Submission on the Zero Carbon Bill:

The New Zealand College of Public Health Medicine would like to thank the Ministry for the Environment for the opportunity to make a submission on the Zero Carbon Bill.¹

The New Zealand College of Public Health Medicine (NZCPHM) is the professional body representing the medical specialty of public health medicine in New Zealand. We have over 228 members, all of whom are medical doctors, including 197 fully qualified Public Health Medicine Specialists, 15 Associate Members, and 16 Registrars (doctors in the early stages of training in the specialty).

Public Health Medicine is the branch of medicine concerned with the assessment of population health and health care needs, the development of policy and strategy, health promotion, the control and prevention of disease, and the organisation of services. The NZCPHM strives to achieve health gain and equity for our population, reducing inequalities across socioeconomic and cultural groups, and promoting environments in which everyone can be healthy.

Health equity is one of the NZCPHM’s core values,² and so the College strongly supports approaches to setting climate targets that explicitly incorporate fairness. Our stance on the setting of greenhouse gas (GHG) emissions reduction targets is that New Zealand needs to rapidly reduce its GHG emissions – substantially more than its targets in international commitments to date.² ³ ⁴ For more information, see Attachment 1.⁵

The NZCPHM believes that there will be co-benefits to proactively addressing climate change across New Zealand’s main climate polluting sectors: transport, housing, energy, agriculture and food. These co-benefits will include reductions in cardiovascular and respiratory disease, cancers, obesity, food insecurity, and child poverty as well as an easing of the financial pressures on the health sector.² ⁶ For more information, see Attachment 2.⁷

As described in the NZCPHM’s substantive policy statement on climate change (2013),² we have long known that climate change is a serious, potentially catastrophic emerging risk to public health, sustainable development and equity. Projected climate change health impacts include malnutrition, deaths and injuries from extreme events, vector-borne disease such as dengue fever, cardio-respiratory effects from air pollution, and diarrhoeal disease. More diffuse effects include mental

health problems, migrant health issues and the health issues resulting from civil tension and conflict. Aotearoa-NZ urgently needs climate protection that is fast, fair, firm, and founded in Te Tiriti o Waitangi.\textsuperscript{2-6,8,9}

Thank you for the opportunity for the NZCPHM to submit on Zero Carbon Bill. We hope our feedback is helpful and please do not hesitate to contact the NZCPHM if we can be of further assistance.

Yours sincerely,

Dr Felicity Dumble
President
Personal / organisation details

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☐ NGO
2050 target

1. **What process should the Government use to set a new emissions reduction target in legislation?**

   **The NZCPHM recommends** the target for attaining zero carbon emissions be set in legislation, and that the Climate Change Commission be given the authority to set and monitor emissions budgets for New Zealand to reach this goal.

   Further, we recommend that this goal be to achieve net zero emissions, across all greenhouse gases, by 2040.

   **Achieving net zero greenhouse gas emissions by 2040**
   
   NZ (businesses, iwi, communities, whānau, households, and the health sector) need certainty and transparency to act fast.

   Achieving net zero greenhouse gas emissions by 2050 is the outer limit set based on current science. It is the budget allocated for a two-thirds chance of keeping within the internationally 2°C global warming. From a public health and safety perspective, the risk of adverse effects calls for a safety margin much greater than two-thirds.\(^5\)

   At Paris, the world agreed for the first time to aspire towards keeping warming below 1.5°C – reducing the budget even more in order to safeguard low-lying countries and cities, including our own Pacific neighbours and families. Ultimately, to make a fair contribution to limiting global warming to 1.5°C, due to our previous inaction and delay (alongside inaction by other countries) as well as meet our commitments under the Paris Agreement, New Zealand will need to reach net zero well before 2040. Therefore, the 2050 should certainly not be a target to drive towards, rather an outer limit to keep as far away from as possible.

   In addition, the second draft of the Intergovernmental Panel on Climate Change’s (IPCC) Special Report on Global Warming of 1.5°C finds substantial differences in the harming effects of global warming limited to 1.5°C compared to 2°C above pre-industrial levels\(^10\) – where the 0.5°C warming difference is critical for vulnerable regions.\(^11\) The final version of this Report (due October 2018) must inform New Zealand’s response.

   Within these limits, we need to distribute efforts across countries fairly. The Paris Agreement included the principle of ‘common but differentiated responsibilities and respective capabilities’. Least developed and developing nations are disproportionately affected by climate change, which they have not caused and have least capacity to adapt. Meanwhile, established economies, like New Zealand, historically have had high greenhouse gas emissions and have benefited from activities that cause high emissions; they are in a position, and have a responsibility, to mitigate past actions and contribute rapidly and proportionately more reductions than nations with historically lower emissions;
established economies have greater economic capability to make the adjustments that are needed to reduce emissions.\textsuperscript{3,4,5,8,12,13}

There are many models and ways to share emissions\textsuperscript{5} and efforts to get to net zero safely across countries that account for historical emissions and wealth. Such modelling, using frameworks like the Climate Equity Reference project\textsuperscript{12} (we are wealthy and have benefited from large historic emissions), with 72+ ‘fairness’ scenarios, indicates general timelines for New Zealand of year 2022 to 2038 to reach net zero emissions. Further rationale for setting ambitious emissions targets can be found in the attachment, ‘Setting ambitious greenhouse gas emissions targets for New Zealand – the case for international fairness/equity’.\textsuperscript{5}

The IPCC’s latest Special Report on Global Warming of 1.5°C (due this October 2018) must also guide NZ’s Zero Carbon Act.\textsuperscript{10}

The shape of the emissions reductions trajectory is as important as the target date in keeping within the 1.5°C bounds – making the setting of budgets to be important. Whether emissions reach zero rapidly or slowly strongly impacts the total carbon budget (as total emission, being area-under-the-curve). The graph below shows this, albeit based on the 2°C pathway, not the more urgent reductions required to limit global warming to 1.5°C. The sooner we start reducing emissions, the easier it is, and vice versa.

\textit{Figure.} Staying within budget – the later we start, the harder it gets. Key: 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 1010 Gt CO\textsubscript{2} between 2012 and 2100 (CERP had based this on RCP2.6, as used by IPCC AR5 WG1), which gives a roughly 2/3rds chance of limiting long-term temperature increase to 2°C. Note this has not been updated for the necessary 1.5°C global trajectory.\textsuperscript{5}
Independent Climate Change Commission

An independent Commission, in partnership with Māori, is important to ensure that targets are set and monitored independent of current government priorities.

2. If the Government sets a 2050 target now, which is the best target for New Zealand?

The NZCPHM recommends setting a target of net zero emissions across all greenhouse gases and all sectors by 2040, or earlier if the IPCC’s October 2018 Report provides guidance that global emissions need to be reduced faster.

What matters is total net emissions in our atmosphere and oceans – so we do not breach crucial ecological tipping points.

Three of NZ’s main greenhouse gases, carbon dioxide, nitrous oxide and methane, will continue to damage our climate and/or oceans for hundreds of years or more. In sensibly keeping with the safer, healthier global warming limit of 1.5°C, global anthropogenic CO2 emissions need to reach net-zero by 2040, together with rapid reductions in other emissions, particularly methane. And within these limits, we need to distribute efforts across countries fairly.

The final version of the Zero Carbon Act must be decided in light of the IPCC’s Special 1.5°C report due this October.

3. How should New Zealand meet its targets?

- domestic emissions reductions only (including from new forest planting)

The NZCPHM agrees that the target be met from domestic emissions reductions only (including new forestry plantings as well as horticultural planting and improved soil health).

Our main focus must be rapidly reducing NZ’s greenhouse gas emissions - all gases, all sectors. NZ (businesses, iwi, communities, whānau, households, and all sectors including the health sector) needs certainty to act decisively now.

Although using international emissions reductions may seem like the cheaper option, it would undermine investment in New Zealand’s economy in reducing its own emissions. Relying on international tradeable emissions units means NZ misses out on opportunities for well-being and equity co-benefits of reducing our domestic emissions, and means delaying the real changes for later.

Reforestation, horticultural planting and improved soil health (which will absorb some of New Zealand’s carbon dioxide emissions), can be part of meeting our domestic net zero
emissions target. But the focus must be on rapidly reducing NZ’s domestic emissions and investing in the infrastructure now that will take us quickly to our net zero emissions future.

4. Should the Zero Carbon Bill allow the 2050 target to be revised if circumstances change?

The NZCPHM recommends the target be revised only to increase climate action ambition in response to updated scientific recommendations. The Government should not be allowed to extend the deadline or increase the target (i.e. no backsliding/weakening of the target).

All Acts in NZ can currently be changed through due process under exceptional circumstances.

Emissions budgets

5. The Government proposes that three emissions budgets of five years each (i.e., covering the next 15 years) be in place at any given time. Do you agree with this proposal?

☐ yes

The NZCPHM advocates for three emissions budgets of five or six years each.

Given the urgent need for global emissions to peak by 2020,17,18 the Act could include the requirement for the Commission to urgently set an initial 2-year Emissions Budget, with three six year budgets to follow.

If NZ adopts a carbon budget cycle of six years, as suggested by the Parliamentary Commissioner for the Environment, it would have the advantage of matching the NZ electoral cycle.19 The Commissioner also suggests an interim update and review of policies three years after each budget is adopted, giving the Government the opportunity to review progress.

Conversely, 5-year cycles accord better with the frequency of the IPCC’s assessment reports. Ultimately the College however tends towards recommending six-yearly budgets, on balance in light of local circumstances and needs.19

Regardless of the precise duration (5- or 6-yearly), the budgets must give the certainty needed for action and investment now.

6. Should the Government be able to alter the last emissions budget (i.e., furthest into the future)?
**The NZCPHM recommends** that the last budget should be able to be reduced if needed to respond to emerging international evidence. The Zero Carbon Act should also permit any Government to act so NZ can emit less than budgeted.

However, emissions budgets should not be able to be increased, unless the Government changes the Act through the usual Parliamentary process.

### 7. Should the Government have the ability to review and adjust the second emissions budget within a specific range under **exceptional circumstances**?

**The NCCPHM recommends** that the last budget should be able to be reduced if needed to respond to emerging international evidence. The Zero Carbon Act should also permit any Government to act so NZ can emit less than budgeted.

If there are **exceptional circumstances**, the Government should be able to change the Zero Carbon Act, to increase the emissions budget, through the usual Parliamentary process. Although it is hard to imagine any exceptional circumstances that could justify delaying in reducing our far-reaching climate change risks.

### 8. Do you agree with the **considerations** we propose that the Government and the Climate Change Commission take into account when advising on and setting budgets?

☐ no

**The NZCPHM recommends** the Climate Commission’s emissions budgets be consistent with the best possible chance of limiting global warming to 1.5°C degrees and the greater responsibility of well-resourced nations like NZ, with budget considerations including:

- scientific knowledge about climate change, sea level rise and ocean acidification to confidently stay within the safer, healthier global warming limit of 1.5°C
- obligations under Te Tiriti o Waitangi\(^6,9\)
- global leadership, including international equity\(^4,8\)

Identifying climate change as both the greatest threat to global health and as the greatest opportunity to address our biggest causes of mortality and morbidity will set New Zealand on a path to respond in a way that ensures a fairer, just, sustainable Aotearoa-NZ. See attached paper, ‘Health benefits and savings of equitable climate mitigation in New Zealand’.\(^7\) As the impacts of unmitigated climate change will be highly regressive for New Zealanders, the priority must be robust emissions budgets that make sure tipping points are never breached.
The physics of climate change comes first for setting emissions budgets – the bottom line is what ends up in our shared global atmosphere and oceans, making sure ecological tipping points are not breached. As the impacts of unmitigated climate change will be highly regressive on New Zealanders, affecting low-income New Zealanders first, the priority must be robust emissions budgets.

Te Tiriti o Waitangi obligations and health equity within New Zealand climate action have significant potential to reduce health inequities for Māori, Pacific people, and low-income New Zealanders and are recommended top priorities for policy and planning.

Government response

9. Should the Zero Carbon Bill require Governments to set out plans within a certain timeframe to achieve the emissions budgets?

☐ yes

The NZCPHM recommends the Bill be enacted as high priority, so NZ can help ensure that as agreed, global emissions peak by 2020 at the latest.

The Zero Carbon Act must require the Government to respond by publishing plans to stay within a budget as rapidly as feasible within a set time frame that is definitely less than 12 months.

10. What are the most important issues for the Government to consider in setting plans to meet budgets? For example, who do we need to work with, what else needs to be considered?

The NZCPHM recommends the Government:

- most importantly, adhere to Te Tiriti o Waitangi obligations
- consider health equity¹,² as essential to planning and monitoring - all regressive policies (including ETS settings) must be effectively offset for vulnerable communities
- consider substantial health co-benefits from well-designed reduction and mitigation²¹
- consider sustainable economic opportunities and technology relevant to climate change, to grow a fairer, just, sustainable Aotearoa-NZ
- recognise that our Pacific neighbours are in the frontline of climate change²² and Pacific island countries have been strongly calling for urgent action to keep global warming below 1.5°C
The direct and indirect health effects of climate change will have a greater impact on those already suffering from disadvantage and poorer health in New Zealand – children, elderly, low-income, Māori and Pacific populations, and people living with disabilities, acute or chronic illnesses.

We must strive to reduce inequalities between Māori and other New Zealanders, and value the concepts of kaitiakitanga (guardianship), aroha (love/compassion), manaakitanga (caring), whakatipuranga (future generations), hauora (health and wellbeing), and tika (integrity/doing what’s right).

Climate action that prioritises health equity has significant potential to reduce existing and prevent future health inequities (e.g. retrofitting insulation to make homes warm and dry can reduce childhood asthma and chest infections - as leading causes of hospital admissions, particularly for Māori and Pacific children).

Overall, mitigation strategies must contribute to achieving equity by improving outcomes for Māori and other groups experiencing disadvantage and discrimination.

Financial costs of climate change responses can be offset by the cost-savings of health co-benefits. For example, health benefits from zero-carbon public and active transport include increased physical activity, improved social connections and more equitable access to education and employment.

Climate Change Commission

11. The Government has proposed that the Climate Change Commission advises on and monitors New Zealand’s progress towards its goals. Do you agree with these functions?

☐ yes

The NZCPHM agrees the Climate Change Commission include mechanisms built in to hold Government accountable. This includes:

- setting NZ’s emissions budgets
- monitoring and publicly reporting (annual) on New Zealand’s progress to stay within budget
- periodically check in with the below 2040 target level, accounting for changes in circumstances
- advising on policies for adapting to the impacts of climate change, sea level rise, and ocean acidification – with mitigation the Commission’s primary focus

The Government should:
- respond by publishing plans to stay within budget definitely within 12 months after the Climate Commission has set a new emissions budget
12. What role do you think the Climate Change Commission should have in relation to the New Zealand Emissions Trading Scheme (NZ ETS)?

☐ advising the Government on policy settings in the NZ ETS

**The NZCPHM recommends** the Climate Change Commission:

- advise on ETS policy settings that support NZ staying within emission budgets
- identify the extent of regressive impacts from proposed ETS settings, and
- propose effective complementary policies which fairly compensate vulnerable households.

13. The Government has proposed that Climate Change Commissioners need to have a range of essential and desirable expertise. Do you agree with the proposed expertise?

☐ no

**The NZCPHM agrees that there should be** a range of transdisciplinary stakeholders with sectoral and climate science expertise amongst the Commissioners.

However, in addition to the expertise proposed, the NZCPHM strongly recommends that:

- all Commissioners have equity expertise
- health experts are represented on the Commission
- mātauranga Māori; Te Tiriti O Waitangi, te reo me ona tikanga Māori and Māori interests are represented with high priority on the Commission, as will be the formation of relationships with climate-vulnerable Pacific nations with whom New Zealand has significant ties
- the involvement of vested interests be disallowed, particularly those with a financial interest in maintaining the health-harming status quo (in health we have seen too many crucial policy processes derailed by those who have financial stake in continuing to do harm); and
- a larger pool of Climate Commissioners be created so that Commissioners can be called in according to the focus area (for example, adaptation policy recommendations would require the oversight of Commissioners with Tiriti expertise, local government, community and adaptation experience).
- experts in achieving social change are represented
Adapting to the impacts of climate change

14. Do you think the Zero Carbon Bill should cover adapting to climate change?

☐ yes

The NZCPHM recommends the Bill covers adapting to climate change, sea level rise and ocean acidification.

The adaptation plan should:

• be a separate advisory work stream, to avoid overtaking the Commission’s top priority climate mitigation role
• include a health adaptation plan - including health sector adaptation and health-protecting adaptation in other sectors; and
• include actions to influence climate policies in other sectors, including how those policies can promote health and health equity.

15. The Government has proposed a number of new functions to help us adapt to climate change. Do you agree with the proposed functions?

☐ no

The NZCPHM agrees with the proposed functions, however, we strongly recommend the inclusion of a health adaptation plan that covers health sector adaptation and health-protecting adaptation in other sectors.

We note that care must be taken in designing adaptation policies to ensure that climate-damaging emissions are not increased.

Mitigation and adaptation are often deeply interlinked - so often mitigation and adaptation can be addressed together in the same policy (e.g. housing). We suggest that adaptation be dealt with by a separate working group, to avoid distraction from the top priority of mitigation.

16. Should we explore setting up a targeted adaptation reporting power that could see some organisations share information on their exposure to climate change risks?

☐ yes

The NZCPHM recommends a targeted adaptation reporting power that could start with voluntary reporting in the first year and require compulsory reporting in subsequent years.
References


Attachments:

1. Setting ambitious greenhouse gas emissions targets for New Zealand – the case for international fairness/equity

2. Health benefits and savings of equitable climate mitigation in New Zealand
Setting ambitious greenhouse gas emissions targets for New Zealand – the case for international fairness/equity
Scott Metcalfe, 15 July 2018 v1.2

Key points:
- Patterns of greenhouse gas GHG emissions, wealth and climate disease burden vary dramatically between countries
- The climate gap, between those who have emitted most vs. those impacted first and worst (and least able to adapt), is large
- NZ is both wealthy and a high emitter. There are many allocation models. Under a 1.5°C global pathway reaching zero emissions by 2050, key models – Contraction & Convergence and Climate Equity Reference Project – indicate general timelines for New Zealand to reach net zero emissions between 2022 and 2038.

More information:
New Zealand is considering greenhouse gas targets under the proposed Zero Carbon Act, proposing net emissions (CO₂ or all-gas – to be determined) reaching zero by year 2050.[1,2] However, in terms of global urgency,[3] the health gains from equitable mitigation[4], and especially fairness[5,6], this target needs to be more ambitious, before 2040.

A Zero Carbon Act will need to set targets and action that are fast, fair, firm, and founded on Te Tiriti o Waitangi.

In the 2015 Paris Agreement, countries including New Zealand committed to limiting average temperature rise to well below 2°C – and to pursue efforts to limit temperature increase to 1.5°C.[7] Since then, the second draft of the IPCC Special Report on Global Warming of 1.5°C is reporting substantial differences in the harmful effects of global warming limited to 1.5°C compared to 2°C above pre-industrial levels[3] – where the 0.5°C warming difference is critical for vulnerable regions.[8]

Limiting global warming to 1.5°C sensibly[9,10] will likely require global anthropogenic CO₂ emissions to reach net-zero before 2040,[11] together with rapid reductions in other emissions, particularly methane.[3,12]

Within these limits, we need to distribute efforts across countries fairly[6,13] – where due to previous inaction and delay (alongside inaction by other countries)[14], New Zealand needs to work hard to meet our commitments under the Paris Agreement and make a fair contribution to limit warming below 1.5 degrees.[5,6,15-18]

- The Paris Agreement included the principle of ‘common but differentiated responsibilities and respective capabilities’.[1]
- Patterns of GHG emissions vary dramatically between countries.[6, 13-18]. Differences in the likely health consequences of those emissions are large,[19,20] as is the potential for countries to reduce those emissions and/or adapt.[18] Historic emissions correlate with both countries’ current wealth (increased per capita GDP) and health (decreased disease burden).[6]
- Least developed and developing nations are disproportionately affected by climate change, which they have not caused, and have least capacity to adapt to, let alone mitigate. About 100 countries, with a total population of nearly one billion people but who produce less than 3% of the global emissions, will suffer worst the effects of climate change impacts in the near term.[21]
The climate gap: those who have emitted most vs. those impacted first and worst

Meanwhile, established economies, like New Zealand, historically have had high greenhouse gas emissions and have benefited from activities that cause high emissions; they are in a position, and have a responsibility, to mitigate past actions and contribute rapidly and proportionately more reductions than countries with historically lower emissions; established economies have greater economic capability to make the adjustments that are needed to reduce emissions.[13]

New Zealand has accounted for 0.063% of the world’s population, 0.15% of world GDP, 0.16% of world current annual gross GHG emissions, and 0.19% of cumulative gross GHG emissions.[22]

Ultimately what is ‘fair’ is a value judgement[13], where there are many internationally-accepted models and ways to share emissions and efforts to get to net zero safely across countries.[23-32] These models and frameworks account for factors like historical, current and projected populations, emissions and wealth.

Endnote 1 details the various frameworks possible.
Figure. Variability of models of emissions shares for Japan/Australia/New Zealand combined

Figure: Population, GDP, current and historic emissions, and projected future excess deaths from climate change, by groups of countries[6]

Key:
Country groups:
North America: Canada, United States of America
EU: Austria, Belgium, Switzerland, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Portugal, Sweden
other established economies: Australia, Japan, New Zealand
former Soviet bloc, plus Turkey: Bulgaria, Bosnia and Herzegovina, Belarus, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Russia, Slovakia, Slovenia, Turkey, Ukraine
recent developed economies: United Arab Emirates, Bahrain, Bahamas, The, Brunei, Equatorial Guinea, Israel, Korea, Rep., Kuwait, Malta, Oman, Qatar, Saudi Arabia, Singapore, San Marino, Seychelles, Trinidad and Tobago
developing economies: Albania, Argentina, Antigua and Barbuda, Azerbaijan, Bangladesh, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Cote d’Ivoire, Cuba, Cyprus, Dominica, Dominican Republic, Ecuador, Egypt, Ethiopia, Fiji, Georgia, Ghana, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Indonesia, Iraq, Jamaica, Jordan, Kenya, Kyrgyzstan, Lao People’s Democratic Republic, Lesotho, Lithuania, Libya, Madagascar, Malawi, Malaysia, Maldives, Mozambique, Myanmar, Nepal, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Poland, Portugal, Qatar, Republic of Korea, Réunion, Romania, Russian Federation, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Senegal, Serbia, Sierra Leone, Singapore, Somalia, South Africa, Spain, Sri Lanka, Sudan, Suriname, Swaziland, Syrian Arab Republic, Tajikistan, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, United Arab Emirates, United Kingdom, United States of America, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Zimbabwe

Figure. Per capita cumulative emissions 1950-2013 vs. GDP 2013 and excess climate deaths 2030 (log scales)[6]
Most health organisations have core values that include equity,[33,34] and this supports parallel approaches that account for fairness in the face of fixed limits.[35] Particular values to note kaitiakitanga (guardianship), aroha (love/compassion), manaakitanga (caring), whakatipuranga (future generations), hauora (health and wellbeing), and tika (integrity/doing what’s right). Approaches to the allocation of emissions reductions amongst countries, including New Zealand, need to include these values akin to fairness and equity. Principles of historic responsibility accord with tika and Crown redress of Te Tiriti o Waitangi injustices through within treaty settlements,[13] where countries like New Zealand are wealthy and have benefited from large historic emissions.

Of the various models and frameworks used internationally, the closest to these values seems that of the Greenhouse Development Rights framework (GDRF),[36-39] as used by the Climate Equity Reference Project and which takes the effort-sharing approach. This contrasts with the other model best known by the health sector, Contraction and Convergence,[40-42] a resource/allocative approach that grandparents historic emissions.

Applying both the Climate Equity Reference Project and Contraction & Convergence models to New Zealand, with 72+ scenarios, under a 1.5°C global pathway reaching zero emissions by 2050, indicates general timelines for New Zealand of between year 2022 and 2038 to reach net zero emissions fairly. This is based on both our historical responsibilities and obligations, and our capacity to adapt and mitigate, when compared with other countries.

- For the for 1.5°C emergency global pathway, CERP models allocate NZ year 2030 gross greenhouse gas (gGHG) targets of 26.1 to -6.4 MtCO2-e for 72 scenario permutations (a -57% to-111% change from the 1990 level).
- Modelling for contraction&convergence lies within this range, at 19.1 MtCO2-e (-69%).
- These results translate to achieving net zero GHG emissions for New Zealand between the years 2022 and 2038 for most models, if meeting the Paris COP21 ambition of no more than 1.5°C global warming.

Figure. Models for NZ: per capita, C&C, CERP (72 permutations)
– baseline and allocated net GHG (MtCO2-e), under 1.5°C global pathway, by year
Endnote 2 details the modelling methods and sources.

Further content, rationale, sources, modelling assumptions are in ‘Background to the NZCPHM’s Stance on Setting National GHG Emissions Targets’, the NZCPHM’s INDC submission, joint editorial Fast, fair climate action crucial for health and equity, and joint presentation 2017 Sharing our global carbon budget.

References

2. https://zerocarbonatnz.nz/


Endnote 1 – Detail of frameworks for sharing

Consistent with the Paris Agreement’s principle of ‘common but differentiated responsibilities and respective capabilities’, there are multiple models and approaches to sharing, but in two main groups:

1. Resource/allocation sharing approaches
2. Effort sharing approaches

Resource/allocation sharing distributes emissions amongst the remaining budget (within global emissions pathway), whereas effort sharing distributes the gap between projected expected business-as-usual BAU (emissions growth left unabated) and what is needed to achieve budget.

Figure. Ways to share 1.5°C – resources vs effort

To help conceptualise the two main approaches, these are depicted in the following figures, preceded by BAU (what’s likely to happen if no sharing).
Figure. Baseline (unabated projected emissions)

<table>
<thead>
<tr>
<th>Country</th>
<th>2013 pop(m)</th>
<th>gdp(billion US$-net GHG PPP)</th>
<th>% pop</th>
<th>% GDP</th>
<th>% nGHG</th>
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<tr>
<td>High Income</td>
<td>1267.6</td>
<td>$40,520</td>
<td>16,334</td>
<td>55%</td>
<td>35%</td>
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<td>Upper Middle Income</td>
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<td>$8,619</td>
<td>6,449</td>
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<td>14%</td>
</tr>
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<td>Lower Middle Income</td>
<td>3872.4</td>
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<td>47%</td>
</tr>
<tr>
<td>Low Income</td>
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<td>4%</td>
<td>9%</td>
</tr>
<tr>
<td>World</td>
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<td>$74,216</td>
<td>47,074</td>
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</tbody>
</table>

-10.0 0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0
net GHG emissions (Gt CO2-eq) year

Low Income
Lower Middle Income
Upper Middle Income
High Income

Figure. Effort-sharing

-10.0 0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0
net GHG emissions (Gt CO2-eq) year

Low Income
Lower Middle Income
Upper Middle Income
High Income

Figure. Resource/allocation sharing
Models/frameworks are catalogued as follows (from Climate fair shares literature, including Different Perspectives on Differentiated Responsibilities):


1. Resource sharing approaches
   - Equal Per Capita Emission Rights
   - Contraction and Convergence (C&C)
   - Common but Differentiated Convergence (CDC)
   - One Billion High Emitters (aka the Princeton Proposal)
   - The ‘Indian Prime Minister’s approach’
   - Equal Cumulative Per Capita Emission Rights approaches

2. Effort sharing approaches
   - Equity in the Greenhouse, South-North dialogue
   - Brazilian Historic Responsibility
   - Climate Equity Reference framework (was GDR Greenhouse Development Rights framework)
   - Oxfam approach
   - EU approach for Annex I countries

There are three leading frameworks:

1. Equal Per Capita Emission Rights is a straightforward approach premised on the equal rights to the atmospheric commons. All countries would be awarded emission allowances in proportion to their population, and would be free to trade them. The total number of allowances granted globally would steadily decrease along a path consistent with an agreed climate stabilization goal.

2. Contraction and Convergence (C&C) is a hybrid framework combining grandfathered emission rights with per capita emission rights, with a gradual transition from the former to the latter over a specified number of years. Countries whose emissions start above the global average would receive allowances that gradually trend down to the global average, while countries whose emissions start below the global average would receive allowances that gradually trend up to the global average.

3. Greenhouse Development Rights (Climate Equity Reference framework) is a framework wherein the burdens for supporting both mitigation and adaptation are shared among countries in proportion to their capacity and responsibility, as expressed by way of an responsibility and capacity index that is
defined with respect to a “development threshold” – an income level modestly above a global poverty line. Like most frameworks, GDRs could be implemented with an emissions trading system only, with a global fund only, or with a combination of the two. GDRs is a flexible framework, and can be implements in a manner that includes a “luxury threshold” as well as a development threshold, and, if desired, in a manner that takes “embodied emissions” into account in the calculation of national responsibilities. Note also that several Chinese variants of GDRs have also been articulated.

Other frameworks are:

- **Equal Cumulative Per Capita Emission Rights approaches** (three variants) extends the concept of equal per capita rights to cover the entire historical and future carbon budget since (for example) the beginning of the industrial revolution, rather than just the portion of the budget remaining for the future. This approach, which has grown in influence over the last few years, particularly in China, India, and parts of civil society, takes into account the fact that some countries (generally, higher income countries that industrialised earlier) have consumed more than an equal per capita share of the total budget, resulting in a “carbon debt” that may be expressed as a negative allocation for the future.

- **Brazilian Historic Responsibility** is based primarily on historic responsibility for emissions: developed countries are each allocated emissions cuts based on the total contribution of their historic emissions (going back to 1800s) to the current global temperature increase. In the A1/nA1 version, capacity is reflected in the distinction between developed countries and developing country parties, and responsibility is used to quantitatively determine the level of obligation.

- **Oxfam** has proposed an approach, subsequently supported by various other NGOs, that uses a calculated responsibility and capability index to allocate an overall developed country target of 40%, and allows for a climate finance budget of $150bn to be allocated using the same method. Developing countries individual need for financing is assessed in line with available economic capability, taking into account intra-national inequality, and hence climate finance is provided on a sliding scale (below a minimum ‘available capability threshold’).

- **The EU** has (eg. EU Commission Proposal of 2009) suggested a method for distributing targets amongst Annex 1 countries that includes starting with an overall target for Annex 1 countries of 30% below 1990 levels by 2020 and allocating this target on the following basis: GDP per capita, addressing the capacity to pay for emission reduction within a country and through the global carbon market [capacity]; GHG per GDP, addressing the opportunities to reduce GHG emissions within one economy [capacity/mitigation potential]; Change of GHG emissions between 1990 and 2005, rewarding early action by developed countries to reduce emissions [reward early action/recognize latent mitigation potential]; Population trends over the period 1990 – 2005, recognizing different population trends between countries and as such different pressures on the projected emission evolution [equal rights to pollute]. In other words, the EU approach is highly parameterized and its effort-sharing implications depends upon the exact functions and values that are assigned to distinct parameters. These are typically not well explained or justified in EU proposals. In general, these proposals can be better understood as negotiating frameworks than as effort-sharing proposals.
Endnote 2 – Detail of modelling methods, sources and results

For the for 1.5°C emergency global pathway, CERP models allocate NZ year 2030 gross greenhouse gas (gGHG) targets of 26.1 to -6.4 MtCO2-e for 72 scenario permutations (a -57% to -111% change from the 1990 level). Modelling for contraction&convergence lies within this range, at 19.1 MtCO2-e (-69%). This translates to achieving net zero GHG emissions for New Zealand between the years 2022 and 2038 for most models, if meeting the Paris COP21 ambition of no more than 1.5°C global warming.

Methods

Data sources: Climate Equity Reference Project (CERP) data for NZ and world, with baseline (BAU – no change, no contribution, no pathways) and global emergency mitigation pathways to keep within 2°C and 1.5°C by gas (gross greenhouse gas emissions (gGHG), net GHG (nGHG) = gGHG + LUCF, fossil CO2 (fCO2), net CO2 (nCO2) = fCO2 + LUCFCO2), and multiple allocative models (288 permutations, 72 for gGHG) provided by Dr Christian Holz. Climate Equity Reference Project Online Calculator version 3.0.0 Data version 7.0.0dev Last modified 7 Apr 2016 17:28:41 PDT.

CERP uses the global emissions pathways of Climate Action Tracker (Climate Analytics, NewClimate Institute, Ecofys, Potsdam Institute for Climate Impact Research (PIK)) for reaching 2.0°C and 1.5°C by 2100, see https://climateactiontracker.org/methodology/global-pathways/, https://climateactiontracker.org/global/temperatures/

Scenarios analysed:

- Key scenarios selected from Höhne et al 2014 – per capita, current GDP, current emissions etc.
- Contraction & convergence (GCI, Stott 2012)
- CERP (GDRF)
  - GHGs (4 components): fossil CO2 alone; fCO2 + LULUCF = CO2-alone; fCO2+non-CO2 = gross GHG; fCO2+nonCO2+ LULUCF = net GHG
  - mitigation pathway (2): 1.5°C, 2.0°C
  - responsibility vs. capacity (3): 100%, 50%, 0% Responsibility
  - progressivity (3): no development threshold, $7,500 development threshold, $7,500
dev threshold + plus additional progressivity (luxury emissions threshold $50k)

Caveat: CERP had not, at the time of writing (mid-2016), updated its database baseline 1990 emissions for NZ for revised greenhouse warming potentials (GWPs), eg NZ’s gGHG emissions for 1990 is recorded in the CERP as 60.71 MtCO2-e, not the revised 66.72 MtCO2-e (Metcalfe 2015). Likewise, NZ nGHG is 23.39 MtCO2-e with the incorrect CERP baseline without revised GWPs, when it should be 38.07 with revised GWP; hence all modelled allocations may be too low.

Results for New Zealand under the 1.5°C global pathway

For gGHG, NZ’s expected emissions year 2030 under baseline = 85.6 MtCO2-e.
With the 1.5°C pathway, allocation would be 69.0 MtCO2-e (14% increase on 1990 level) on crude per capita model (NZ comprising 0.06% of world population, hence 0.06% of world’s efforts required to keep within 1.5°C). Lower targets for other scenarios, including 19.1 MtCO2-e (-69%) for contraction&convergence, and a range of 26.1 to -6.4 MtCO2-e (-57% to -111%) for the 72 CERP gGHG scenario permutations.

Further information on specific scenarios is available in the following tables and graphs. Other scenarios/gases are available on request.

<table>
<thead>
<tr>
<th>NZ per capita global budget</th>
<th>C&amp;C max</th>
<th>CERP 2.0' max</th>
<th>CERP 1.5' min</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 nGHG (MtCO2-e)</td>
<td>56.7</td>
<td>56.7</td>
<td>46.06</td>
</tr>
<tr>
<td>2017 nGHG</td>
<td>56.7</td>
<td>56.7</td>
<td>42.7</td>
</tr>
<tr>
<td>remaining net tCO2 budget - NZ</td>
<td>440.4</td>
<td>935.6</td>
<td>865.5</td>
</tr>
<tr>
<td>% of world budget</td>
<td>0.063%</td>
<td>0.134%</td>
<td>0.124%</td>
</tr>
<tr>
<td>yrs to reach 0 emissions, to stay within budget</td>
<td>15.5</td>
<td>33</td>
<td>40.6</td>
</tr>
<tr>
<td>(linear decrease from 2014)</td>
<td>year that NZ reaches 0, to stay within budget</td>
<td>2033</td>
<td>2050</td>
</tr>
<tr>
<td>year 2030 nGHG</td>
<td>9.3</td>
<td>34.4</td>
<td>27.90</td>
</tr>
<tr>
<td>% reduction in 2030 cf 2014</td>
<td>84%</td>
<td>39%</td>
<td>51%</td>
</tr>
</tbody>
</table>
### Table: CERP distributive/allocative models for NZ, gGHG (MtCO2-e), by global emergency pathway (2.0°C, 1.5°C)

*non-updated CERP data without revised GWP*

#### CERP gGHG emissions targets for NZ 2030 (gross MtCO2-e)

<table>
<thead>
<tr>
<th>year</th>
<th>1990</th>
<th>2013</th>
<th>2030</th>
<th>2030 pathway</th>
<th>2.0' pathway</th>
<th>1.5' pathway</th>
<th>scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>baseline</td>
<td>60.7</td>
<td>76.3</td>
<td>baseline</td>
<td>baseline</td>
<td>baseline</td>
<td>baseline</td>
<td></td>
</tr>
<tr>
<td>base case scenarios:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mid-equity settings (50:50% resp/capacity, $7.5k development threshold, no luxury threshold)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1950 resp</td>
<td>21.65</td>
<td>5.60</td>
<td>as per GDRf; 1950 responsibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970 resp</td>
<td>20.84</td>
<td>4.59</td>
<td>when nonCO2 became included in measurements; 1970 responsibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990 resp</td>
<td>22.63</td>
<td>-6.87</td>
<td>post-Kyoto; 1990 responsibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>highest modelled CERP allocation</td>
<td>38.01</td>
<td>26.10</td>
<td>historic resp cuml since 1850, 100% resp (nil capacity), no development threshold (ie regressive)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lowest modelled CERP allocation</td>
<td>12.53</td>
<td>-6.43</td>
<td>historic resp cuml since 1850, 100% resp (nil capacity), development threshold $7.5k</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>proxy targets according to responsibility alone (viz cumulative historic emissions):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1950 resp</td>
<td>36.23</td>
<td>23.89</td>
<td>as per GDRf; 1950 resp, nil equity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970 resp</td>
<td>34.60</td>
<td>21.86</td>
<td>when nonCO2 included; 1970 resp, nil equity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990 resp</td>
<td>37.07</td>
<td>24.98</td>
<td>post-Kyoto; 1990 resp, nil equity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nil resp (ie 2013 current)</td>
<td>23.28</td>
<td>nil historic resp, nil equity = contraction&amp;convergence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Distributive/allocative models for NZ, 1.5°C global pathway:

<table>
<thead>
<tr>
<th>model</th>
<th>1990</th>
<th>2030</th>
<th>% change 1990-2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>(baseline)</td>
<td>60.7</td>
<td>85.6</td>
<td>41% (baseline projections - no change, no contribution)</td>
</tr>
<tr>
<td>pop (per capita)</td>
<td>64.8</td>
<td>7% NZ makes per capita contribution (0.06% of world population) to global effort (gap pathway vs baseline), 2015 onwards</td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>45.5</td>
<td>-25% NZ makes GDP-based contribution (its % of world GDP, 0.15%) to global effort (gap pathway vs baseline), 2015 onwards</td>
<td></td>
</tr>
<tr>
<td>current GHG</td>
<td>22.8</td>
<td>-51% NZ contributes current GHG gross emissions (its % of world current emissions, 0.16%) for global effort (gap, 2015+)</td>
<td></td>
</tr>
<tr>
<td>cuml GHG</td>
<td>20.7</td>
<td>-66% NZ contributes cumulative GHG gross emissions 1990-current (0.19% of world emissions 1990-current) for global effort (gap, 2015+)</td>
<td></td>
</tr>
<tr>
<td>Climate Equity Reference framework</td>
<td></td>
<td></td>
<td>Greenhouse Development Rights (GDR) framework fair shares calcs for NZ</td>
</tr>
<tr>
<td>- 1990-2013 cuml emissions resp, mid-equity s</td>
<td>-6.9</td>
<td>-11% GDR fair shares calcs for NZ, cuml emissions 1990-2013, capability=GDPpc, $7500 development threshold, no luxury threshold</td>
<td></td>
</tr>
<tr>
<td>- 1990-2013 cuml emissions resp, mid-equity s</td>
<td>5.6</td>
<td>-91% GDR fair shares calcs for NZ, cuml emissions 1990-2013, capability=GDPpc, $7500 development threshold, no luxury threshold</td>
<td></td>
</tr>
<tr>
<td>- highest modelled CERP allocation</td>
<td>26.1</td>
<td>-57% GDR fair shares calcs for NZ, historic resp cuml since 1850, 100% resp (nil capacity), no development threshold (ie regressive)</td>
<td></td>
</tr>
<tr>
<td>- lowest modelled CERP allocation</td>
<td>-6.4</td>
<td>-111% GDR fair shares calcs for NZ, historic resp cuml since 1950, 100% resp (nil capacity), development threshold $7.5k</td>
<td></td>
</tr>
</tbody>
</table>
Health benefits and savings of equitable climate mitigation in New Zealand

A Zero Carbon Act will need to set targets and action that are fast, fair, firm, and founded on Te Tiriti o Waitangi.

Climate change has been identified as both the greatest threat to global public health and the greatest opportunity to address our biggest causes of mortality and morbidity.[1] Proactively combating climate change is one of the most important actions the New Zealand government can take to improve outcomes for health. Climate protection can also help with many of the government’s other social and health priorities, including reducing health inequities and eliminating child poverty.

If climate change continues unchecked, the burden of disease, disability and premature death from climate change will continue to accelerate globally. New Zealand will not be immune. Conversely, potential win-wins for health (co-benefits) exist in addressing climate change across New Zealand’s main climate polluting sectors: transport, housing, energy, agriculture and food, and health.

Health co-benefits of climate action [1,2,4-8]
The building blocks for health lie well outside the health sector and, like health services, are unjustly distributed by income and ethnicity. In particular, this undermines the Treaty and other rights to health for Māori.[2,3]

Climate actions that are timely, well-designed and fairly implemented, can lead to a healthier nation, a healthier environment and alleviate growing financial pressures on the health sector in New Zealand.[1,2,4-8] Financial costs of responding to climate change will be offset by the cost savings of health co-benefits. There are actions and policies that can be valued, included in cost benefit assessments and implemented now.

Specific examples are in the table below.

<table>
<thead>
<tr>
<th>Emissions reduction measure (mitigation)</th>
<th>Health benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero-carbon public and active transport by rebalancing the transport investment</td>
<td>Physical activity-related including obesity, air pollution-related, road traffic injuries, equitable access to education and employment, improved social connection, improved economic resilience, and more [9-17]</td>
</tr>
<tr>
<td>Housing-related energy efficiency through investment in housing insulation and quality and zero-net carbon heating including in private rental housing</td>
<td>Reductions in lung cancer, cardiovascular and respiratory disease, extreme temperature related deaths including cold-related deaths, asthma, child poverty [18-20]</td>
</tr>
<tr>
<td>Reducing production and consumption of animal products through pricing, removal of perverse incentives and health promotion</td>
<td>Ischaemic heart disease, cancer, obesity, freshwater quality, food and waterborne infectious disease, antimicrobial resistance, food insecurity [21-28]</td>
</tr>
<tr>
<td>Zero-carbon energy generation through no new fossil fuel exploration, putting climate change back in the RMA and taxing pollution</td>
<td>Air pollution related (cardiopulmonary mortality, cancer), occupational injury, social and health equity [4]</td>
</tr>
</tbody>
</table>

Health equity and harms [1-3]
Climate action that prioritises health equity has significant potential to reduce health inequities for Māori, Pacific people, and low-income New Zealanders. For example, recycling carbon penalty
revenue back to low-income families would remove the risk of an extra carbon-cost burden, and could provide revenue for initiatives that improve health (and lower emissions) for low-income New Zealanders (eg. retrofitting insulation to make homes warm and dry can reduce childhood asthma and chest infections, being leading causes of hospital admissions, particularly for Māori and Pacific children).

These win-wins (co-benefits) will not come automatically. There is also potential for co-harms to health and health equity from mitigation and adaptation actions (examples include: food crop biofuels, incentivising expensive electric private cars at the expense of public and active transport, an Emissions Trading Scheme from which only corporations profit, and poorly managed retreat from sea level rise). Many health equity risks of climate policy can be reduced through the effective government hypothecation (directed recycling) of carbon price revenues – making it crucial that carbon price instruments enable this.[29,30]

References


