

# Zero Carbon Bill - Submission by Wise Response Society Incorporated

19 July 2018

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And the  
wind says speak truth

to power, and the rivers  
say respect our powers,

and the night skies  
say remember the stars

have seen it all, it's time  
we bowed before truth.

- Brian Turner

## Part A: General points not covered by the Discussion Document questions

### Name of Bill

1. This bill is addressing the impacts of a range of GHG emissions because of anthropogenic activities. We suggest therefore that the Bill should be named to better reflect this. We propose the Net Zero<sup>1</sup> Anthropogenic Emissions Bill (NZAEB).

### Ethics and Values

2. Wise Response recommends that the concepts of
  - ) improving the overall well-being of all New Zealanders,
  - ) having regard to a wide range of communities of interest and population groups in New Zealand society,
  - ) the need to live within the material and energy limits of Earth's environmental systems that are essential for human and other life, and
  - ) the need to integrate climate transition, adaptation and mitigation requirements with responses to other risks we face be incorporated in the purpose and aims of the proposed Climate Change Commission (CCC).
3. There is insufficient acknowledgement of the need to develop an ethic other than exploitation of the Earth's resources for human utility as the dominant principle underlying our economic activity. Profound shifts in our intrinsic values, culture and way of life (for our communities, our land, and for the wellbeing of individuals) are required if we are to build and sustain the necessary impetus for change. For example, our continuing uneconomic growth makes us complicit in a process that is currently on track for an ecological catastrophe for our children and generations beyond them.
4. Thus, the above recommendation is intended to acknowledge that climate change is but one symptom of anthropogenic activities encountering resource limits or planetary boundaries (in this case atmospheric assimilation capacity of GHG pollutants) and that solving climate change will achieve sustainability when we successfully address the way we use and manage other limited resources. We recommend the following three general issues in particular must be examined (see Appendix A for detail).

### Impact of energy limits on climate change

5. Concurrent with climate change, we are depleting finite resources. Current supply constrained projections<sup>2</sup> for future oil supply converge on roughly a 50% reduction in all liquids supply by 2035-2040. All GDP in modern industrial economies is dependent on fossil fuel energy expenditure right through the mining, transportation, refining, transportation, manufacture, transportation, end use and ongoing operation and maintenance. EV's are not a replacement for heavy transport trucks to give equivalent

<sup>1</sup> Net zero carbon emissions refers to achieving net zero [carbon emissions](#) by balancing a measured amount of carbon released with an equivalent amount sequestered or offset.

<sup>2</sup> Kopits 2015 <http://bit.ly/1NGQlbo>

range, and no commercially viable, sufficiently energy dense battery is on the horizon. The energy transition would have taken decades to achieve to sustain anything like business as usual.

6. The above factors when considered together pose a big question mark against humanities capacity to 'cook itself' – i.e. cause the higher Representative Concentration Pathways (RCP's). This is not to say that no action is required, rather the "decision space" indicated by either Anthropogenic GHG emissions or reducing supply rate is fundamentally shifted.
7. **Hence, certain 'solutions' will fall foul of the second law of thermodynamics, and it is crucial that this dimension be included in planning by the CCC or any climate risk assessment.**

### Scope Scale and Content of Risk Assessment and Plans

8. The Pentagon has termed climate change a 'risk multiplier', and this framing speaks to the fact that all other areas of risk are affected by the changes we will see in the climate systems.
9. **Therefore, Wise Response recommend that the risk assessment scope should be extended to cover the 5 broad areas of risk Wise Response identified in our 2013 appeal for a biophysical risk assessment, the scale should be economy wide, and the content should be body quantitative and qualitative.**
10. A system dynamics perspective should be implemented alongside conventional modelling, to allow bodies tasked with responding effectively to get sufficient understanding for the dynamics, and trade-offs.
11. The Risk Assessments should be carried out centrally, but with positive feedback (continuous improvement) from risk management / futures / resilience building teams within Ministries.

### Final framing of the issues and options

12. It is important to be clear that while supporting the general thrust of the discussion document, and that targets need to set now, it has become very evident from the range of professional views within our Society that final framing of the technical issues needs some more discussion.
13. **Therefore Wise Response recommends that there needs to be the flexibility in the legislation to enable the CCC to address these complexities through discussion during the first few months after their establishment.**

## Part B: Responses to the 16 Questions in the Discussion Document

### **Q1. What process should the Government use to set a new emissions reduction target in legislation?**

#### **Options given:**

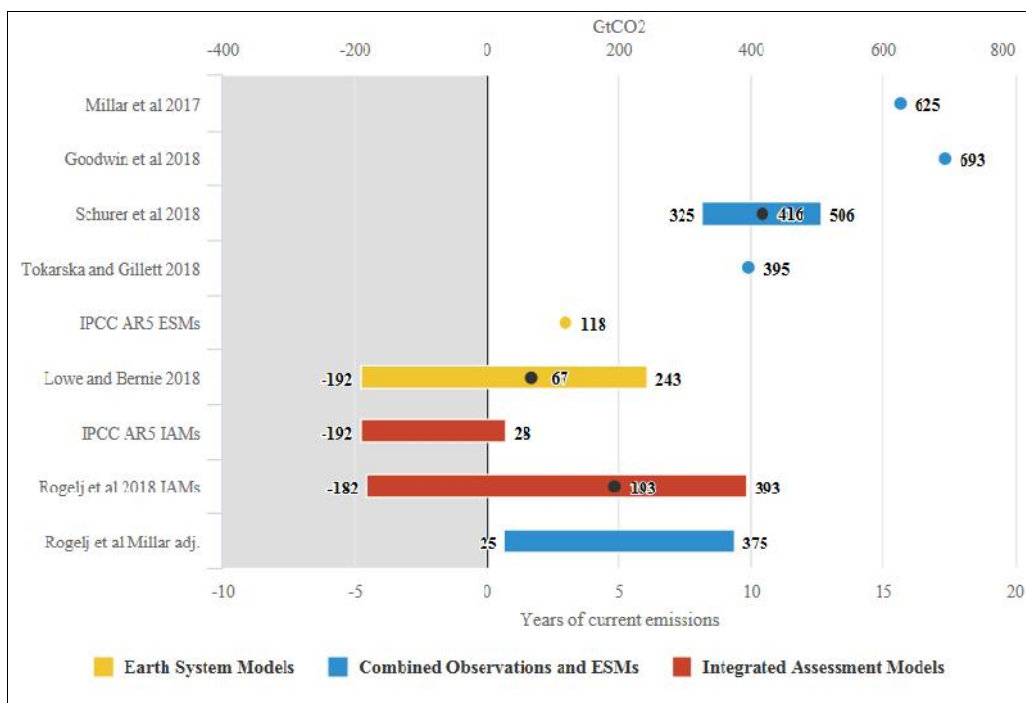
- i. the Government sets a 2050 target in legislation now.**
- ii. the Government sets a goal to reach net zero emissions by the second half of the century, and the Climate Change Commission advises on the specific target for the Government to set later.**

14. **Wise Response recommends that the Government sets a flexible target based on the best science now (i.e. Zero Net Carbon<sup>1</sup> by 2050) but that that target can be made more stringent and specific should new science or events dictate but not less stringent.**
15. **Rationale:** The Paris agreement called for a limit of 2 °C warming but preferably 1.5 °C. With an apparent growing number of extreme climate events the world over, calls for an upper limit of 1.5 °C for global warming have intensified. Yet leading climate scientists have warned that the Earth is perilously close to breaking through the 1.5 °C limit, and this only three years after the target was set in 2015 (see Figure below).
16. To limit warming to 1.5 °C by 2025 all coal-fired power stations across the planet will have to have closed down. And by 2030 humanity will have to be rid of the internal combustion engine entirely. Clearly, such change is tremendously challenging. Even that decarbonisation will not guarantee restricting the rise to 1.5 °C but it will give humankind a chance.<sup>3</sup>.
17. Similarly, because nearly any plausible scenario would require a large amount of negative emissions later in the century, the carbon budget itself is not a hard cap on anthropogenic emissions. No matter what carbon budget is used, there is still less than 0.5 °C additional warming to go before the 1.5 °C limit is passed and only a few decades before the world has to reach net-zero – and then net-negative – emissions<sup>4</sup>.
18. At the international level, efforts to remove fossil fuel subsidies, cease the planning and building of new coal plants, and the exploration for fossil fuels, have yet to make significant headway. Changing physical infrastructure investment and social and cultural behavioural patterns typically takes time. Humanity does not have much time, to make the necessary changes to transition to a low carbon economy.

<sup>3</sup> McKie, R. 6 August 2016. Scientists warn world will miss key climate target. Retrieved from <https://www.theguardian.com/science/2016/aug/06/global-warming-target-miss-scientists-warn>

<sup>4</sup> Carbon Brief. 9 April 2018. Analysis: How much 'carbon budget' is left to limit global warming to 1.5°C? <https://www.carbonbrief.org/analysis-how-much-carbon-budget-is-left-to-limit-global-warming-to-1-5c>

**Figure 1: Remaining carbon budget for a 66% chance of staying below 1.5 oC warming from reports released over the last 2 years**



Source: Hausfather Z, Carbon Brief, 9 April 2018

19. **Wise Response recommends that cross party support for the target be secured to avoid the risk of the target being changed for political expediency, rather than due to scientific indicators.**
20. The lack of any certainty about our capacity to remove anthropogenic emissions from the atmosphere after mid-century is another reason to act with all haste now and not permit an option for the current target at 2050 to slip.
21. Of course, the planned charging regime, reduction rate, and target levels for methane from any continuing livestock farming would still need to be taken into account in the mix of science-based reductions in GHG forcing required to achieve the next milestone consistent with the legislated goal. If achieving those requires a large scale shift out of livestock, then it is in all our interests that that be an option that the Commission can recommend without being obstructed by some predetermined framing.
22. A proposal that we think warrants further consideration, being based on the same science, is that which differentiates gases and links them to appropriate offsets and avoids the simplistic two baskets approach.
23. However, three key questions remain: 1) differential pricing based on gas profiles and 2) acceptable stabilisation levels of short-lived gases, and 3) separating anthropogenic sources from natural sources - enteric methane from wetlands methane.

**Q2. If the Government sets a 2050 target now, which is the best target for New Zealand?**

**Options given:**

- i. **net zero carbon dioxide: Reducing net carbon dioxide emissions to zero by 2050.**
- ii. **net zero long-lived gases and stabilised short-lived gases: Long-lived gases to net zero by 2050, while also stabilising short-lived gases.**
- iii. **net zero emissions<sup>5</sup>: Net zero emissions across all greenhouse gases by 2050.**

24. **Wise Response recommends that the zero carbon “target” be Option iii. Within this option the main focus needs to be on reducing gross anthropogenic emissions of all GHGs and a secondary focus, to reduce net anthropogenic emissions. Wherever possible planting native forests or selection logging of mixed-age exotic forest plantations should take precedence over short term plantation forests for achieving net anthropogenic emissions objectives.**
25. **Given its complexity to achieve a multigas approach, Wise Response strongly recommend any decision on this key point should be for the proposed CCC when it is appointed, once the Bill becomes enacted, and not a matter for public submission.**
26. **Rationale:** Option iii is recommended because no decision now should in anyway risk handicapping the CCC from giving its best advice or impede NZ from taking the steps necessary to achieve or better, the 2050 zero limit.
27. As we understand the discussion paper, the CCC's primary task is to determine what changes New Zealand needs to make to their current activities to comply with the 2050 limit. As achieving that limit successfully is crucial for our common future and that of our children, it must take priority above all else, including short-term economic impacts through the likes of trade exposure.
28. The issue of CO<sub>2</sub>-equivalence is related to this. **All international agreements have used CO<sub>2</sub>-equiv as a key metric.** This is a one-basket approach. It is well-known that there are serious difficulties in defining “CO<sub>2</sub>-equiv”. Most practical policies need to look at the technical, political and cost aspects of reducing emissions of individual gases. However, the NZ policy framework must be consistent with international agreements. This is a climate issue. It is not only GHGs that affect the climate, but gases like NO<sub>x</sub>, CO and VOCs, and also (more importantly), aerosols. These factors need to be included. Aerosols are crucially important globally, and in some NZ urban areas.

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<sup>5</sup> Zero GHG emissions (in absence of the qualifier net) would imply that there are no anthropogenic GHG emissions. This is an implausible scenario given that for some parts of the agricultural, grazing, and life-stock sectors only low technical mitigation potentials have yet been identified. Joeri Rogelj, Michiel Schaeffer, Malte Meinshausen, Reto Knutti, Joseph Alcamo, Keywan Riahi and William Hare, Zero emission targets as long-term global goals for climate protection, Environ. Res. Lett. 10 (2015), doi:10.1088/1748-9326/10/10/105007



29. 'Zero emissions' for ruminant CH<sub>4</sub> would require ruminant animal numbers to go to zero or require complete capture of CH<sub>4</sub> from the animals. Either option would be extremely difficult in terms of a viable NZ agriculture sector, but 'net zero anthropogenic emissions' across all NZ greenhouse gases combined might be a possible target.
30. In addition, any methane emission reductions by NZ would need to be coordinated with global anthropogenic emissions reductions and methane concentrations in the atmosphere. The latter is important as many positive feedback processes are likely to increase natural ecosystem emissions to the extent that the usefulness of any further anthropogenic reductions are undermined.
31. New Zealand's target must be primarily guided by the Paris Agreement and by any future international agreements signed by the Government which means NZ's climate change processes and metrics must be compatible.
32. Anthropogenic emissions of short-lived gases must be stabilised at a level compatible with the Paris Agreement and the Net Zero 2050 target. But for reasons given above, the precise level of stabilisation required, and the best methods of achieving it, cannot be determined now, so we recommend that it be subject to advice from the CCC and policy development by Parliament and may need amending in light of future developments in mitigation options, international developments, and many other factors. There are some basic mitigation methods for ruminant methane that are available now and a mechanism to ensure that these methods are adopted is required.

### Factors against Option ii: carbon plus stabilising short-lived gases

33. Confusing the issue with the (conceptually flawed) two-basket approach is not recommended for a number of reasons.
  - ) The UNFCCC recognizes that there are different ways to calculate CO<sub>2</sub>-equiv and gives countries flexibility here.
  - ) The two-basket approach also removes another important aspect of flexibility. With a CO<sub>2</sub>-equiv target, there is the freedom to reduce emissions across a range of gases and to modify policies at an individual gas level over time.
  - ) It opens the way for exemptions in any Emissions Trading Scheme that would cause cross subsidy from carbon to methane emitters and may not be what the CCC recommends. We have made past mistakes with such exemptions for the likes of non-point source nutrients.
34. If we based our decarbonisation plans around stabilising methane at present levels (34MtCO<sub>2</sub>e), we would be heading for net anthropogenic emissions 50% below 1990 levels in 2050 (gross anthropogenic emissions in 1990 around 68Mt, present methane 34Mt). This would not be consistent with the Paris Agreement and would very likely be judged insufficient internationally.
35. Nearly all of the arguments around methane point to it being more important to decrease it than GWP100 would suggest.
36. A new report headed by Massey University's Professor Ralph Sims for the UN Global Environment Facility concludes that currently, the global food supply system is not



sustainable, and that present policies will not cut agricultural emissions sufficiently to limit global warming to 1.5°C above pre-industrial levels <sup>6</sup>

37. Avoiding meat and dairy products is the single biggest way to reduce food production's environmental impact, according to the scientists behind the most comprehensive analysis to date of the damage farming does to the planet<sup>7</sup>. It shows that while meat and dairy provide just 18% of calories and 37% of protein, it uses the 83% of farmland and produces 60% of agriculture's greenhouse gas emissions. Indeed, without meat and dairy consumption, global farmland use could be reduced by more than 75% and still feed the world and reduce stress on biodiversity<sup>8</sup>.
38. Therefore, with such a large anthropogenic emission and environmental footprint, there is a massive potential to reduce GHG forcing, alongside competition from plant-based protein sources, global pressure to move away from intensive livestock and dairy production from ruminants will inevitably increase.
39. Understanding where to draw the line is drawn between Anthropogenic- and non-Anthropogenic methane is clearly essential for mitigation strategy but not yet well understood<sup>9</sup>.
  - ) if the methane increase over the last 10 years is from more intense rain events affecting wetlands across the Amazon and Congo basins at the same time as deforestation has led to a longer seasonal cycle for waterlogged ground areas, then is that anthropogenic?
  - ) or, if the increase is due to the increasing extent of the Hadley cell moving CH<sub>4</sub> more rapidly out of the tropics and into regions with lower atmospheric removal rates, then is that anthropogenic?
  - ) or, given the growing evidence for biogenic methane production in the surface oceans that have a large decrease in methane solubility as sea water warms, then is that an anthropogenic source?
40. Dr Manning adds, "Unfortunately methane is a mystery gas and the 2016 revision to its radiative forcing of the climate system... has now increased that by 23%. Perhaps it's time to apply a precautionary principle". This supports our second recommendation under Q2 above (Para 25), that this be a matter for CCC determination. An example of the scale of forecasting difficulty is given in Appendix B.
41. Under these circumstances it makes no sense to establish an anthropogenic emissions reduction regime that in any way delays the transition or hinders objective analysis and recommendations by the CCC.

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<sup>6</sup> A future food system for healthy human beings and a healthy planet A STAP document June 2018 <http://stapgef.org/sites/default/files/publications/STAP%20Report%20on%20food%20system.PDF>

<sup>7</sup> Avoiding meat and dairy is 'single biggest way' to reduce your impact on Earth, D Carrington <https://www.theguardian.com/environment/2018/may/31/avoiding-meat-and-dairy-is-single-biggest-way-to-reduce-your-impact-on-earth>

<sup>8</sup> J Poore and T Nemecek, Reducing food's environmental impacts through producers and consumers *Science* 01 Jun 2018: Vol. 360, Issue 6392, pp. 987-992

<sup>9</sup> Manning, Martin Personal communication July 2018

## Factors supporting Option iii: all gases

42. While every clause of the Paris Agreement is relevant to determining each country's actions, we draw attention to the full text of Article 4.1:

*In order to achieve [Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels], Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.*

43. The “equity” clause has been widely discussed (see, e.g., The Paris Agreement on Climate Change: Analysis and Commentary, ed. D. Klein et al., OUP, 2017); developed countries should reach net zero earlier than “in the second half of this century”. Net zero anthropogenic emissions by 2050 is compatible with this goal. Several other developed countries and regions have interpreted the Paris Agreement in this way already: France and Germany (net zero by 2050), Sweden and Hawaii (2045), and Norway (2030). In January 2018, the European parliament voted to move forward with net zero anthropogenic emissions by 2050.<sup>10</sup>
44. Option ii under Q2, while it has the potential to be an ambitious target depending on the level of stabilisation of short-lived gases, has an apparently serious failing in that it appears to allow emissions of long-lived gases to be offset by short-term carbon sinks, while allowing short-lived gases to escape mitigation efforts.
45. The 2050 target must be guided by considerations of short- and long-term actions and aspirations as well as the desired state in 2050. Short-term factors strongly point towards reducing methane emissions; this is discussed in detail below. Only Option iii is compatible with long-term climate goals for the planet. A primary focus of any policy has to be on dramatically reducing gross anthropogenic emissions. Option ii is a medium-term solution that risks locking in greater difficulties in the long term.
46. The tree planting effort in the 1990s giving negative emissions will be lost by the 2020s as these trees are harvested. The 7th National Communication shows NZ forestry emissions going to zero by 2030.
47. There is considerable uncertainty around carbon budgets. This argues for a more ambitious target rather than a lower target<sup>11</sup>. In addition, the dilution of probabilities creeping into climate modelling is disturbing. A probability of 66% chance of staying below 2 °C (or 1.5 °C gives us a ‘reasonable’ chance of success) but going to a 50%

<sup>10</sup> Equity further indicates an ambitious target for New Zealand because we have relatively high per-capita emissions; we have had relatively high emissions for a long time; and we have failed to decrease our emissions since 1990. . In this regards it is thought NZ,s main effort should be to financially assist the island countries of the Pacific region to decrease their anthropogenic emissions in accordance with their respective NDCs. This effort is already underway.

<sup>11</sup> <https://www.carbonbrief.org/analysis-how-much-carbon-budget-is-left-to-limit-global-warming-to-1-5c>, and Peters, G., Beyond carbon budgets, Nature Geoscience 2018, <https://www.nature.com/articles/s41561-018-0142-4>.

chance is akin to tossing a coin about the future of the planet. Such diluted probabilities raise risk and are clearly not good planetary management.

### Factors supporting immediate reductions of short-lived GHG emissions (eg methane)

48. As the Zero Carbon Bill (ZCB) is looking towards 2050 then a GWP for CH<sub>4</sub> on a shorter time frame becomes necessary not to devalue the CH<sub>4</sub> reductions impact - which is 86, compared with GWP100 of 25. So in our interpretation, the science clearly favours the Option iii framework, with the detail to be established through the CCC.
49. The present baseline, reference position for evaluating methane emissions is GWP100<sup>12</sup>. The Productivity Commission argues strongly to keep GWP100 for methane.
50. Having said that, there are other factors, not considered by the Productivity Commission in their draft report, that further indicate the need for reductions in methane emissions. UNFCCC reporting uses emission factors (28 for methane) that do not include carbon cycle feedbacks; the IPCC AR5 emission factor for methane including carbon cycle feedbacks (primarily involving ozone) is GWP100 = 34 (Chapter 8, Table 8.7). Earlier IPCC reports, however, used 21 (AR2) and 25 (AR4) for GWP 100 for methane and there is a good deal of variation in the GWP value used for methane in country reporting.
51. Wedderburn-Bisshop et al<sup>13</sup> argue that the use of GWP100 underestimates the amount of CO<sub>2</sub> reduction needed to offset the warming effects of a given emission of methane by a factor of 2.5, and also underestimates the benefits of rapid reductions of methane emissions. They recommend the use of the GWP20 emission factor, namely 86, for methane. Wigley<sup>14</sup> reaches the same conclusions<sup>15</sup>.
52. The idea that constant emissions of methane at present levels means we are not contributing to further warming is highly misleading<sup>16</sup>.

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<sup>12</sup> As noted by the Productivity Commission, "While amending or moving away from GWP<sub>100</sub> is possible, it risks New Zealand falling out of step with international emissions reduction frameworks under the United Nations Framework Convention on Climate Change." They summarize the arguments of several researchers and groups arguing for alternative metrics that weight methane either higher or lower than GWP<sub>100</sub>, finally recommending that New Zealand does not use independently determined metrics for domestic policymaking purposes. Any policy based on another metric would still be evaluated internationally using GWP<sub>100</sub>; adopting an alternative measure that either deliberately or collaterally limits our obligations or improves our mitigation is self-serving and is not a way to approach an international issue which relies on cooperation for success. New Zealand is heavily reliant on international cooperation – our strategy so far has been based around promoting it.

<sup>13</sup> Neglected transformational responses: implications of excluding short lived emissions and near-term projections in greenhouse gas accounting, Int. J. Climate Change: Impacts and Responses 7(3), 2015

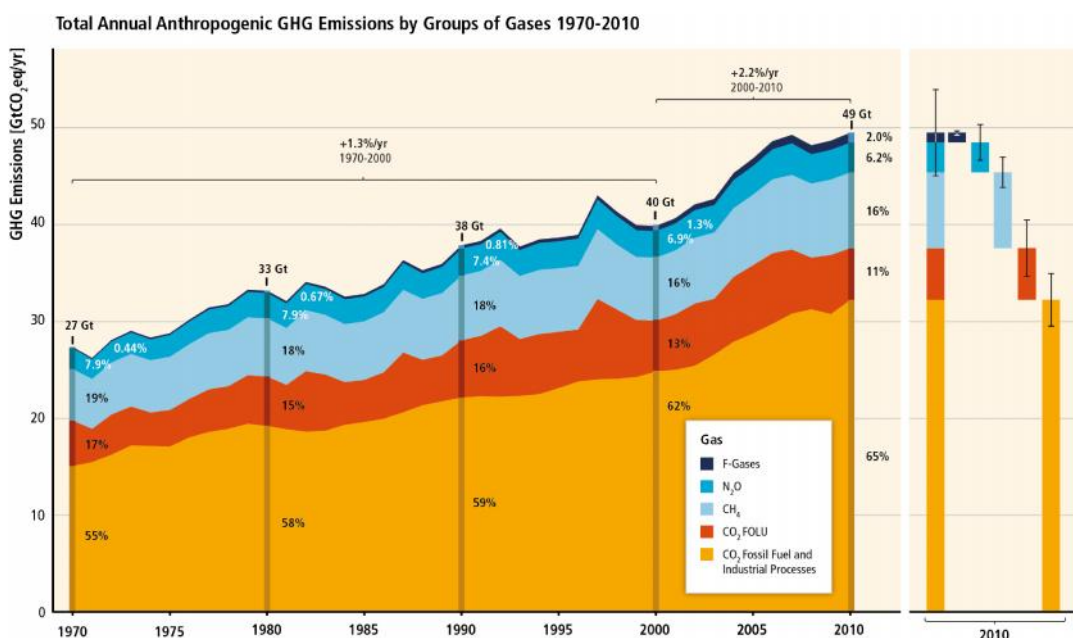
<sup>14</sup> The Kyoto Protocol: CO<sub>2</sub>, CH<sub>4</sub> and climate implications, Geophys. Res. Lett. 25(13) 2285-2288, 1998

<sup>15</sup> The question of the appropriate level of emissions of short-lived gases depends on many factors: costs and benefits locally and globally, mitigation opportunities, the changing market for our products, and other environmental factors. It does not depend on our level of emissions in 1990. It is not accepted by any parties to the Paris Agreement that high emissions in 1990 creates an entitlement to emit in the future.

<sup>16</sup> At present methane is contributing about 28% of the GHG-induced climate forcing.

53. It is expected that reducing CO<sub>2</sub> emissions alone will not be sufficient to limit warming to 1.5 °C. Constant emissions of methane provide a constant level of climate forcing. Reducing the total emissions of methane is likely to provide a drop-in temperature commensurate with the 10-12-year half-life of the gas in the atmosphere; reducing emissions of CO<sub>2</sub> does not. Reducing anthropogenic methane if ecosystem methane continues to increase will be counterproductive so total all methane mitigation needs to be considered as a package.

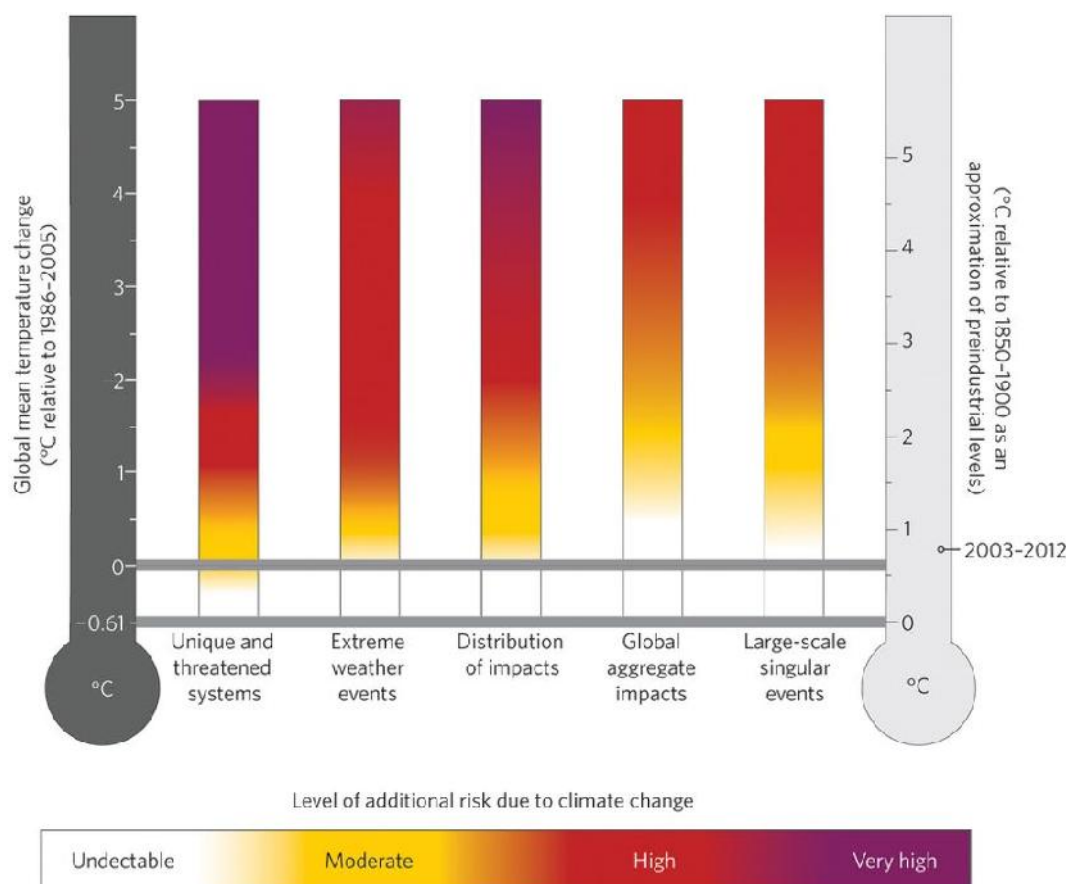
**Figure 2: Total Annual Anthropogenic Greenhouse Gas Emissions by Groups of Gases 1970-2010.**



Source: IPCC WG3 AR5

54. Climate impacts increase rapidly with temperature; some economic studies put 2 degrees of warming at 4-8 times as damaging as 1°C of warming (compare temperatures on the right-hand axis of the graph below), but there is no certainty about what tipping points we are approaching or might have breached. Therefore, urgent action is required on all anthropogenic emissions and the CCC should not be hampered by limits or exclusions that might prevent the most effective action.

**Figure 3: A global perspective on climate-related risks.**



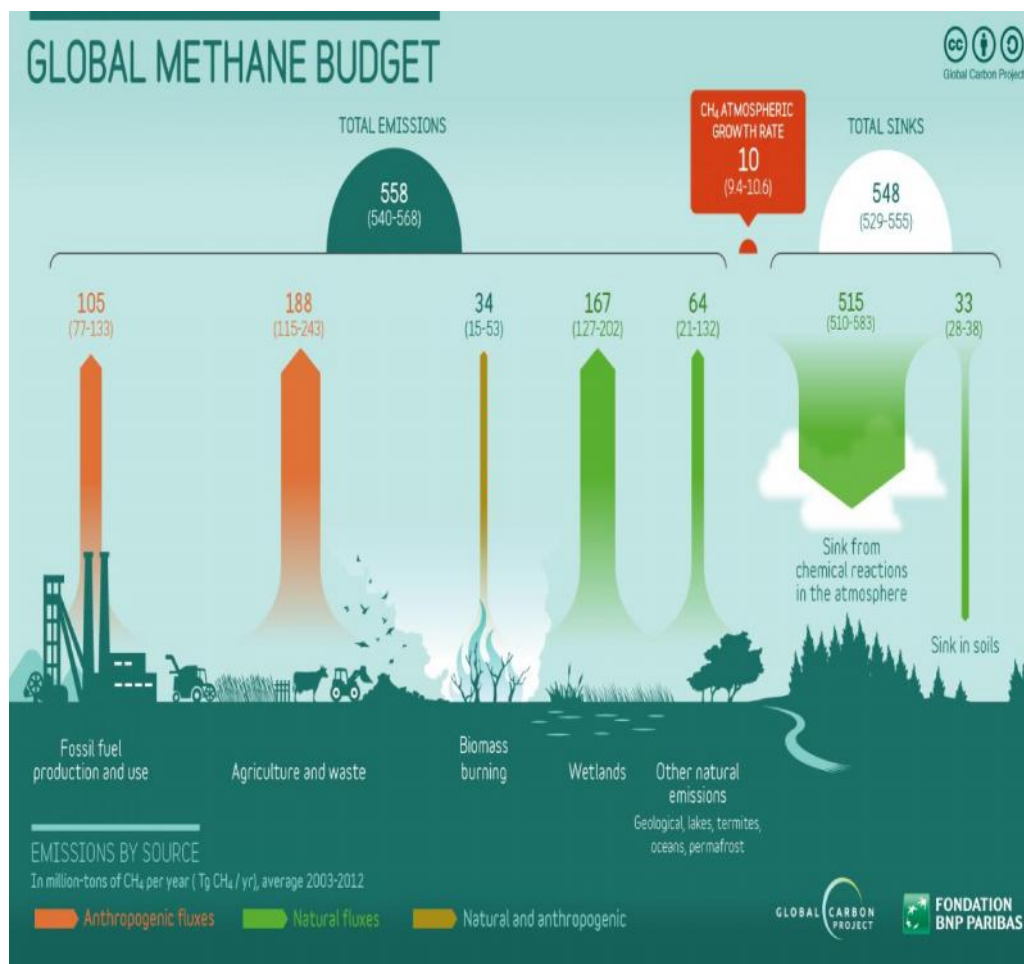
Source: IPCC WG2 AR5

55. If it is accepted that global methane emissions must be reduced, then the country with the highest per capita emissions of methane, New Zealand, 6 times the global average, must play its part, notwithstanding that, reducing emissions of fossil methane is even more important than reducing agricultural methane. At the same time a cautious eye must be focussed on ecosystem methane emissions which are part of the overall climate feedback effects to make sure these do not overwhelm direct anthropogenic emissions.
56. The modelling commissioned by the Productivity Commission found that Option iii under Q2 is achievable by New Zealand and is no more difficult than for other countries (the required carbon price in 2050 is at or below that required internationally)<sup>17</sup>.

<sup>17</sup> As well as having unusually high levels of agricultural methane emissions, New Zealand has large amounts of land available and suitable for forestry. Our positive and negative features are somewhat balanced. It is universally accepted that forestry will play a large role in our climate mitigation effort. However, the two features are even more strongly linked than is often realized. Forestry and ruminant methane both act as flows. A constant flow of methane produces a constant level of climate forcing. A plantation forest, assuming it can be selectively and sustainably harvested and replanted forever, sequesters a constant stock of carbon. (i.e. the forest stock is constant not a constant flow. When the forest is growing i.e. 'turns on a tap' and a flow of CO<sub>2</sub> comes from the stock in the atmosphere. When the forest is then cut down this CO<sub>2</sub> (mostly) flows back to the atmosphere.



**Figure 4: Global Methane Budget**



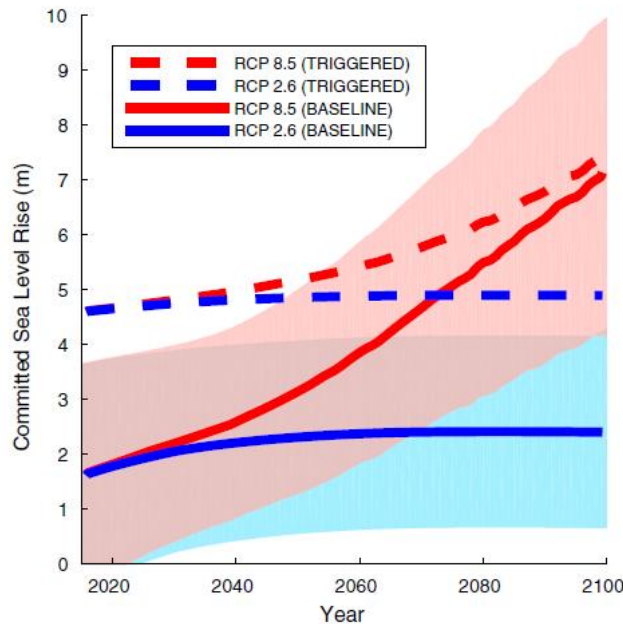
Source: Global Carbon Project, 2016.

### Urgency to drawdown emissions

- Anthropogenic carbon emissions have locked in long-term sea-level rise that poses profound challenges to coastal communities. Analyses based on previously published relationships linking global warming and sea level rise indicate that unabated anthropogenic carbon emissions up to the year 2100 will commit an eventual global sea-level rise of 4.3–9.9 m.
- The point is that, although immediate sea level rise may appear manageable, it is now that a lack of action sets in motion long-term changes that will be unmanageable and therefore the long-term viability of thousands of coastal municipalities and land currently inhabited by tens of millions of persons hang in the balance<sup>18</sup>.

<sup>18</sup> ESRL Global Monitoring Division  
<http://www.pnas.org/content/pnas/early/2015/10/07/1511186112.full.pdf>

**Figure 5: Committed Sea Level Rise**



Source: National Academies of Science, 2016.

The current CH<sub>4</sub> increases (Fig. 14a in Fig. 6 below) show significant deviation developing between the RCP2.6 mitigation path required to achieve a <2 degree temperature departure and the present global trend.

**Figure 6: Comparison of observed CH<sub>4</sub> and N<sub>2</sub>O amounts and RCP scenarios.**

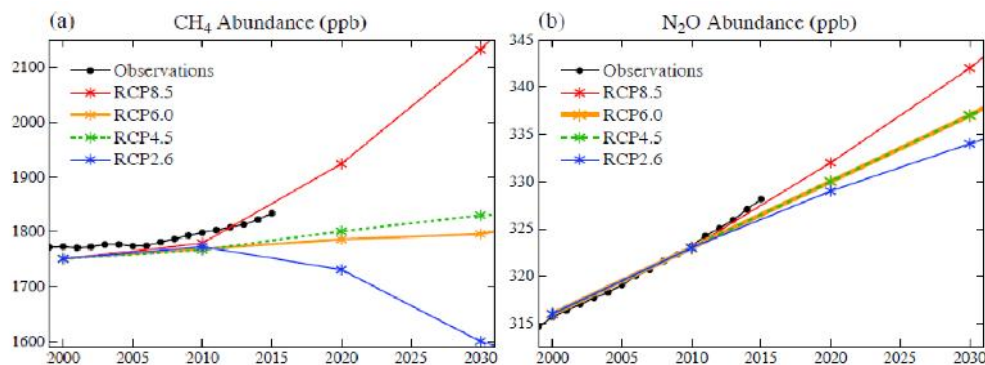


Fig. 14. Comparison of observed CH<sub>4</sub> and N<sub>2</sub>O amounts and RCP scenarios. RCP 6.0 and 4.5 scenarios for N<sub>2</sub>O overlap. Observations are from NOAA/ESRI. Global Monitoring Division.

59. Under such circumstances, treating long lived and short-lived gases quite separately is right either. It is more appropriate to look at how much more radiative forcing is allowed and weighting all emissions according to how much of that they are using up and over what time scales.

60. Nitrous oxide is also showing signs of deviating (14b).



**Q3. How should New Zealand meet its targets?**

- i. domestic emissions reductions only (including from new forest planting)**
- ii. domestic emissions reductions (including from new forest planting) and using some emissions reductions from overseas (international carbon units) that have strong environmental safeguards**

61. **Wise Response recommends that NZ achieves its targets using domestic emissions reductions only; i.e., Option i but that any GHG transition plan incorporate as "domestic emissions" embodied carbon, both the aviation and shipping industries and the future of the tourism industry. This should not however preclude assistance for developing nations in achieving their emission reduction goals.**
62. **Rationale:** Firstly, we see no international mechanism through which "strong environmental safeguards" can be guaranteed. This may be due to the risk of the likes of fire, disease or wind blow under climate warming or changes in state administration.
63. In addition, any form of international credit simply transfers our GHG liabilities to another state, which compromises their future capacity to manage their own resources or offset their own anthropogenic emissions. In simple terms, the need to resort to purchasing international emissions can be interpreted as a state of living beyond one's means.
64. Retaining a level of economic stability during the transition to a low carbon economy depends on achieving leading technologies and management methods, not propping up a now unsustainable BAU model.
65. Furthermore, relying on international credits will mean that NZ may delay making changes to systems of production and consumption which will be required in the longer run. Delays may (a) expose NZ to financial risks should the cost of international credits increase markedly, (b) make NZ products less acceptable in the increasingly discerning international marketplace as they will have higher embedded emissions, and (c) the changes, when eventually made, will be more costly to undertake at a time when these sectors could be under financial stress from the combination of (a) and (b).
66. Conversely, netting forestry against CO<sub>2</sub> is not sustainable in the long-term as forest area cannot be expanded indefinitely. It does, however, buy us useful time out to around 2050 while we reduce gross emissions of CO<sub>2</sub>.

**Q4. Should the Zero Carbon Bill allow the target to be revised if circumstances change?**

67. **Wise Response supports this proposal, but only in the case of a more stringent limit or shorter timeframe being identified as necessary by the CCC and that recommendation receiving Parliamentary approval. In this context, New Zealand's target must be primarily guided by the Paris Agreement and by any future international climate agreements signed by the Government.**

68. **Rationale:** To stay below 2°C, anthropogenic-driven CO<sub>2</sub> emissions will need to fall below zero (i.e. into net removals) by the 2050s-70s along with deep reductions of all other greenhouse gases. To stay close to 1.5°C, CO<sub>2</sub> emissions would need to reach net zero by the 2040s. If net removals cannot be achieved, global CO<sub>2</sub> emissions will need to reach zero sooner<sup>19</sup>.
69. Against this backdrop, we observe that
- i) to achieve 1.5 °C the target already needs to be sooner than the current 2050, and
  - ii) the history of response to the climate change threat has been one of procrastination and with the growing body of research, an effective ratcheting up of the magnitude of the challenge.
70. Thus we can confidently anticipate enormous political pushback from large sectors of the community as they become aware of the constraints on economic activity and the changes across the whole economy that achieving the 2050 target will mean. While achieving net zero anthropogenic emissions will be a win for everyone, the transitions required to do so will create winners and losers along the way. The more rapidly society begins to experience the co-benefits of energy transition, for example, the quicker coalitions of clean energy winners will emerge.
71. The development by the CCC of clear process and timelines to turn proposals into firm, funded policy and actions in their recommendations for Parliament to approve will minimise the temptation to weaken the target.

**Q5. The Government proposes that three emissions budgets of five years each (ie covering the next 15 years) be in place at any given time. Do you agree with this proposal?**

72. Wise Response supports this proposal.

**Q6. Should the Government be able to alter the last emissions budget (ie, furthest into the future)?**

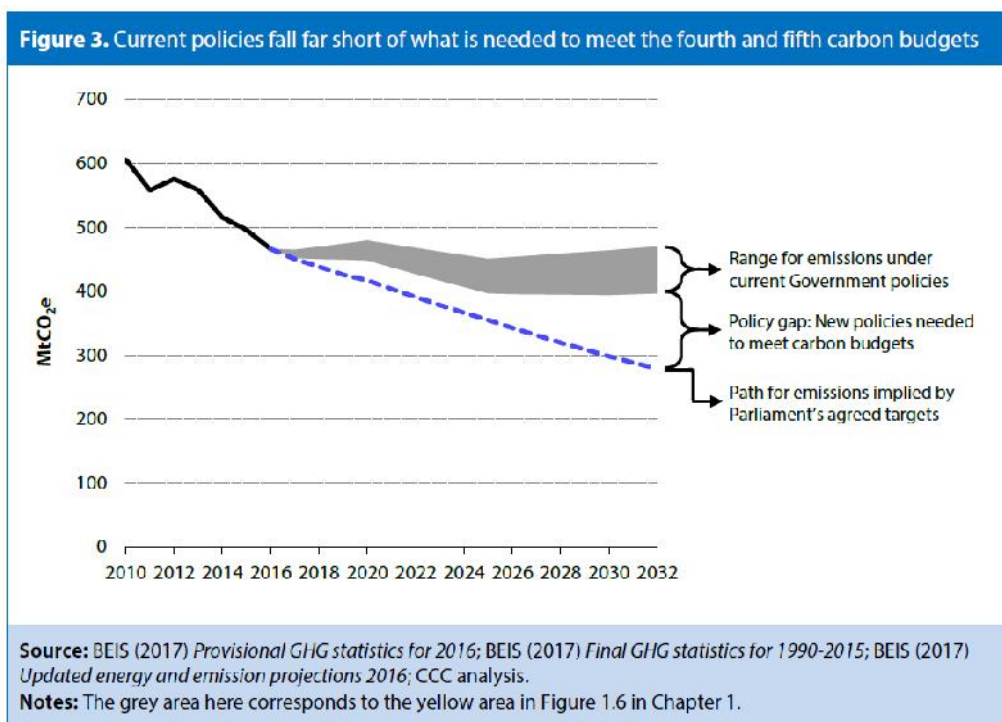
**Options given:**

- i. **yes, each incoming Government should have the option to review the third budget in the sequence**
- ii. **yes, the third emissions budget should be able to be changed, but only when the subsequent budget is set**
- iii. **no, emissions budgets should not be able to be changed.**

<sup>19</sup> Meeting Carbon Budgets: Closing the policy gap, 2017 Report to Parliament Committee on Climate Change June 2017. <https://www.theccc.org.uk/wp-content/uploads/2017/06/2017-Report-to-Parliament-Meeting-Carbon-Budgets-Closing-the-policy-gap.pdf>

- 73. **Wise Response recommend that no, the third budget should only be revised in exceptional circumstances on the recommendation of the CCC and with the approval of Parliament but not at the whim of an incoming government.**
- 74. **Wise Response recommend that the CCC be mandated to review the government's policy response and report to Parliament (and therefore the public) on any growing gap between policy and future budgets.**
- 75. **Rationale:** Minimises the risk of change for political expediency or yielding to pressure groups with short term economic objectives that are out of kilter with the longer term target.
- 76. By example, a policy gap between the trajectory of current anthropogenic emissions and the path implied by Parliament's agreed targets must not be able to develop as it has in the UK (see "Figure 3" in Figure 7 below<sup>20</sup>). Thus, it is clear NZ processes need to be swift enough to rectify such trends and not over-reliant on the science-review- policy-effect pathway.

**Figure 7: Growing gap between current policy and requirements to meet carbon budgets**



Source: UK Dept for Business Energy and Industrial Strategy and Climate Change Coalition, 2017.

<sup>20</sup> Meeting Carbon Budgets: Closing the policy gap, 2017 Report to Parliament Committee on Climate Change June 2017. <https://www.theccc.org.uk/wp-content/uploads/2017/06/2017-Report-to-Parliament-Meeting-Carbon-Budgets-Closing-the-policy-gap.pdf>

**Q7. Should the Government have the ability to review and adjust the second emissions budget within a specific range under exceptional circumstances?**

77. **Wise Response conditionally supports this proposal but again only on the recommendation of the CCC and with the approval of Parliament, so not simply at the whim of an incoming government.**
78. **Rationale:** Minimises the risk of change for political expediency or yielding to pressure groups with short term economic objectives that are out of kilter with the longer term target.

**Q8. 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?**

79. **Wise Response does not agree that the proposed list of considerations to take into account when setting emission budgets<sup>21</sup> is complete or in the most suitable order. We recommend making the following changes to the the objectives and establishing an order of priority as shown:**
- i) **the need for NZ to play its genuine and just part in the international effort to stabilise the climate and to maximise the probability of successfully complying with the target temperatures limit for the wellbeing of future generations (New)**
  - ii) **the need to preserve healthy ecosystem function for life supporting capacity, biodiversity and to provide ecosystem services. (New)**
  - iii) **the need for precaution, given the level of uncertainty attached to estimates affecting the rate of GHG emissions and climate change (New)**
  - iv) **the potential impact on climate change of any scarcity of material resources on the economy and GHG emissions, particularly that of viable fossil energy reserves. (New)**
  - v) the three Government objectives for climate change policy: sustainable economy, global and local leadership and creating a just and inclusive society
  - vi) the Government's obligations under the Treaty of Waitangi
  - vii) social circumstances and, in particular, the likely impact of the decision on **community resilience and wellbeing**(altered)
  - viii) **best available** scientific knowledge about climate change **and its uncertainties**, (altered)
  - ix) **technological opportunity** relevant to climate change **and a low carbon economy**
  - x) energy policy and, in particular, the likely **pros and cons** of the decision on energy supplies and the carbon and energy intensity of the economy. (altered)

<sup>21</sup> An emissions budget, carbon budget, emissions quota, or allowable emissions, is an upper limit of total [carbon dioxide \(CO<sub>2</sub>\)](#) or equivalent GHG emissions associated with remaining below a specific global average temperature.

- xi) fiscal circumstances and, in particular, the likely **pros and cons** of the decision for taxation, public spending and public borrowing. (altered)
- xii) economic circumstances and, in particular, the likely **pros and cons** of the decision for **local access to land and property**, the economy and the competitiveness and innovation of particular sectors of the economy. (altered)

**80. Wise Response specifically recommend that the taxation system itself be reformed to support the net zero targets, as an instrument to improve pricing, change behaviour and recycle revenue for a systems change (i.e. a net zero, circular, sharing, ecological, regenerative economy).**

81. **Rationale:** The new clauses acknowledge the need for a climate that sustains healthy ecosystems because our social and economic institutions depend on them. The proposed order of priority seeks to reflect that relationship.

82. The current economy is the least important consideration, as it will need to adapt. For example, achieving the goal may mean it is impossible to fully avoid stranded assets if the goal is to be achieved.

***Q9. Should the Zero Carbon Bill require Governments to set out plans within a certain timeframe to achieve the emissions budgets?***

83. **Wise Response supports this proposal and recommends that a suitable timeframe be 5 - 6 months after an emission budget has been set.**

84. **Rationale:** The facility for public scrutiny of the means by which the Government proposes to achieve the budget is the most powerful way in which the public can be confident that shortcuts are not being made. It is therefore essential that public disclosure is set according to a predetermined schedule.

***Q10. 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?***

85. **Wise Response recommends a strongly precautionary budget that makes highest rates of emissions decline in the first years and does not rely on overly complex technology or technical breakthroughs to achieve it.**

86. **Wise Response recommends that Government require that the CCC includes in their recommendations to Parliament clear process and timelines to make it straightforward to turn proposals into firm, funded policy and actions.**

87. **In addition, Wise Response recommends the following must be considered to give predictive planning in line with the biophysical reality we face:**

- a. **Uncertainty in the models and data, specifically:**

- i. Underlying assumptions 'built-in' to the modelling processes to date that are questionable from a physical sciences perspective. An example of this is the key assumption in the Vivid Economics model of a 50% reduction in the energy intensity of GDP in the technical appendix.
  - ii. Uncertainty of the quantum and impact of agricultural emissions.
  - iii. Assumed rate of energy supply is in contradiction to the laws of thermodynamics (depletion leading to declining the net energy of fossil fuel systems) based understanding of oil supply as outlined in the Wise Response submissions to the Productivity Commission inquiry into the Transition to a Low Emissions Economy<sup>22</sup>
- b. Reversibility
- i. Scenarios that assume a change to a 'circular economy' or similar must understand and factor in the efficiency limits to this line of thinking, as imposed by the 2nd law of thermodynamics<sup>23</sup>.
- c. Implementation
- i. Role of local government and winning "hearts and minds" of the general public and its exposure to legal challenge
  - ii. Technical and in some cases financial support for the transition – specifically that technical experts in risk / futuring / resilience building be embedded at a senior level in each TLA, Regional Council and Ministry, with a strong network back to the technical guidance from the CCC.
  - iii. Avoidance of mortgagee sales and loss of opportunity for land ownership for NZ residents
- d. Compliance
- i. Provision of technical support for mitigation and adaptation
  - ii. The need to give plans appropriate enforcement provisions to ensure compliance.
  - iii. The need for a clear legal mechanism, with enforceable consequences for the government of the day, to ensure that the policy updates associated with the rolling carbon budget settings 'have teeth'. Suggest considering a power for the CCC to call a vote of no confidence in the government and force early elections if their estimation of the ambition and effect of the policy is not in line with the reduction pathways required by the ZCA.

**Q11. 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 proposed functions?**

88. **Wise Response supports the advisory and monitoring functions proposed for the CCC in the service of Parliament as follows** (see also the last point in Q10 above, in relation to a legal mechanism to ensure the policy and plans are commensurate with the legislated reduction pathways set):

- ) emissions budgets: advise on the most appropriate level and composition of emissions budgets and monitor our progress towards achieving these budgets
- ) independent expert advice: provide independent advice on areas of the economy to focus on and achieve emissions budgets, and what is important to consider in getting there

<sup>22</sup> Oct 2017 <http://bit.ly/2zmQmBv> and June 2018 <http://bit.ly/2l9s318>

<sup>23</sup> <http://bit.ly/2lAm6mX>



- J 2050 target: periodic check-in on the target level, in light of changes in technology as well as accounting for what the rest of the world is doing. It could also advise the Government on the most appropriate level for the 2050 target.
- J adaptation: monitor New Zealand's progress towards addressing the risks posed by climate change. Publish a report setting out progress towards delivering the national adaptation plan
- J international emissions reductions: advise on the extent to which international emissions reductions should be used towards our targets.

**89. In addition Wise Response recommends that the CCC:**

- 1. reframes the National Adaptation Plan as a National Land Use and Management Plan based on a risk survey of the likes of coastline inundation and storm surge, flood frequency, sea level and groundwater rise, drought risk, potential for an integrated land management application focused on carbon<sup>24</sup> and so on (refer to the 2016 Royal Society's Implications Report).**
- 2. monitors the collation of a national inventory of anthropogenic emissions based on data provided by each Territorial Authority. .**
- 3. initiate and monitor a review by other parties of how actions by local government to reduce exposure to future hazard can be better protected from heightened legal, financial and political risk.**
- 4. identify conflicting policy across different sectors e.g. agriculture, energy, transport, housing, urban development, ethical investment.**

**Given the urgency of the situation, Wise Response recommend the Zero Carbon Act requires all Territorial Authorities to, forthwith, develop an inventory of their current anthropogenic emissions profile as baseline data for the proposed CCC and in readiness for the development, in consultation with their communities, of local government adaptation and mitigation programmes.**

90. **Rationale:** As local bodies have statutory responsibility for sustainable development through the LGA and RMA it will hasten progress if the Commission can facilitate action by them as well as central government.
91. It is anticipated that reform will be required to the RMA, LGA, LG Official Information & Meetings Act, the NZ Coastal Policy Statement and perhaps other statutes to achieve compliance with such programmes.

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<sup>24</sup> Hall, D. (June 2018). The Interwoven World | Te Ao i Whiria: Toward an Integrated Landscape Approach in Aotearoa New Zealand. Discussion paper. Auckland: The Policy Observatory. Retrieved from <https://thepolicyobservatory.aut.ac.nz/>



**Q12. What role do you think the Climate Change Commission could have in relation to the New Zealand Emissions Trading Scheme (NZ ETS)?**

**Options given:**

- i. advising the Government on policy settings in the NZ ETS**
- ii. makes decisions itself, in respect of the number of units available in the NZ ETS.**

92. **Wise Response supports a Fee and Dividend Scheme over and Emissions Trading Scheme. With a Fee and Dividend Scheme we would recommend the Commission advises Government, through Parliament, of the settings.**

93. Rationale for a Fee and Dividend Scheme: It is not possible to "scientifically" or otherwise "price" the existence of our support system as an externality. We have a scientifically determined physical target -1.5 °C (or 2 °C maximum) - to prevent runaway climate change. We know what has to be done in terms of anthropogenic emissions reductions to keep below this target. For 1.5 degrees, this amounts to permissible anthropogenic emissions of around 600 Gt CO<sub>2</sub> from the year 2010. For 2.0 °C this amounts to anthropogenic emissions of around 900 Gt from 2010.

94. The basic process is the placement of an initial carbon price at a level that will incur those reductions which, depending on the baseline mean temperature, and would need to amount to between 4 to 8% pa, . If the required reduction rate is not achieved in the initial years, then the carbon price would be raised. If the target is exceeded, then the price could be relaxed. The fee could be imposed on carbon miners and importers, which would be simple to administer, not easy to avoid and, when passed to consumers, act as a disincentive. Revenue raised from the fee can be redistributed equally (making it revenue neutral), so those consuming less would end up with a monetary surplus. To protect local industries a fee would be applied to embedded carbon in imports from countries without their own carbon fee.

95. If the fee was not revenue-neutral, funds might be used to progress alternative fuels and to incentivise further reductions. Any surplus would be returned to those most vulnerable to increased energy prices.

96. Thus, Carbon dioxide can be targeted easily with a fee on fossil fuels and this will indirectly constrain emissions from many landuse activities through the cost of mechanization etc. On the other hand methane (short-term) and nitrous oxide (long-term) emissions both need to be drawn down with land use changes supported in the short term with offsets from sequestration in biomass and soils. The situation is this not just a simply "two basket" challenge - one for long and one for short-term gases.

97. Because of the magnitude of the challenge we are faced with, in terms of emissions reductions (realising that the cost of failure is much higher), we are of the view that the best chance of making the necessary emissions reductions will be to use the 2050 limit as a benchmark and design compatible economic activity by "hindcasting". Tweaking our existing economic activities is not sufficiently reliable. GWP models can be used to support this hind-casting approach (Wigley, pers comm July 2018).

98. Other reasons we support a Fee and Dividend scheme rather than a trading scheme include:

- J The value and affordability of an emissions unit differs between participants. Thus, even with a maximum (and minimum) unit price, units will tend to gravitate to those actors which can most afford them. This outcome is most unlikely to be optimal for society as a whole.
- J As the rate of emissions permissible declines, it will become increasingly difficult to maintain access to units and eventually, for the market to function.
- J A fee regime maintains greatest control, minimises the opportunity for fraudulent practice, is simpler to enforce, and can be structured to ensure that access for critical purposes is maintained.
- J If a new plantation forest is planted with the associated credits, it is increasingly vulnerable to wildfire, wind damage, drought and disease as the globe warms, and is at best only effective for a limited time (e.g. 20 - 30 years for Pinus radiata).
- J Examples of less than satisfactory outcomes using a pricing system for Resource access are the QMS and transferable water rights and rights to discharge nutrients.
- J With respect to CO2 emissions, we consider a weakness is that an ETS aims to limit climate change indirectly by controlling emissions, rather than directly by limiting fossil fuel use. This indirect approach undermines precision and introduces uncertainty and offers more scope to ignore or subvert the scheme. An example is the attempts to link freshwater outcomes with stocking rates and management systems through OVERSEER. Confusion over its reliability has delayed effective action for years.
- J And with a market, the business opportunity creates incentive to trade emissions, not to reduce them. The same direct principle of controlling inputs could be extended to cut back other gases e.g. methane controlled by stocking rates and nitrous oxide by fertilizer application rate.
- J With respect to methane emissions, a major complicating factor is over what time-frame to consider the emissions<sup>25</sup>. This is relevant especially in countries such as India and China with large amounts of methane emissions. This makes the ETS pricing of methane very difficult, and would be better managed with a Fee and Dividend scheme.

**99. However, if there is to be an ETS then: Wise Response supports the CCC making the decision on the number of units available to the NZ ETS. In addition, the carbon price in the ETS should be subject to a rising floor and ceiling price, as recommended by the Productivity Commission.**

100. **Rationale:** The number of units is the key instrument affecting price which is the key driver that controls the volume of anthropogenic emissions. It is therefore essential that this instrument is not subject to political expediency. The rising floor gives stability to investment decisions for both carbon-positive and carbon-negative activities. The rising ceiling provides stability and reassurance for high emitters.

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<sup>25</sup> If the Zero Carbon Bill target is 2050, then a GWP20 is much more relevant than the GWP100. The latter is unfair for reducing methane over a few decades as it underestimates the radiative forcing (climate warming) of methane.

**Q13. 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?**

101. **Wise Response generally supports the proposed list of expertise which should be included on the CCC's knowledge base:**
- J Climate change policy (including emissions trading)
  - J Resource economics and impacts
  - J Te Tiriti o Waitangi, te reo me ona tikanga M ori and M ori interests
  - J Climate and environmental science including m tauranga M ori
  - J Experience with addressing adaptation challenges like planning, insurance and local government
  - J Risk management
  - J Engineering and/or infrastructure
  - J Community engagement and communications.
102. **Desirable, but non-essential, expertise could include:**
- J Business competitiveness
  - J Knowledge of the public and private innovation and technology development system.
103. **However, Wise Response recommend the following additional expertise categories are included on the CCC**
- J **Values and ethics**
  - J **Systems thinking and Climate modelling**
  - J **Biophysical or ecological economics (biophysical economists with a particular focus on energy analysis and supply led energy modelling including social impacts, labour markets and distribution<sup>26</sup>)**
  - J **Transition engineering and energy management**
  - J **Public Health, social science and communication**
104. **Rationale:** Wise Response considers that solving climate change is not primarily a technical issue, rather one of values, beliefs and wellness, hence the essential need for expertise in that aspect.
105. No doubt climate modelling expertise will be commissioned but the \$76 - \$845 emission price range from independent modelling quoted in the discussion document by MfE underlines the need for the CCC to have climate change modelling expertise capable of scrutinizing such work (see Figure 1 below from the discussion document). MfE concludes that, in their opinion the actual price range may lie somewhere between \$100 and \$272 /tCO<sub>2</sub>-e annual average.

<sup>26</sup> What is Biophysical Economics <http://bit.ly/2AamLbL> and supply led forecasts <http://bit.ly/1NGQlbo>

Figure 1: A range of modelling results on emissions prices



**Q14. Do you think the Zero Carbon Bill should cover adapting to climate change?**

106. **Wise Response recommends that the ZCB be focused primarily on mitigation but recognises that adaptation and mitigation overlap and are both essential aspects of climate resilience. Careful integration with other legislation will be required.**
107. **Rationale:** Climate change now demands systemic change. This will require a mix of both adaptation and mitigation as temperatures are increasing and sea levels rising<sup>27</sup>. Simply having legislation is not the same as having an effective planning process. Because they are often intertwined, responding to one while ignoring the other risks a less than optimal outcome. In particular, considering both could get away from the interminably repeated estimates of economic costs for mitigation that tend to completely ignore the much broader and more rapidly increasing socio-economic costs of climate impacts.
108. Therefore adaptation should be a consideration in the sense of empowering the CCC to review adaptation strategies to risk assessments, and ensure compatibility with any emission reduction initiatives. The links can thus be exploited proactively.
109. Adaptation includes looking at current assessed risks based in part of projections from past trends. In addition, a risk assessment must incorporate future projections modified by climate change modelling. The Zero Carbon Act (ZCA) and CCC will feed into those future projections. This will contribute to assessing risk and consequences for New Zealand in terms of both emissions (the primary goal of the ZCA) and adaptation.
110. Notwithstanding this interrelationship, we do recognise that effective implementation may involve different players, for example, through the roles of central and local government in overcoming structural boundaries to achieve a coherent planning outcome. So an integrated approach is recommended where the existing legislative framework is changed, perhaps quite significantly, alongside the new legislation for the CCC. One example is the need for a National Environmental Standard for Small-Scale renewable generation or similar instrument to build more resilience into our electricity supply.
111. The changes necessary to existing legislation to improve its effectiveness could be enacted thus:

- a. The broad risk assessment is done, at the same time as the risk / futuring / resilience building expertise is introduced (as per our comment on Q10, 3<sup>rd</sup> para, c ii).
  - b. The findings are communicated through the legislative and executive branch of government with a strong educational focus.
  - c. The commission switches to a 'gap analysis' mode, to find where existing policy has been ineffective, and where new policies or other mechanisms are needed to create effective mitigation and adaptation.
  - d. The findings are communicated to the legislature and executive branches, who now have the background education to understand the recommendations and act decisively to implement them.
112. More generally, there is the question of whether our governance structures themselves are fit for guiding the transition from what is a deeply systemic challenge within the necessary timeframe.

**Q15. The Government has proposed a number of new functions to help us adapt to climate change. Do you agree with the proposed functions?**

113. **Wise Response supports the preparation of a national climate risk assessment, a national policy plan to address those risks identified, and a monitoring and reporting framework.**
114. **In addition, Wise Response recommends that a Risk Assessment for New Zealand be undertaken in parallel and that the climate change risk assessment inform that more general inquiry.**
115. **Rationale:** A general risk assessment will place climate change risk in a broader context and help identify information gaps and opportunities. The need for a broad spectrum risk analysis is clear from our Productivity Commission submissions of the past 12 months. A fertile place for inquiry is with the global insurance industry. It's technical body, the Actuarial community has already received in depth advice on the multi faceted nature of the risks we're facing in a comprehensive 2013 report<sup>28</sup>

**Q16. Should we explore setting up a targeted adaptation reporting power that could see some organisations share information on their exposure to climate change risks?**

116. **Wise Response supports setting up an adaptation reporting authority**
117. **Rationale:** Climate warming with increased extremes, and sea level rise including storm surge and inundation is already affecting New Zealand communities and ecosystems. Monitoring and coordinating a response to these risks is urgent.

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<sup>28</sup> <http://bit.ly/1Hr4epA>

118. In terms of adaptation, the strategies and regulations will occur through the RMA, LGA and LG Official Information & Meetings Act, which need to be reviewed in this regard.

**Wise Response Committee**

Dr Alan Mark (Chair)

Dugald MacTavish (Sec)

Dr Rob Lawson (Tres)

Dr Bob Lloyd

Brian Turner

Donna Watson

Dr Janet Stephenson

Dr Jim Simpson

Dr Jocelyn Harris

Dr Lisa Ellis

Dr Liz Slooten

Mark Jackson

Nathan Surendran

Pat Scott

Philip Temple

## Appendix A

### Impact of energy limits on climate change

1. The Limits to Growth (L2G) report published by the Club of Rome in 1972 describes a set of computer simulations of a future Earth. Its business-as-usual (BAU) projection predicts overshoot and collapse of the global economy, environment, and human population from about 2020 onwards. L2G's BAU projection has accurately tracked 40 years of subsequent statistical data collected by many international agencies and has yet to be taken seriously by decision makers<sup>29</sup>.
2. Diminishing return to energy investment (EROEI) and how it supports the limits to continuing unsustainable (uneconomic) growth case, along with a range of other biophysical indicators and its profound implications for consumer behaviour and therefore economic productivity<sup>30</sup>. Yet the underlying assumption in the discussion document is continuation of traditional economic growth.
3. Conclusions of a just released working paper by ecological economist Professor Tim Jackson, Director of the University of Surrey's Centre for Understanding Sustainable Prosperity<sup>31</sup> are that while some level of growth might continue in coming decades, the boom era of seemingly unlimited material throughput, we became accustomed to in the middle of the twentieth century, is unlikely to ever return again as we enter a fundamentally new age of diminishing returns.
4. Because of the historically close relationship between economic growth, energy use and anthropogenic GHG emissions (as illustrated by the impact of the GFC in 2008), a "no growth" scenario would literally reconfigure both the threat of climate change and the "decision space" on the most appropriate response strategy (including any national adaptation or land plan), it is essential that this possibility be included in the CCC's brief.
5. Based on the above assessment, a scarcity of energy would impact the effects of climate change, it would also affect many other parts of the economy and our access to resources. Indeed, it has been the assumption that energy supply and the global ecosystems capacity to absorb pollutants are inexhaustible and can therefore be treated as externalities that has got us in this vulnerable situation and scrambling to reassess and rectify.

### Risk Assessment of New Zealand

6. On 9 April 2014 Wise Response presented a petition on the steps of Parliament to request for a National Risk Assessment. The petition sought commitment to a quantitative, cross-party risk assessment of how and exactly where New Zealand is exposed - environmentally, socially and economically - as a rational, integrated basis for planning a more secure future. The 5 areas identified are:

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<sup>29</sup> Turner, G. (2014) 'Is Global Collapse Imminent?', MSSI Research Paper No. 4, Melbourne Sustainable Society Institute, The University of Melbourne.

<sup>30</sup> [http://www.feasta.org/wp-content/uploads/2012/10/Trade\\_Off\\_Korowicz.pdf](http://www.feasta.org/wp-content/uploads/2012/10/Trade_Off_Korowicz.pdf)

<sup>31</sup> <https://www.google.com/url?q=https%3A%2F%2Fwww.cusp.ac.uk%2Fwp-content%2Fuploads%2FWP-12-The-Post-Growth-Challenge-1.2MB.pdf>



- i. **Financial/Economic security:** the risk of a sudden, deepening, or prolonged financial crisis. Such a crisis could adversely impact upon our society's ability to provide for the essentials, including local access to resources, reliable supply chains, and a resilient infrastructure.
  - ii. **Energy and climate security:** the risk of continuing our heavy dependence on fossil fuels. Progressively restricting their extraction, importation and use could promote a switch to genuine renewables and encourage smarter use of existing energy and energy systems while creating better public transportation. Such responses would simultaneously lower anthropogenic GHG emissions.
  - iii. **Business continuity:** the risk exposure of all New Zealand business, including farming, to a lower carbon economy. To mitigate this risk, all businesses could explore both market and job opportunities in reducing the human ecological footprint, finding substitutes for petroleum-based goods and services, increasing efficiencies and reducing waste in food and resources. This would position New Zealand as a market leader in low-carbon technologies and living arrangements.
  - iv. **Ecological/environmental security:** the risks associated with failing to genuinely protect both land-based and marine ecosystems and their natural processes. We believe that such protection is essential for both the maintenance of indigenous biodiversity and ultimately, all human welfare.
  - v. **Genuine well-being:** the risk of persisting with a subsidised, debt-based economy, preoccupied with maximising consumption and GDP. An alternative is to measure progress by means of indicators of community sustainability, human well-being, more equitable wealth-sharing and environmental resilience, and to incorporate full-cost pricing of harmful environmental impacts.
7. Following its presentation, Dre Kennedy Graham (Green Party) delivered an address to The House in the early afternoon session, highlighting the Wise Response petition, during which he stated that this petition was perhaps the most important one to ever come before a New Zealand Parliament.
  8. The Climate Change Risk assessment would partly address but one of the risks identified (i.e. of issue 2). Thus it is essential that the risks brought by anthropogenic emissions and climate change are not assessed without reference to the wider context and benefits. This will also help minimise inconsistencies and contradictions at a systems level.
  9. We therefore endorse the proposal to implement a national climate change risk assessment (including a national adaptation or land plan) but recommend that it be broadened to include the implications of continuing to take fossil fuel supplies for granted and whether there are ways to reduce NZ's exposure to the demand for material growth built into our current measures of progress and means of exchange and financial instruments. Without considering climate change risks in this wider context, including the likelihood of successful mitigation as a globe, a risk assessment could be rendered irrelevant by developments in these associated areas.
  10. We note that Gen Zero in their Submission also recognise the need for a wider ranging risk assessment (page 40).

11. It is acknowledged that the Government already assesses risk in various areas but what is missing is an overarching body to bring together that information for ranking and the identification of information gaps. The body established for this purpose would logically receive information and advice from the CCC just as it would from other relevant bodies.

## Appendix B:

### Note illustrating the uncertainty of predicting global CH<sub>4</sub> changes from Professor Tom Wigley

This is just to show how uncertain projected anthropogenic CH<sub>4</sub> emissions are. The values given below are for 2010 and 2050. The 2017 EGDAR report gives the 2010 ECH<sub>4</sub> value as 8652 MtCO<sub>2e</sub>. The report does not say what GWP was used for CH<sub>4</sub>, but I assume it is 25 (AR4 value). So this converts to 346.1 MtCH<sub>4</sub> (Mt = Tg). Units below are MtCH<sub>4</sub>.

Scenario	2010	Observed 2010	2050	Percentage decrease
RCP2.6	329.83	346.1	189.29	43
CCSP Lev1 IGSM	392.94	346.1	305.07	22
CCSP Lev1 MERGE	318.63	346.1	268.51	21
CCSP Lev1 MiniCAM	280.06	346.1	222.43	16

The CCSP Level 1 scenario leads to stabilization of global-mean temperature at close to 2°C relative to the pre-industrial level with 50% probability (Wigley et al. 2009). RCP2.6 is much more demanding. Relative to pre-industrial, using 3C for the climate sensitivity, warming is 1.75°C in 2050, peaks at 1.79°C in 2064, declines to 1.71°C in 2100, 1.47°C in 2150, 1.26°C in 2200, 0.92°C in 2300, and is still declining at that point. I personally think the RCP scenarios are useless. I have much more confidence in the CCSP scenarios, especially given that they were tasked with the same forcing goals, which means that the differences between them are a useful indicator of IAM methodological uncertainties.

The key results in the above Table are: the RCP2.6 decrease is not 60% (as stated in one of the recent emails), but much less at 43%; and, if the CCSP results are anything to go on, the required 2010 to 2050 ECH<sub>4</sub> reduction to meet the 2°C Paris target is only about half this value.

Note that the CCSP 2010 estimates, made about 2006, are quite poor. In fact, there are many initialization errors in the CCSP scenarios. I and my colleagues have a paper that discusses these errors ... which we consider to be typical of IAM analyses and projections in general. It is interesting that the 2010 ECH<sub>4</sub> value in RCP2.6 is better than any of the CCSP estimates.

Tom Wigley,  
7 July, 2018.