaptation of Pacific Island and other developing nation populations who will face many of the worst health effects of climate change.<sup>131,132</sup>

## Conclusion

Climate change poses an urgent threat to human health, wellbeing, and health equity globally, and in Aotearoa-New Zealand.

On the other hand, well-planned action to reduce greenhouse gas emissions offers opportunities to improve population health, equity, and reduce chronic disease burden. This could result in large cost savings for the health sector and society as a whole, which would offset a great deal of the early costs associated with climate change mitigation measures.

As health professionals, we have a responsibility to raise awareness of the health implications of climate change, and to press for urgent action. If we act quickly, we have an opportunity to turn one of our greatest health threats into positive action to significantly improve the health, equity, and resilience of our patients and population.

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## **Appendix: Supporting detail: Ancillary arguments supporting OraTaiao's position**

### **Climate change and health**

OraTaiao: The New Zealand Climate and Health Council (OraTaiao, 'The Council') holds climate change a serious, potentially catastrophic emerging risk to public health, development and equity.

- Climate change is almost certainly already contributing to the global burden of disease and premature death, with larger health impacts expected over coming decades. These potentially catastrophic health impacts disproportionately affect developing countries, and the most disadvantaged and vulnerable within all countries. New Zealanders will not be immune from the consequences.
- In New Zealand, Māori, Pacific, vulnerable, and lower socioeconomic populations are at risk of disproportionate health impacts from climate change. Therefore climate change also has serious implications for health equity in New Zealand.
- New Zealand's location in the Pacific and its reliance on the global economy mean that beyond direct climate-health impacts, adverse impacts on the determinants of health are likely, along with new health and social pressures from migrant populations arriving in New Zealand.

Our key messages include:

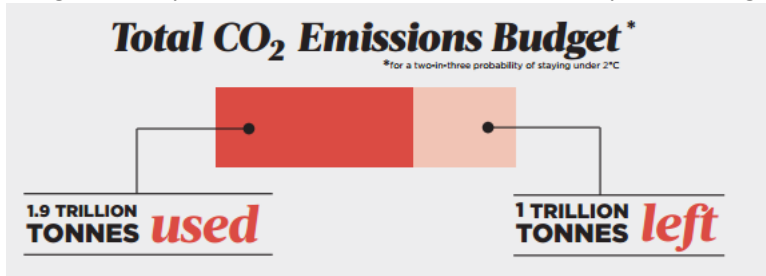
- Human-caused climate change is a serious and urgent threat to health and health equity globally and in New Zealand.
- Globally, leading health threats include water and food insecurity with malnutrition, extreme weather events, and changing patterns of infectious disease.
- Climate change means New Zealand will face many adverse impacts on health, with disproportionate health impacts for Māori. New health and social pressures will arise from climate migrant and refugee populations arriving in New Zealand and flow-ons from disruptions to the global economy.
- Without rapid and sustained global action to reduce greenhouse gas emissions (particularly from fossil fuels), the world will breach its carbon budget and may experience high levels of warming (4- 6°C by 2100) that render many populated areas of the world unable to support human health and wellbeing.
- Well-planned action to reduce greenhouse gas emissions can bring about substantial health benefits and will help New Zealand address its burden of chronic disease. Public health medicine professionals call for strong and urgent action on climate change that improves population health, accords with Te Tiriti O Waitangi (The Treaty of Waitangi), and creates more equitable, just and resilient societies in New Zealand and worldwide.

### **OraTaiao's stance on setting national GHG emissions targets**

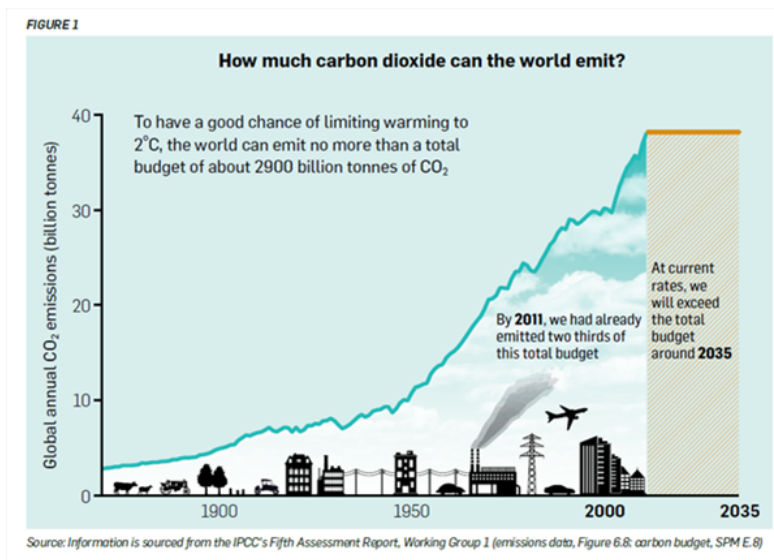
Health equity is one of OraTaiao's core values, and so the Council supports approaches that explicitly incorporate fairness. Our stance on the setting of greenhouse gas emissions reductions targets is that New Zealand needs to rapidly reduce its greenhouse gas (GHG) emissions, substantially more than its targets in international commitments to date. This stance is detailed in Supplement 1 to the New Zealand College of Public Health Medicine (NZCPHM)'s [climate change policy](#), which OraTaiao fellows of the College co-authored. The Supplement 1, '[Background to the NZCPHM's stance on setting national GHG emissions targets](#)', is available at <http://www.nzcpm.org.nz/policy-publications>.

The Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment report states that to give a >66% chance of staying below 2°C, the maximum amount of CO<sub>2</sub> that can be emitted over the industrial period is 3.67 trillion tonnes (2.90 trillion tonnes CO<sub>2</sub> if also including the effects of non-

CO<sub>2</sub> greenhouse gases). At 2011 the world had already used up two-thirds of that budget (1.89 trillion tonnes CO<sub>2</sub>) (see first figure below), and if current rates of emissions continue, the rest of the budget is likely to be exhausted before mid-century (second figure).

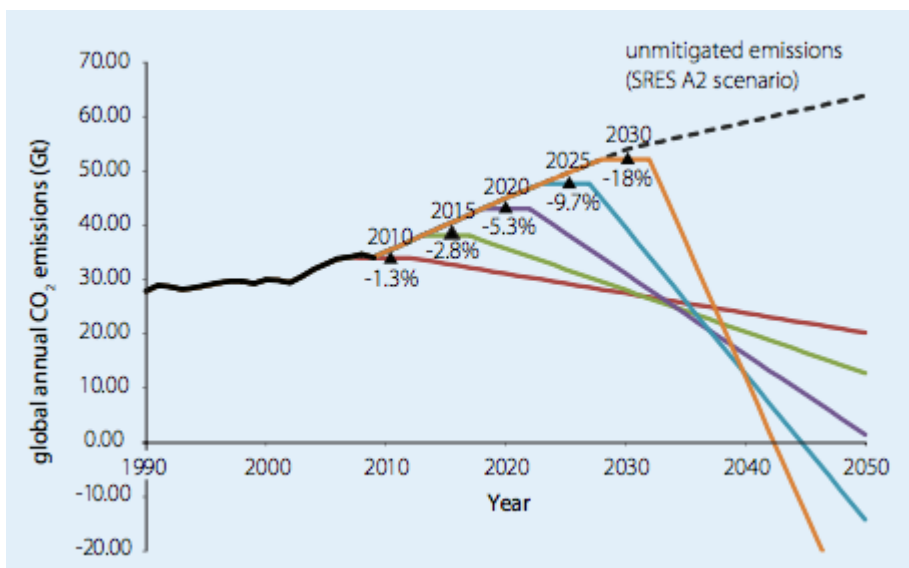


[source: [http://www.generationzero.org/report\\_a\\_challenge\\_to\\_our\\_leaders](http://www.generationzero.org/report_a_challenge_to_our_leaders)]



[source: MfE 2015]

The longer the world delays getting started - NZ included - the steeper the emissions cuts will need to be, and the earlier the world will need to reach zero emissions, in order to remain within the carbon budget. As the following graph shows, this becomes extremely challenging in short time.



source: New Zealand Climate Change Centre 2011, [The Challenge of Limiting Warming to Two Degrees](#). Alternative scenarios for global CO<sub>2</sub> emissions to 2050.

The percentage figures indicate the amount (relative to 1990) by which global emissions would need to be reduced, per year, every year, after their peak to remain within the same cumulative emissions budget. In this particular modelling, all scenarios meet the same cumulative emissions budget of 1445 Gt CO<sub>2</sub> between 2000 and 2050, which gives a roughly 50/50 chance of limiting long-term temperature increase to 2°C

There are a number of different ways for countries to set targets for GHG emissions reductions, in order to keep within global emissions budgets. Several frameworks, in the context of fixed limits, incorporate historical responsibility, science and fairness in calculating emission reduction allocations. For example, the Greenhouse Development Rights (GDR) framework's Responsibility and Capability Index combines countries' cumulative emissions (responsibility) with their capability to mitigate (using wealth as a proxy, from per capita GDP adjusted for distribution of thresholds of individuals' incomes).

Within overall limits for established economies, approaches that consider per capita emissions (which can include historical cumulative emissions) and affordability calculate markedly higher targets than what New Zealand has committed to. The Greenhouse Development Rights (GDR) framework (GDRf) would expect New Zealand to reduce its emissions by 41% by 2020 on 1990 levels.

OraTaiao's core values include equity, and this supports approaches that account for fairness in the face of fixed limits. Established economies, like New Zealand, historically have had high greenhouse gas emissions and have benefited from activities that cause high emissions. By contrast, least developed and developing nations are disproportionately affected by climate change, which they have not caused and yet have least capacity to adapt.

**Figure: The climate gap: those who have caused climate change**



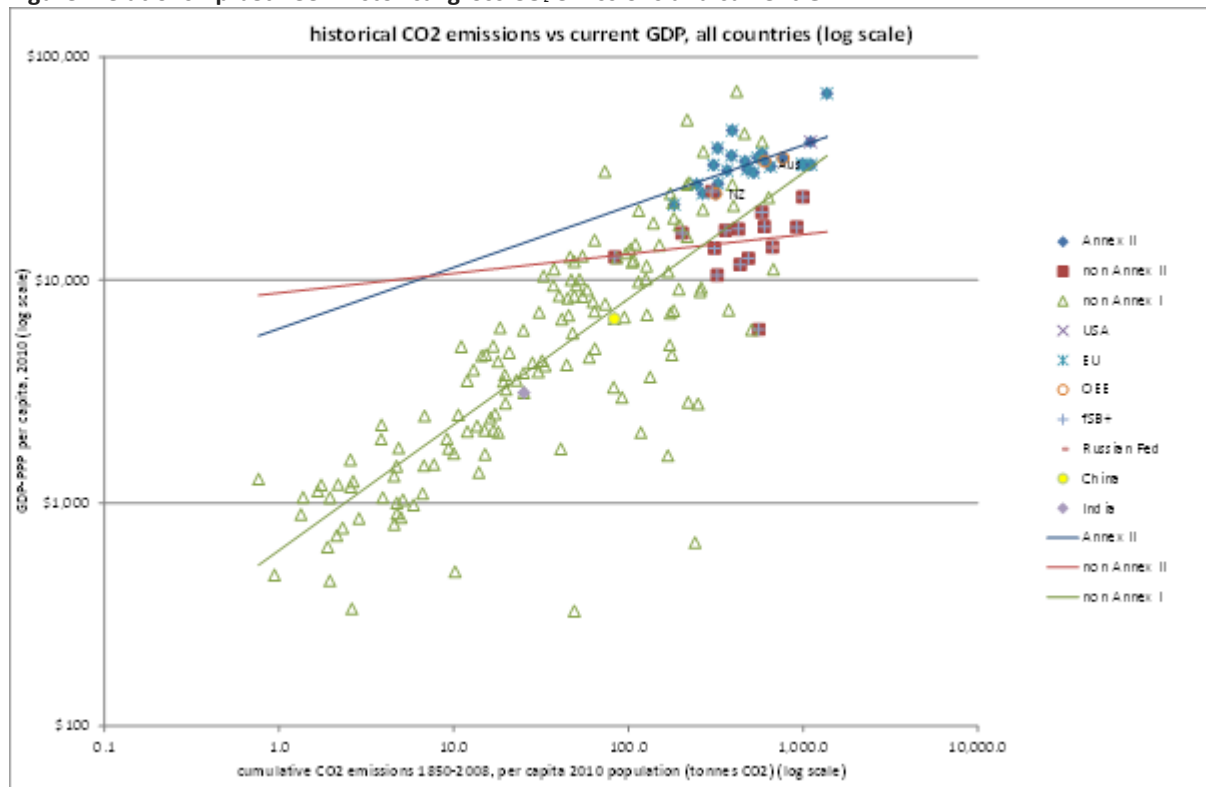
**Figure: The climate gap: those who will suffer most from climate change**



Density-equalising cartogram. Comparison of (a) undepleted cumulative CO2 emissions by country for 1950–2000 vs. (b) the regional distribution of four climate-sensitive health consequences (malaria, malnutrition, diarrhoea, and inland flood-related fatalities) est for 2000-2030.

source: Costello A, Abbas M, Allen A, Ball S, Bell S, et al. Managing the health effects of climate change: Lancet and University College London Institute for Global Health Commission. Lancet 2009;373:1693-1733. figure 4: sourced from Patz et al: Patz JA, Gibbs HK, Foley JA, Rogers JV, Smith KR. Climate change and global health: quantifying a growing ethical crisis. EcoHealth 2007;4:397-405. figure 1.

**Figure. Relationship between historical gross CO<sub>2</sub> emissions and current GDP**



source: New Zealand College of Public Health Medicine. Supplement One - Background to the NZCPHM's stance on setting national GHG emissions targets (2013). Wellington: New Zealand College of Public Health Medicine, 2013.

<http://www.nzcpm.org.nz/policy-publications>

Consequently, the Council considers established economies, like New Zealand, are in a position, and have a responsibility, to alleviate past actions and contribute rapidly and proportionately more reductions than nations with historically lower emissions.

Targets calculated using the GDR framework are based on fair and equitable approaches to the allocation of emissions reduction amongst countries. New Zealand's 5% target for 2020 and its 50% target for 2050 are much lower than needed under the GDR and similar frameworks.

The Council therefore holds that New Zealand's targets for 2020 and 2050 need to be higher in order to fairly and equitably contribute to limiting global warming to 2°C by 2050. Our Intended Nationally Determined Contribution needs to also commit to the cross-party agreement and national policies needed to achieve these targets.

## **Response to the Consultation process, including economic modelling with lack of Health input**

### **Rushed process, bias in discussion document, with poor supporting information**

Considering the importance of the issue, OraTaiao considers the consultation process has been unnecessarily brief (18 working days) and poorly resourced. The requirement to submit New Zealand's contribution (preferably by March 2015) has been known by the New Zealand government since November 2013, yet public consultation was announced via email on 7 May 2015. For such an important yet complex issue, meaningful consultation should have started in January or February.

The Council also considers the discussion document biased. It reads that emissions reduction in New Zealand is too expensive, too difficult, and more costly compared with other parts of the world, but does not provide credible evidence in support. It implies that New Zealand should therefore take on a minimal emissions reduction target.

There is no mention of what NZ has committed to already – not only 5% below the 1990 baseline level by 2020, but also 50% by 2050, both targets officially gazetted. These can only be the bare minima made at the beginning of any considerations – yet, misleadingly, there is no mention of them in the discussion document.

After receiving a formal request, the government agreed to release the economic modelling behind these assertions. This was released but a short time ago, available at <http://www.mfe.govt.nz/climate-change/reducing-greenhouse-gas-emissions/consultation-post-2020-climate-change-target>. Further, government has so far refused to release the analysis that lies behind the claim that emissions reductions in New Zealand are more costly compared to other countries. This gives little confidence that the argument has any pedigree or robust supporting evidence.

The late release of this information by the Ministry, and the modelling itself, so late into consultation, questions the credibility of the consultation itself – with inadequate consultation material, hence public discourse that is uninformed, which the government may easily dismiss. It is also difficult to see how NZ will be able to meet the international obligation to furnish a contribution that is transparent, given the failure to date to share assumptions and methodological approaches with the NZ public.

### **Flaws in the economic modelling**

The economic modelling is also biased due to the baseline that has been chosen. New Zealand has already committed to reducing emissions 5% below 1990 levels by 2020, and the current Bonn/Paris negotiations implicitly expect no 'backsliding' from existing commitments. This 5% target effectively sets a new baseline for New Zealand to take further action. By contrast, the modelling assumes a baseline where New Zealand has no reduction commitment and takes no action. We consider this diplomatically untenable and hence an unrealistic assumption that creates an impression that income foregone is greater than it otherwise would be. The 'real world baseline' is in fact a 5% reduction commitment by 2020.

A late posting on the MfE website describes the economic analyses commissioned and why those have ignored health etc, as follows:

<http://www.mfe.govt.nz/climate-change/reducing-greenhouse-gas-emissions/consultation-post-2020-climate-change-target>

#### **“Modelling the economic costs of New Zealand's intended nationally determined contribution Why doesn't the modelling include the costs of inaction or co-benefits of action?”**

The costs of inaction are difficult to quantify as they depend on the actions that the whole world takes to reduce emissions, not just New Zealand. The costs of inaction will be large but are hard to predict accurately and hard to express in monetary terms.

This is also the case for modelling co-benefits of action such as air quality and health benefits. Current research and model development is beginning to address these complexities.”

OraTaiao however is very unconvinced by these arguments and disputes their validity, for the following reasons:

1. Some cost have already been modelled, reporting cost-benefit ratios or monetary savings, especially for the health co-benefits of action (references at end of this section);
2. Health costs in a warming NZ could be substantial. The lack of any Health input into modelling work is of concern (see ‘Which Government agencies are involved?’ on that webpage) – the extent and scope of health costs and benefits will not have been identified as modelling issues;
3. Including uncertain health cost of inaction and health savings from action is no less valid than the aspects modelled that have been included;
4. Scenario analyses with logical consequences can be modelled, which could include applying the inflated \$50 social cost of carbon (already used by Government) to excess CO2 emissions BAU beyond targets cumulative to 2030.

The reason given for not including the health costs from climate inaction was that New Zealand is dependent on the rest of the world to take adequate climate action. But this applies to any country - no nation is large enough to solve climate change on its own, and it is nonsensical to expect other nations to not weigh the costs and benefits of climate action (unless unduly influenced by NZ’s example, NZ thus being saboteur).

The inclusion of only climate action costs (with incomplete analysis and questionable assumptions) is invalid; the modelling done already is full of assumption, and including uncertain (but substantial) health cost of inaction and health savings from action is no less valid than the aspects modelled that have been included. Consistent with [Treasury CBA guidance](#), it is better to manage uncertainty – with loss of precision – than discard major factors, wrecking construct validity.

Variable levels of information do not excuse presenting only the costs of action, without attempting to outline the benefits. The discussion document could have easily undertaken scenario analyses rudimentary in any public policy setting, examining a matrix of four scenarios - (i) neither the world nor NZ takes adequate climate action (NZ as co-saboteur, and humanity is all doomed), (ii) the world doesn’t act/NZ does (this is impossible), (iii) the world acts/NZ acts (adaptation costs averted), and (iv) the world acts/ NZ does not (NZ as pariah).

The costs of inaction (scenarios (i) and (iii)) could be broadly estimated by applying the Government’s (viz NZTA’s) implied \$50/tonne CO2 social cost of carbon ([EEM Appendix A9.6,A9.7](#) \$40/tonne, inflation-adjusted) to excess emissions beyond NZ’s [620 Mt CO2 per-capita share of the remaining global carbon budget](#) as BAU beyond targets cumulative to 2030.

[In summary](#), the modelling asked by MfE

- ignores the likely costs to society and the economy of a changing climate;
- ignores any non-market tools for achieving emissions reductions by regulation;
- ignores NZ’s international exposure to climate risk (ie action by consumers or governments in other countries might take against New Zealand if it was perceived that New Zealand was not doing enough to reduce emissions);
- ignores likely trends in global carbon prices;
- ignores anything that agriculture can do to reduce emissions, and assumes that the rest of the economy will subsidise farming;
- ignores anything that our forestry industry can do to plant trees and remove carbon from the atmosphere;



- assumes NZ can only meet our emissions obligations by buying overseas emissions units.

Despite such flaws, the model quoted in the discussion paper still finds that New Zealand could achieve a 40% emissions reduction target while raising average household incomes from \$73,000 today to \$83,200 by 2027 (based on a \$50 per tonne carbon price). With a 40% target, the increase in average annual household income is only \$530 lower than it would be with the 'real world baseline' - a 5% target (\$83,730) (p.14 [MfE discussion document](#)). So, according to the government's own modelling, the average household will forego just \$10.20 per week in additional income to achieve a 40% target compared with the 'real world baseline'.

### **Lack of Health consideration**

The discussion document presents no analysis of the costs to New Zealand of climate change, Health and otherwise. In the absence of concerted action to reduce emissions globally, the cost to the economy of the increased frequency of extreme weather events is likely to be billions of dollars, astride the cost to peoples' lives and health (both physical injury and mental/social disruption); eg. [the 2008 drought cost the economy an estimated \\$2.8 billion](#). Likewise with adapting to sea level rise.

While New Zealand's emissions are a very small contribution to the global problem, if a country like New Zealand is unwilling to take significant action and is perceived to be doing as little as possible, it reduces the chances of a meaningful global deal (we become saboteurs, truly punching above our weight). If we want to avoid these costs, we need to increase the likelihood of significant action by major emitters, which means committing to take significant action ourselves.

The discussion document makes no attempt to assess the co-benefits of taking action to reduce emissions, such as improved health arising from increased walking and cycling or reduced water pollution from more riparian tree planting. Studies already exist on the estimated costs of air pollution in New Zealand, the economic costs of congestion, the costs to the economy of physical inactivity, the potential economic benefits of more active transport modes, likewise home insulation, better eating, and the potential economic benefits of riparian planting (references at the end of this section). The failure of the Ministry for the Environment to incorporate this kind of analysis into its discussion of New Zealand's emissions reduction target – and in fact the failure to have any Health involvement in the economic modelling (Government agencies involved) – is disappointing.

### **Lack of Health sector input**

We are concerned at the clear lack of Health input into the targets work to date – evidenced by Health not being in the listed Government agencies involved, and rejection of health impacts of inaction, in economic analyses (<http://www.mfe.govt.nz/climate-change/reducing-greenhouse-gas-emissions/consultation-post-2020-climate-change-target>). OraTaiao was concerned to learn, from the Ministry's public meetings, that neither the health gains ('mitigation co-benefits') from well-designed climate action, nor the health costs from climate changes, have been included in the economic analysis of the costs of New Zealand's climate action. Any climate action strategy should include appropriate and well-designed actions that protect – and improve – New Zealanders' health and well-being in the short and longer term. These actions will have an economic impact that should be included in any serious economic analysis of the costs of a climate action strategy.

We are further concerned the above defects may be symptomatic of more fundamental under-appreciation of the health impacts of climate change, even in New Zealand, by the Ministry, on our reading of the MfE's website <http://www.mfe.govt.nz/climate-change/how-climate-change-affects-nz/climate-change-impacts>. This ignores extensive literature on health impacts, health equity

implications and potential climate action co-benefits in New Zealand, where effects on health and health equity will be large and far-reaching.

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Earth Statement <http://earthstatement.org/> (4/8 statements):

- Governments must put into practice their commitment to limit global warming to below 2°C.
- The remaining global carbon budget - the limit of what we can still emit in the future - must be well below 1000 Gt CO<sub>2</sub> to have a reasonable chance to hold the 2°C line.
- We need to fundamentally transform the economy and adopt a global goal to phase out greenhouse gases completely by mid-century. Deep decarbonization, starting immediately and leading to a zero-carbon society by 2050 or shortly thereafter, is key to future prosperity..
- Equity is critical for a successful global agreement in Paris. Every country must formulate an emissions pathway consistent with deep decarbonization. For the sake of fairness, rich countries and progressive industries can and should take the lead and decarbonize well before mid-century. Developing countries should formulate plans far beyond what they can be expected to pursue on their own, reaping benefits from leapfrogging into a sustainable economy, well supported by international climate finance and technology access. Safeguarding the right to development of the Least Developed Countries (LDCs) is fundamental.