

To the Chair - Productivity Commission Inquiry: “Transition to a lower net emissions economy” (the Transition)

**Submission of: Wise Response Society Inc
(the Society).**

We would appreciate the opportunity to appear before the committee to speak to our submission

We can be contacted via the Chair:

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Background to the Wise Response Society Inc :

Purpose of Society

1. The purpose of this Dunedin-based but New Zealand-wide Society is to persuade the New Zealand Parliament, Government and New Zealand

society in general to confront and respond effectively to any confirmed threats arising from the question: "As demand for growth exceeds earth's physical limits causing unprecedented risks, what knowledge and changes do we need to secure New Zealand's future well-being?"

2. The Society has no formal membership beyond its committee of 15 persons. However, it received over 5,000 signatures in its petition to Parliament through the Finance and Expenditure Select Committee (July 1, 2015), requesting Parliament to undertake a New Zealand-wide Risk Assessment in five key subject areas - economic security, energy and climate security, business continuity, ecological-environmental security, and genuine human well-being.

Recent Work of Society

Otago Regional Policy Statement Review

3. The society continues to promote its purpose through the likes of submissions, resource consents and press releases.
4. In Oct 2016, the Society appealed the Otago Regional Council's Regional Policy Statement (RPS) Review to the Environment Court with the assistance of Dr Royden Somerville QC and barrister, William Anglin, to seek strengthened recognition in the Statement of the importance of resilience, ecosystem function, risk assessment and precaution, as well as addressing renewable energy and the causes of climate change, not just adaptation to it.

Climate Consensus Coalition Aotearoa

5. Most recently we have facilitated the development a Position Statement and Action Plan for NGOs under the name Climate Consensus Coalition Aotearoa (CCCA). It proposes a goal and a process by which to effectively meet the spirit and intent of the Paris Accord of Dec 2015. So far, the total of individuals and the membership of organisations which have formally endorsed it numbers approximately 330,000 from about 100 organisations.
6. On 16 August, WR Chair Sir Alan Mark led presentations of the CCCA Position Statement and Action Plan to MPs at Parliament on behalf of its creators and supporters. There were two presentations - one in the morning to GLOBE-NZ members (chaired by Dr Kennedy Graham) and the second to an invited audience of all MPs in the Beehive Theatre, hosted by GLOBE-NZ.

7. Professor Jonathan Boston and our Patron Sir Geoffrey Palmer, as well as representatives of 5 other NGOs, who helped develop the statement, spoke in support. These included James Drew-Young (GenZero), Adelia Hallett (Forest & Bird), Dr Roger Blakeley and Sue Kedgley (Wellington RC & Local Govt NZ), Gay Keating (Ora Taiao) and Katherine Peet (Network Waitangi Otautahi/One Voice Te Reo Kotahi).
8. Concluding remarks were provided by Sir Geoffrey Palmer (for WR), and Tracey Martin (NZ First), David Parker (Labour) and Kennedy Graham (Greens), for GLOBE-NZ.

Q1 How can the Commission add the most value in this inquiry?

Terms of Reference

9. While there is no specific invitation to submit on the TOR, we consider it important to do so, to clarify the scope necessary for this inquiry. If the terms are interpreted too narrowly, and matters that directly affect our capacity to transition to a low emissions economy can not be considered, then the value of the inquiry will be thrown into doubt. This would make the Productivity Commission's efforts unproductive.
10. We consider the terms of reference are open to misinterpretation for reasons outlined below.
11. In the Issues Paper it states that the purpose of the inquiry is to "identify options for how New Zealand could reduce its domestic greenhouse gas emissions through a transition towards a lower emissions future, while at the same time continuing to grow incomes and wellbeing" (Terms of Reference, p. 2). Similarly, in the Exclusions it states that the inquiry "should only consider the implication of a changing limits to inform consideration of different economic pathways along which the NZ economy could grow and develop".
12. These statements appear to limit the inquiry to only those pathways that will result in economic gain and the Commission appears to accept this interpretation (Issues p.1). However, as the Commission's own purpose makes clear, human wellbeing is ultimately the most important mission, and untrammelled climate change will have serious impacts on both economic growth and wellbeing.

13. Other economic frameworks are available that incorporate more realistic analyses of current behaviour, and provide different understandings of what can be defined as economic gains and incomes. These frameworks are based on modern science, use more accurate measures of wealth creation, and include the financial sector.
14. The TOR, if limited to a narrow interpretation, will provide inadequate guidance and pathways, and false expectations for both the Government and business, in planning future investments in land use, infrastructure, and resource allocation generally, resulting in unprofitable investments, less efficiency and productivity.

Alternative pathways

15. The TOR also state that "The inquiry should explore NZ and international research and experience" while "the focus should be on practical applications relevant to NZ's circumstances", and that it "...should have a long term focus..." out to 2050.
16. Scientists have calculated that if the world is to meet the Paris Agreement 2 deg C target, the carbon budget for every person in the world is about 2 tonnes a year. New Zealanders, according to our formal report to the UNFCCC last year¹, emit 18 tonnes per capita per year. And even if biological emissions of 11 tonnes/year from the agriculture sector are excluded, NZers are still therefore using over 300% of the sustainable allocation on a per capita basis.
17. The problem we have is that globally, over 80% of the energy for driving economic production is derived from fossil fuels, and it is the emissions from their use that is causing climate change.
18. Therefore, with such deep cuts to emissions necessary to meet the ultimate goal of the Paris Accord, the prospect of ever-increasing wealth must surely be highly unlikely. Many studies have demonstrated a close relationship between GHG emissions and GDP, and the difficulties of "decoupling" beyond a certain point.
19. In essence, shifting to a low emissions economy is essential for the wellbeing of mankind, whether or not it enables continued economic growth. We argue

¹ <http://carbonnews.co.nz/story.asp?storyID=11498>

that pathways that conceive of a world without growth, or with limited growth, must be seriously considered. In the face of a poisoning of earth's atmosphere, surely we have to put the exigencies of our life supporting capacities above those of the economy. In signing the Paris accord, the global community have recognised they have collectively overshot the world's sustainable carrying capacity and must restore the missing feedback loops.

20. The Commission's statement: "During the transition, action to mitigate GHG emissions will require real and significant changes which will have disruptive and potentially painful impacts on some businesses and households" (p.1 Issues Paper), appears to be tacit acknowledgement that there could be significant economic compromise associated with an effective transition.
21. The need to take a broad approach to the inquiry is acknowledged in the Issues Paper: "Action to lower emissions also needs to operate within a number of complex and interacting systems. These include the domestic and **global economies, the physical environment, and social systems shaped by beliefs, social norms and values.** Adding to this complexity is uncertainty about future technological change. The choice of options to lower emissions will need to take account of this **complexity and uncertainty..**," (p.2 - our bolding).
22. Under such circumstances, the most useful outcomes from this inquiry will be ensuring that information, incentives, disincentives, goals, stresses and constraints, impinging on all the interested parties, are appropriate and will lead to decisions that at least secure a liveable planet and human wellbeing. In this context we commend to the Commission, the Royal Society of NZ's 2016 report on "Transition to Low Carbon Economy for New Zealand" identified in the Issues Paper.

Growth versus Wellbeing

23. It is also important to acknowledge that circumstances may mean that growing incomes and growing wellbeing are not necessarily the same thing. We will argue below that limits to growth mean that growing wealth forever is not possible (nor necessarily healthy), and under such circumstances, planning to cut emissions, even though they may lead to lower incomes,

should be an option open to the inquiry. Moreover, it is clear that if we do not self-regulate, economic constraints will be imposed by other biophysical limits in the not too distant future.

24. At best we can seek to maintain an adequate level of wealth by shifting the focus of the economy to activities and products that are useful for local and international transition, and ideally that are likely to remain relevant in a low emissions world. It is in this transitional sense that we consider any remaining room to "grow and develop" lies.
25. In such circumstances, the most "productive" activity is to focus on "growing and developing" resilience as the primary goal. This is consistent with the requirement in the TOR that the focus "should be on practical applications relevant to NZ's circumstances" (p.3, 4 TOR).
26. We therefore submit that if the inquiry limits its scope to options with economic gain it is essentially hobbled and risks a spurious outcome and recommendations that are not relevant and of little value.

A case for including a contracting economy scenario

27. As our current economic system requires GDP growth for stability, a continuation of the current growth paradigm implies an environment where, by using past experience and trends, future conditions and activities can be broadly predicted. The assumptions within a growth scenario may include:
 - reliable access to essential materials and goods from other markets
 - continuing reliable demand for NZ's current or emerging products
 - a climate which is sufficiently stable for reliable food production and not causing major and costly disruptions
 - uninterrupted energy supply growing in line with GDP
 - reasonably predictable demographic change
 - intact governance structures which maintain law and order
 - growing wealth (for NZ) and possibly wellbeing
 - geopolitical stability and respect of state borders

28. Under these conditions the Commission can reasonably respond to the two key questions out to 2030 and beyond, and potentially develop a roadmap for a stepwise transition to a low carbon economy.
29. However, we consider global growth, as it has been experienced over recent decades, may not continue for much longer, and that the stagnant global economy and wages, and low energy price are all signs consistent with encountering deep-seated resource limits.

The IMF's growth forecasts have been consistently wrong when compared against actual data over many years, as they are based on the assumptions in the growth scenario:

30. As well as for a growing economy, it would therefore be rational to include in the analysis a transition scenario for a contracting or collapsing economic and social context. The two primary scenarios are represented conceptually, below².

Two alternative presuppositions about the future of economic growth

31. The pathways that will be open to NZ, to pursue a low carbon economy within, will be radically different under the two growth scenarios. For example, repaying loans is relatively easy in a growing economy, but not a shrinking one.
32. The following sections provide some evidence for the statements made above about the necessary scope and context for this inquiry.

Limits to Growth

33. Arguments around availability of the wide variety of generalised resources needed for continuation of economic growth, especially in order to meet compound interests, were examined in the Limits to Growth (LTG) scenarios debate of the early 1970s.

² <https://ourfiniteworld.com/2017/09/26/why-political-correctness-fails-why-what-we-know-for-sure-is-wrong/>

34. The most powerful and succinct presentation we know of that sums up the LTG predicament we face is found in the Business as Usual “Standard run” of the 1972 study³, with Turner’s historical data from 1970 to 2010 overlaid (see Figure 1 below). This diagram demonstrates that the data to 2010 reflect the 1972 scenario figures remarkably well, given that those figures were constructed over 40 years ago. The Society considers the primary reason for this is that they are logically derived from the basic laws of physics.
35. The scenario pointed to general economic and environmental collapse occurring over a period of about 20 years, starting around 2020, due largely to limits in essential resources being reached, for which no equivalent substitutes could be found and which, incidentally, caused an abrupt collapse in human population.
36. Turner (2014)⁴ concludes that "Although the modelled fall in population occurs after about 2030—with death rates rising from 2020 onward, reversing contemporary trends—the general onset of collapse first appears at about 2015 when per capita industrial output begins a sharp decline".
37. Figure 2 below (Turner, 2014) is a comparison between the oil production depletion, actual and predicted use, based on the volume of discovery, and that forecast by the model. While the actual production has a less sharp profile, note that the model coincides with it.
38. Somewhat ironically, the apparent corroboration here of the *LTG* BAU model run "implies that the scientific and public attention given to climate change, whilst tremendously important in its own right, may have deleteriously distracted from the issue of resource constraints, most importantly oil supply. Indeed, if global collapse occurs as in this *LTG* scenario then pollution impacts will naturally be resolved— though not in any ideal sense!"

3 Meadows et al in 1972, *Limits to Growth* and subsequent updates

4 Turner, G. (2014) 'Is Global Collapse Imminent?', MSSSI Research Paper No. 4, Melbourne Sustainable Society Institute, The University of Melbourne.

A range of recent studies⁵ now point to the peak in all liquids production globally occurring somewhere in the next decade. They are based on supply-led rather than demand forecasting. They examine the rates of production and depletion of known reserves, and then add to that the rate of new discoveries. Current policy has been made on the basis of demand led forecasting, projecting past rates of growth into the future (ref: Kopits)⁶.

39. Other studies of the LTG in recent years support that of Turner, and extend the computer model used in the LTG studies to include a wide range of other critical resources (ref: Ragnarsdottir and Sverdrup)⁷, with similar results.

Earth's Planetary Boundaries

40. The idea of 'limits' is also supported by a separate study into defining the planetary limits to a "safe operating space for humanity" ⁸. Often referred to as Earths Planetary boundaries, this framework sets out precautionary boundaries for nine critical processes of human-driven environmental change (see Planetary Boundaries Figure below). Beyond these boundaries, we all face the possibility of abrupt, large-scale changes in Earth system functioning and significant risks to societies and economies, worldwide. Together, the Planetary Boundaries quantify a safe operating space at the global level, providing benchmarks for global sustainability.

1. By this analysis, four planetary processes are already entering the scientifically assessed, global risk zone and past the safe threshold -
- climate change,
 - land use change,
 - loss of biosphere integrity, and
 - an overload in the nitrogen and phosphorus biogeochemical cycles (nutrients).

41. "The planetary boundary framework presented here suggests the need for novel and adaptive governance approaches at global, national, regional, and

5 HSBC <http://bit.ly/2mYaaT6>, UK APPG <http://bit.ly/1SZP4vk>, IEA New Policies Scenario 2016 <http://bit.ly/oilocene>

6 Centre on Global Energy Policy - Global Oil Market Forecasting: Main Approaches & Key Drivers <http://bit.ly/1U4UNBK>

7 Kristin Vala Ragnarsdottir and Harald U Sverdrup, 'Limits to Growth Revisited', www.geolsoc.org.uk/geolscientist, October 2015 pp 10

8 Rockström, J. et al. 2009. *Nature*, Vol. 461, pp. 472-475. Available at <http://www.ecologyandsociety.org/vol14/iss2/art32/>

local scales." Former UN Secretary-general, Ban Ki-moon has urged world leaders to apply planetary boundary thinking.

Earths Planetary Boundaries

42. Considered together, it demonstrates the strategic risks and vulnerabilities associated with many of our interlinked cultural norms - including our current land use systems, biodiversity, transport systems, infrastructure, urban pattern and public health - and therefore, by inference, our economy. Indeed, the LTG analysis suggests we are on the brink of wide scale systems failure, and we are underprepared to avoid it..

Money, growth and emissions

43. Our economic system has a built-in growth imperative. This is due to a combination of the design of our money in combination with a privately owned land system. When money is created as interest-bearing debt, the principle is created but not the interest. Hence the total money supply has to keep on increasing. To prevent inflation, the total money supply must be matched by more economic activity. Hence the demand for economic growth.
44. The most common way to increase the money supply is through bank loans on housing. Since our land (unlike air and water) is largely in private ownership, and land is limited, as society develops land values rise.
45. This built-in growth imperative means we inevitably consume our natural and social capital. And because decoupling of material consumption from GDP is not possible (Refer Q18 below), tragically, it can also mean politicians have to choose between economic growth or constraining emissions⁹.

Decline in Energy Return on Energy Invested (EROEI)

46. It is gradually becoming understood that the amount of oil reserves and increases in them due to for instance fracking, is of little significance; what matters is their EROEI. If a vast amount of oil was found, but to deliver a

⁹ Kent, Deirdre. *The Big Shift – Reinventing Money, Tax, Welfare and Governance for the Next Economic System* and Naomi Klein *This changes everything. Also papers by Steve Keen.*

barrel of it required the use of all the energy in the barrel, then there would be no point drilling the field.

47. When oil was first discovered the EROEI in producing it was over 100/1, but Murphy (2013) estimates that by 2000 the global figure was about 30, and a decade later it was around 17. These approximate figures are widely quoted and accepted although not precise or settled. In other words, oil is rapidly becoming scarcer and more difficult to locate and produce. Thus prospectors are having to go to deep water sources (EROEI of 10 according to Murphy), and to develop unconventional sources such as tar sands (EROEI of 4 according to Ahmed), and shale (Murphy estimates an EROEI of 1.5 ... Ahmed reports 2.8 for the oil and gas average.)
48. As a result, the capital expenditure on oil discovery, development and production is skyrocketing but achieving little or no increase in production.
49. Even in the situation where gross production is maintained, the net energy available to society for other uses than the energy sector drops much faster - sometimes referred to as the "energy cliff. This diagram below, representing a sensitivity analysis of US Oil Production (Hagens),¹⁰ illustrates that point and that it is not simply about declining total resource production rates, concerning though this is. Rather it is the net energy that is delivered per barrel of oil once you subtract the energy used to produce it.

Gross energy versus net energy production

50. Other studies support this relatively simple concept^{11 12 13} but disturbingly, given its implication for the global economy, it remains widely neglected in policy discourse.

10 Peak Oil – why smart folks disagree, Nate Hagens <http://bit.ly/2gfe7Ra>

11 *Victor Court, Florian Fizaine Long-Term Estimates of the Energy-Return-on-Investment (EROI) of Coal, Oil, and Gas Global Productions Ecological Economics Volume 138, August 2017, Pages 145-159*

12 <http://www.thehillsgroup.org/>

13 <http://energyskeptic.com/2014/charles-hall-on-eroei/>

51. Charles Hall, the scientist responsible for developing the EROEI ratio, paints a rather ominous picture of the practical significance of lower ratios¹⁴.
- To pump the oil out and look at it you need 1.1:1
 - Refine it and look at it you need 1.2:1
 - To drive a truck at the wellhead 3:1
 - To move stuff and depreciate the truck 5:1
 - Depreciate the truck driver, oil worker, farmer and support families 7:1
 - Education 8:1 - 9:1
 - Health care 10:1 - 11:1
52. Civilization as we know it therefore will not run on the EROEI of an alternative to oil like corn-based ethanol with a ratio of about 1.1:1. As the general pattern of ratio decline continues, it is obvious that it will start to impinge on the activities in the above list.
53. If the foregoing account is more or less right, there will at least be major knock on effects on the global economy and the wealthier (oil-consuming) countries, on the evidence, probably within a decade. Indeed, other studies suggest that this ongoing decline in the overall value of the energy extracted from global fossil fuels has played a fundamental role in the slowdown of global economic growth in recent years¹⁵.
54. It is quite likely that the global economy will shudder to a halt as the capacity to import oil will be greatly reduced. When the fragility of the global financial system is added (Global debt now \$217 Trillion or 327% of GDP up 25% in the last decade¹⁶), rapid chaotic breakdown appears increasingly likely¹⁷.

Recommendation to add value

55. On the basis of this and a vast quantity of other evidence, Wise Response considers that ultimately the choice is not to set our sights on the patently impossible goal of growing forever - rather decide what limits to live within (in

¹⁴<http://energyskeptic.com/2014/charles-hall-on-eroei/>

¹⁵ Inside the New Economic Science of Capitalism's Slow-Burn Energy Collapse, Nafeez Ahmed
<http://bit.ly/2vRVI51>

¹⁶ <http://www.zerohedge.com/news/2017-06-29/>

¹⁷ Trade Off: Financial system supply-chain cross contagion – a study in global systemic collapse | Feasta
<http://bit.ly/trdoff>

this case GHG emissions and available energy), and make a plan to do so. To exclude any consideration of soon encountering certain critical limits on ideological grounds (masked as economic 'reasoning'), when the consequences would be so profound, would appear foolish in the extreme.

56. Given resource trends, we therefore implore the inquiry to include the concept of limits to growth in its review, starting with the references provided in this submission and, if found to have merit, consider its implications for opportunities and challenges associated with the emissions transition as a "practical application(s) relevant to New Zealand's circumstances" (p.3 TOR).

Q2 Chapter 3 of this issues paper mostly looks at ways to reduce emissions directly at their source. What other approaches would help identify opportunities to effectively reduce emissions?

57. A simple indirect method to reduce emissions is to encourage the development of resilient local communities. These are emerging separately and collectively all over the planet. Transition Towns¹⁸ is one such organisation providing resources and ideas to enable local communities to become self sufficient and resilient. The Post Carbon Institute¹⁹ believes that building community resilience is our best response to the looming economic, energy, and environmental challenges of the 21st Century. A resilient community is one that can maintain its essential identity while adapting to these and other challenges. Often communities have community energy production, local currencies and there is an increase in local goods and services.
58. One of the significant effects of living in resilient communities is a big reduction in road freight around the country with its concomitant drop in emissions. Under the present system supermarkets and other large retailers of food, fresh and processed, centralise distribution. Produce is transported hundreds of km to a "centre" where it is packaged and then redistributed back to the regions, some produce travelling up to a 1000km, perhaps returning to the area where it was produced. This practice is repeated for processed foods and other retail items. Such a practice registers as an increase in RGDP although it hardly represents an increase in productivity. In fact heavy vehicle

18 <http://transitionnetwork.org/>

19 <http://www.postcarbon.org/program/resilience/> and www.sixfoundations.org

travel has been shown to increase at a rate 1.5 times greater than Real GDP increases (Transport Engineering Research NZ Ltd²⁰). The same report, forecast an 85% increase in heavy vehicle travel for the 15 years between 2005 and 2020. Clearly this would lead to an increase in carbon emissions which would contravene our commitment to reduce emissions at the Paris Agreement.

59. Given the future of fossil fuels, as discussed elsewhere in this submission, it seems likely that the huge increase in road transport in recent years could not continue anyway. Communities need to prepare now for that eventuality. Likewise the collection of milk from farms could become costly. The economic rationalisation of all these activities needs to be revisited in the light of carbon emissions.
60. The underlying principle is that standard practice has been to optimise systems for returns and stability; but now for a resilient low emissions economy we need to develop methods to also optimise according to emissions, adaptability and of course a healthy environment. This implies that International trade agreements that impede such change in the local interest should be avoided.

Q3 To what extent is it technically and economically feasible to reliably measure biological emissions at a farm level?

61. Presently we can use Overseer, which is deployed for N limits for regional councils to enforce the use and reporting of. This can be used to gain a proxy for farming for the GHG profile as well. So while farmers are having to use Overseer for water quality compliance reasons, the GHG emissions risk profile can also be gathered from this model. However, we do not have a way of measuring mitigations that could result from vaccines or feed additives at this stage.
62. We also know from a variety of studies that we can constrain the Nitrous Oxide component of the emissions profile, through management of the N cycle in pastoral systems. Then we can immediately have a reduction in the

²⁰ <http://www.ternz.co.nz/Publications/Prediction%20of%20New%20Zealand%27s%20Freight%20Growth%20by%202020.pdf>

overall GHG profile of 10-20% with no impact on profit on a farm, given it is an average dairy farm system²¹.

63. The GHG measures and nitrogen leaching in the most recent versions of Overseer have nearly doubled. Other things being equal, this will have significant implications for current intensive farming practice and reinforces the need for being conservative in our responses.

Box 3: Potential technologies to reduce New Zealand's biological emissions

Currently the suggestions in the Parliamentary Commissioner's review are:

🔦 *Methane vaccine – a vaccine that triggers an animal's immune system to generate antibodies that suppress the CH₄-producing methanogens in an animal's rumen +*

🔦 *Methane inhibitor – a chemical compound fed to an animal to target the methanogens by either killing them, or depriving them of the hydrogen they need to produce CH₄.*

64. This will take 5-10 years before it is developed, tested and passed all regulatory hurdles, and then has reasonable uptake by farmers (30% +). In 2017 – while there are products available to inhibit methanogens and being used in feedlots, in controlled feeding situations, with administration given orally, daily, we have not got anything that could be used in the NZ extensive pastoral farming/grazing situation. So NZ still has not discovered yet as to how we can administer this cost effectively – on a regular basis, and why farmers would use it, if it does not give them a benefit. These hurdles need to be considered at the outset, and could take years to implement. So in the near future, for pastoral agriculture, it is not a quick fix.

🔦 *Targeted breeding – identifying genes unique to animals that naturally emit lower levels of methane to selectively breed low-emitting sheep and cattle.*

65. Although research is being done in this area we have not found suitable breeds yet to integrate into our breeding programmes that will enable this to be used as an option, and thus is still a long way off and may take 10-20 years to have effect. Again, how do we measure and reward farmers for use of these animals, and how we do measure and reward change on farm even if we did have a suitable trait or breed available now?

²¹ AgFirst Upper Waikato nutrient efficiency study - 2009 - for Environment Waikato.

🔍 *Nitrogen inhibitor – a chemical compound applied to pastures to slow the process of nitrification in soils, and thus reduce the loss of N₂O.*

66. DCD, which inhibits the conversion of ammonium to nitrate, was used, and found to have the same signature as Melamine in milk. Therefore it was not continued with. There is nothing available that has been tested as safe to use in the feed production cycle for production animals that has proven to be safe/able to be used.

🔍 *Low-emission feed – identifying, and genetically modifying feeds that reduce an animal's CH₄ and N₂O emissions (eg, increasing the fat content in an animal's feed to reduce CH₄ emissions).*

67. Currently the use or incorporation of feeds with Tannins in them is known to reduce GHG production from animals. The use of Plantain in the diet is useful, and could be integrated here for some reprieve in animal diets. However, how we measure the net reduction in GHG from animals eating it, and then reward farmers for it, is going to be complicated. We do not have a measure/reward system, therefore uptake could be very slow.

Q4 What are the main opportunities and barriers to reducing emissions in agriculture?

National level

68. At a national level, the main barrier is a failure to recognise the seriousness of the climate situation we are in. For example, former PM John Key, under the heading "Science key to climate" (ODT, 23/3/2016) was quoted from his address to the Platinum Primary Producers annual conference in Wellington, that "The world is going to heat up if it's [climate change] left unchecked. [but people] are missing one fundamental point and that is science will deal with the issues, as long as we keep investing. If we did absolutely nothing and just allowed temperatures to continue to rise then we would have a huge issue but the truth is that won't happen."

69. This is nothing short of a "faith" basis to policy when we know that if he is wrong, positive feedbacks may be already locked in, sending temperatures spiralling upward leaving humanity powerless to halt it.

70. Accordingly, there has been a lack of leadership for farming to change, with a lack of technology transfer of already accepted mitigations and management opportunities.
71. The mitigations considered by the Productivity Commission report failed to take note of the management options put forward by the PCE in 2016 report (see below), and also the work that has been released by both Dairy NZ at Scott Farm and also Lincoln University farm. There are a multitude of studies available where the Nitrogen Cycle is managed in the farm system leading to lower overall GHG emissions to water and atmosphere, based on Overseer modelling and economic analysis. This should have been considered by the Productivity Commission.
72. Encourage lower stocking rate policies, reward lower emitters of GHG – as per the N limits on farming: this will also have a win-win effect on lowering overall GHG emissions, as the Nitrous Oxide component of the GHG profile we know can be reduced by 20-40% in some cases (recent example Lincoln Dairy Farm lowering N leaching by 30% with no effect on profit).
73. By doing this, we can lower the overall GHG emission profile by 10-20% on dairy farms; this gain is greater on intensive farms, with no negative effects on profit. This should be encouraged to be adopted by all farmers, and have far more promotion than it has.

Regional level

74. This has also been experienced at a regional level with a total lack of support to initiate policy or discussions that might encourage the issue to be taken seriously, and appropriate mitigation and adaptation action to commence at this level. It was heartening to see that Local Government NZ has finally decided to initiate action and this deserves the full support of this Commission.

Farm level

75. At a farm level the main barrier to reducing emissions in agriculture is the almost exclusive focus by individual property owners on maximising profit (revenue), with very little regard to the resilience (stock/ecosystems) of the

operation. This has resulted in less diversity, both between and within farming systems, with minimal consideration given to adverse impacts.

76. It is only now that we are playing catchup on the likes of emissions and water quality and disease. It has also resulted in farming systems which are heavily dependent on ready and reliable access to cheap fossil energy which of course contributes to emissions as long as it is available, and makes the sector extremely vulnerable to any shortage.

Landuse integration

77. In this context we consider that the evolving concept of "integrated landscape management" (agroecology), which seeks multi-functional synergies at landscape or catchment scale, to achieve a diverse set of landscape objectives, offers huge opportunity as a practical method to concurrently mitigate and adapt to climate change, as well as shore up community resilience as a whole. This approach involves identifying activities most appropriate for different zones that maximise community benefit and minimise the need for tradeoffs, taking into account ecosystem services and amenity.
78. If the landscape is regarded as the main unit of optimisation, then the main units that make up the landscape can be integrated to enhance the productive potential of the overall system rather than individual properties. This approach would be a radical shift from current practice which is by and large not to regulate land use.
79. But there are massive potential gains to individual property owners and the community at large from planning at such a landscape level. Simply focusing on ways to enhance catchment carbon (in soils, vegetation cover, wetlands, etc.) would not only aid sequestration and mitigation of climate change but automatically generate other ecosystem services for the catchment and coastline. These could include enhanced:
- drought-resistance
 - regulation and distribution of water in time
 - natural freshwater water quality due to improved infiltration
 - natural estuarine and coastal water quality
 - natural biodiversity and more diversity in farming practices

- control over erosion and siltation
- synergy between ecology, agriculture and agroforestry
- reduced vulnerability to shortages / price fluctuations in industrially sourced inputs to increase farm productivity. This is contrasted with the work (already referenced) showing lower stocking rates and inputs can sustain net profits.
- independence from fossil fuels and their derivatives (e.g. fertilizers)
- waste management - recycling organic materials

Soil sequestration potential

80. By way of support for this approach, in its 4th Assessment Report, the Intergovernmental Panel on Climate Change estimated that 90% of agriculture's climate change mitigation potential lies in capturing carbon in soils. And an initiative proposed by the French government at the Paris climate conference aims to increase soil carbon by 0.4% a year.
81. This directly contradicts the statement in the Issues Paper (p22) that "[e]stablishing new forests is currently the only large-scale mitigation option that can easily be implemented to sequester large amounts of carbon dioxide from the atmosphere...". Additionally, the tradeoffs between the value of types of trees for sequestration and water yield will need careful consideration, particularly in the light of wilding pine infestation. and the effect on upper catchment vegetation such as snow tussocks in Otago²².
82. We consider these kind of outcomes are what would result if the requirement for Councils to "achieve integrated management of natural and physical resources" under the RMA had it been properly implemented. Integrated land use to achieve the maximum benefits for long-term sustainable management with minimal emissions of GHGs has been central to our Wise Response Society's submission (and Environment Court appeal) on the Otago Regional Council's draft revised Regional Policy Statement. Encouragingly, there has been general support from the several other submitting organisations and Council itself, as the process nears completion.

²² Mark AF, Dickinson KJM. 2008. Maximising water yield with indigenous non-forest vegetation: a NZ perspective, *Frontiers in Ecology and the Environment* 6:25-34

Marketing

83. Any progress toward more integrated management of landscape with a particular focus on carbon would help re-establish credibility behind our clean green market and place us in a better position to ratchet our emissions reduction at the next Paris accord talks.
84. Meanwhile, Government continues to actively promote agricultural intensification through investments in irrigation development, which is known to generally result in higher emissions land uses, and be entirely counterproductive. If the challenge is a massive reduction in GHG, then it is cold comfort to know that we are one of the lowest emitters of agricultural emissions, per unit of agricultural output under an inherently high emissions enterprise.
85. Given their influential role, a bottom line is that as long as Fonterra's long term strategy is growth in absolute volumes of dairy commodities, we will not be able to transition to a sustainable level of industrial agricultural activity.

Q5 What are the issues for government to consider in encouraging alternative low-emissions land uses?

86. Encourage and fund research into alternative protein production that is non-animal in nature. We are limited with mitigations in the short term for reduction of the methane emissions from our ruminant population. Thus for NZ to make any meaningful change to the Agricultural component of the GHG profile, we will have to consider alternative farming scenarios that reduce livestock intensity especially dairy, with more plant protein production. For example: the footprint of Dairy vs Wheat is detailed in the diagram below.
87. These solutions are not without their own adverse consequences (such as increased herbicide applications for intensively grown wheat) which must in themselves be managed through application of agro-ecological design and management techniques.

Livestock verses plant production

Key related concepts from the PCE's 2016 report

Changing management practices

88. Already some farms are considerably more 'greenhouse gas efficient' than others. This is partly due to different soils, climates, and topography, and partly due to managing farms in different ways.
89. It is becoming clear that changing management practices can lead to significant reductions in biological emissions (by at least 10%) on some farms without necessarily affecting profitability. There is a growing body of research and practice supporting this approach.
90. Over recent years, dairy farming, in particular, has become increasingly intensive. With this has come the need for more fertiliser and more feed – more variables, more complexity, and more risk. In some cases, lowering the stocking rate could lead to increased farm profit by decreasing the need for costly inputs.
91. It is axiomatic that the fewer sheep and cattle there are on a farm, the lower the biological emissions will generally be.

The water quality connection

92. Concern about water quality has become widespread in New Zealand, and regional councils have begun the process of setting nitrogen limits in catchments. Some actions taken to reduce nitrate leaching into waterways will have the spin-off effect of reducing nitrous oxide out-gassing from urine-soaked pasture. An example is the practice of taking cattle off pasture at times of the year when their urine is most damaging.

General comment

93. The core problem is the government's own policy of promoting intensification of landuse with irrigation development which is clearly in contradiction to the intent of the Paris agreement, the urgency of our climate situation and the subject of this inquiry.

94. There is a need for Government to consider the science behind connected ecological islands and corridors and likewise, recognise the massive mistakes in the past advice to land owners about total clearance of bush. Existing regeneration activities (e.g. QE2 Trust) urgently need Government support to expand their efforts and develop ways for landowners to profit from indigenous regeneration, such as has been done in the north-east USA.

Q6 What are the main barriers to sequestering carbon in forests in New Zealand?

95. Oversight of the plantation forestry industry to achieve optimum spread of planting and harvesting cycles, nationally, and further aggravating the problem of wilding tree spread. Extensive areas of plantation forestry reduce options for alternative land uses. Eliminating alien herbivores from indigenous forests throughout the country will allow regeneration and recovery of sub-canopy vegetation and increase sequestration.
96. Current planting programmes (new 15,000ha by 2020) are totally inadequate (Issues Paper p.22).

Q7 What policies, including adjustments to the New Zealand Emissions Trading Scheme, will encourage more sequestering of carbon in forests?

97. Consistent long term price for carbon guaranteed in line with international trends – this would prevent a repeat of the reduction in planting seen in the late 1990's. A Zero Carbon Act would create the legislative environment for this to happen.
98. A hard look at the discount rates associated with the forestry sector and tree plantings is indicated. The reality here is similar to that proposed by Prof Tim Jackson in relation to renewable energy systems: the future value of the trees, in terms of carbon sequestration potential, is higher than their current value. In order to prevent harvest, there may need to be a negative depreciation rate applied so they are generating revenue, which could be financed from a general carbon taxation regime.

Q8 What are the main barriers to the uptake of electric vehicles in New Zealand

99. Question 8 is not the right question. The government of Sweden outlawed the use of advertising that referred to electric vehicles or biofuels as “environmentally friendly”, based on the results of numerous research studies that elucidate the supply chain and impacts of the individual private-vehicle-dominated economy.
100. Furthermore, EVs at best will only make a fractional dent in transport emissions in the short-medium term. The remainder of the transport fleet is still inefficient and producing GHGs. At the very least, emissions standards are required for all imported vehicles – almost every other nation has these. Emissions from heavy vehicle fleets and air transport also need to be addressed, and EVs won’t solve this. A comprehensive strategy across all transport is required, with a focus on reducing the need to travel using fossil fuels, and providing low-carbon options for mobility.
101. We consider the entire premise of the Commission’s question is flawed. The only way to reduce carbon emissions in the transport sector is to produce, import and consume less liquid fossil fuel. “Encouraging” purchase of an additional vehicle by households is not the same as re-developing urban and rural landscapes so that the low carbon options offer much lower cost, more valuable experiences, and higher productivity than the current private automobile exclusive systems.
102. There are vast holes assumptions around EVs that are rarely questioned in mainstream dialogue. To name but a few:
- No discussion of the reality of resource constraints associated with key minerals such as lithium
 - Assumptions that the size of the private vehicle fleet could be reduced by 80% using on-demand self-driving EV’s - what about rush hour..?
 - No real attempt to implement the highest efficiency options – electrified mass transit options.
 - No acknowledgement of energy supply limits, as outlined elsewhere in this submission, and the probable effect on BAU and GDP activity.

For more on this subject, see “When Trucks Stop Running”²³

Q9 What policies would best encourage the uptake of electric vehicles in New Zealand?

103. Tax vehicle emissions on a sliding scale.
104. Options include those undertaken in Norway – viz: no purchase/import taxes, exemption from 25% VAT on purchase, low annual road tax, no charges on toll roads or ferries, free municipal parking, access to bus lanes, 50 % reduced company car tax, exemption from 25% VAT on leasing, and a goal that all new cars sold by 2025 should be zero emission. Norway established at least two multi standard fast charging stations every 50 km on all main roads this year. We propose these measures²⁴.

Q10 In addition to encouraging the use of electric vehicles, what are the main opportunities and barriers to reducing emissions in transport?

105. This question starts off with an un-proven assumption that “encouraging electric vehicle use” is an opportunity to reducing emissions in transport. The IEA estimates the current stock of electric vehicles to be 1.2 million, based on the cumulative vehicle manufacture and sales since 2005 if all are still on the roads. (IEA, Global EV Outlook, 2017). This figure appears to include scooters and motorcycles which make up the vast majority of the BEV’s in China (more than half).
106. The government has a nearly exclusive policy focus on "encouraging the use of electric vehicles". To determine if this makes sense, consider the following.
107. New Zealand's share of the current global automobile fleet is around 0.06%. The current total electric vehicle stock globally is around 1.2 million, 200,000 of which are electric scooters in China (IEA, EV Outlook, 2017). New Zealand currently has 3,700 electric vehicles registered. About 120,000 petrol and diesel personal vehicles were added to the registration roles last year.
108. The government is providing subsidies and encouragement with a policy of having 64,000 electric vehicles in the country by 2021 "to help reduce carbon

²³ <http://fromfilmerstofarmers.com/blog/2017/april/book-review-when-trucks-stop-running-energy-and-the-future-of-transportation/>

²⁴ <http://elbil.no/english/norwegian-ev-policy/>

emissions". In the 2000's the Labour led government policy was to "halve emissions from transport by 2020." Since the import of used vehicles from Japan took off in the 1990's, the number of cars in NZ has accumulated by about 3.1% per year.

109. If it seems more crowded on the roads, it is. In 2000, the number of registered cars was 1,877,850. There are currently 3,265,614 registered cars, vans and light trucks in New Zealand.²⁵ The Ministry of transportation data shows that there are 54,565 vintage cars with model year older than 1970. Thus, the current government policy for reducing carbon emissions is based on a target of a number of cars in the range on a par with the number of vintage cars. If vehicles accumulate in NZ at the historic rate, by 2021, there will be 3,822,639 vehicles, and that 64,000 BEV's will represent 1.67% of them. Let's say that these 1.67% of vehicles represent a 1.6% emissions reduction. If the rate of growth in the NZ fleet were reduced to 2.8% per year (from the historic 3.1%) then there would be 73,510 fewer cars than otherwise, and the emission "reduction" would also be 1.6%, even though clearly it would not be a reduction. A real reduction would be achieved by reducing the current number of vehicles used in NZ by 1.6%.
110. The congestion in urban areas and even the highways is cutting into productivity, with estimates of lost productivity in billions of dollars per year. The Productivity Commission should not assume that the one government policy in relation to transportation of "encouraging electric vehicle use" is actually any kind of a way to address emissions reduction or productivity. Rather the commission should engage with transport research experts who work on energy transition and urban transition and explore the real incentives, innovations and options.
111. The other "alternatives" mentioned in the chapter range from the obvious (rail) to the absurd (Hydrogen vehicles and biofuel)²⁶.

25 <https://www.nzta.govt.nz/resources/new-zealand-motor-vehicle-register-statistics/national-vehicle-fleet-status/>

26 Krumdieck S., Page, S Retro-analysis of liquid bio-ethanol and bio-diesel in New Zealand, Energy Policy 62 (2013) 363–371

Page, S., Krumdieck, S., System-level energy efficiency is the greatest barrier to development of the hydrogen.... Energy Policy (2009),

doi:10.1016/j.enpol.2008.11.009

112. Thus, the types of questions that the commission should be asking are very different to that of Q10.
113. What kind of policy, tracking, market and allocation system would need to be innovated to achieve a freeze in accumulation of vehicles and a slight reduction in overall number by 1.6% over the next 4 years?

Indirect barriers

114. Other barriers include the government's own policies on shipping, roads, public transport, rail, urban planning and centralised services. Electrification of the main trunk railway, initially through the North Island, subsequently throughout the country. Increase the use of coastal shipping for freight transfers is also likely to achieve a net reduction in emissions.
115. Air travel is so cheap and convenient. Put aviation fuel tax on the same basis as other fuels.
116. There are no incentives to live and work more locally and curtail frivolous vehicle use. Nor is there support to maintain good services, businesses, adult education and amenity in secondary towns and villages so people can live and work happily in place.

Q11 What are the main opportunities and barriers to reducing emissions from the use of fossil fuels to generate energy in manufacturing?

117. Since the oil shocks of the 1970's – the government, largely based on the non-technical judgement of ministers, has “picked winner technologies” and provided funding to IRL, CRL, Solid Energy, Callaghan, BRANZ, HERA, Fletcher... to build some particular thing. News media incorrectly characterizes the project. It doesn't work, and it quietly goes away.
118. There was a hydrogen fuel cell and wind power demonstration by IRL some years ago, carbon capture and storage (CCS) demonstration, and now tyres in the cement kiln. In this document it says “shift the heat source for the production of cement from coal to waste types (Hon Nick Smith, 2017).” It must be noted that CCS is currently unproven and very expensive technology.

27

27 <https://www.intechopen.com/books/recent-advances-in-carbon-capture-and-storage/economics-of-carbon-capture-and-storage>

119. This is a totally inaccurate depiction of the process by which a small fraction of waste tyres can be disposed of in cement kilns. It also is not a way to reduce carbon emissions. The tyres (if they do not catch on fire) will break down slowly, releasing CO₂ and toxic materials. If they are burned they release all the CO₂ held in them.
120. There are ongoing efforts to try and look to replacing coal with wood for process heat. Activist organisations such as the Coal Action Network have been working in parallel with officially sanctioned analysis from Scion, Fonterra, etc. There are various estimates, and wood is definitely a significant resource to consider, however, it will not support, from the flow of wood that can be sustainably produced, anything like current levels of industrial and commercial activity. These have been enabled by drawing down on the stock of energy captured in the millions of years of fossilised wood in coal.

Q12 What changes will be required to New Zealand's regulatory, institutional and infrastructural arrangements for the electricity market, to facilitate greater reliance on renewable sources of energy across the economy?

121. An issue with being dependant on hydro for such a large proportion of our electricity supply is reliability. This will only become increasingly the case as the more variable climate change kicks in, as we introduce more wind turbines and as the ice mass in the alps shrinks reducing its value as a reliable means for meeting base load.
122. We suggest that a serious examination of large scale pump-storage be conducted as a potentially more sustainable and practical method of reducing this variability of electricity supply.

Q13 What evidence is there on the possible physical effects of future climate change on sources of renewable energy in New Zealand, such as wind, solar and hydro power?

123. Hydro-power is likely to be seriously affected by reductions in volumes of permanent and seasonal ice and snow cover. This will mean higher river inflows in winter, but less in summer as there will be more rain but less snow

precipitation²⁸. By contrast, tidal generation would be immune from such effects.

124. Increased wind speeds may make wind power utilisation rates fall and maintenance costs increase if significant periods above the maximum generation speed are realised. This appears to be a likely effect give the evidence presented by Hansen et al in the 2016 paper "Ice melt, sea level rise and superstorms..."²⁹

Q14 Apart from the regulation and operation of the electricity market, what are the main opportunities and barriers to reducing emissions in electricity generation?

125. Adequate electricity supply from renewable sources would be essential and could best be achieved with the harnessing of tidal potential, with its very large potential and absolute predictability, particularly in Cook Strait, identified as one of the World's best sites and where initial studies have already been conducted. Adequate funding and further trailing is well justified.
126. This project would use technology developed in New Zealand and therefore can be readily manufactured locally and exported, being a potential "transition" business.
127. A tidal power station in the Pentland Firth between mainland Scotland and Orkney broke the world record last month for electricity generation from tides³⁰.
128. During August, [two tidal turbines](#) produced enough energy to power 2,000 Scottish homes. And studies have showed that this site alone has potential to generate 43 per cent of the total electricity used in Scotland.
129. Other projects exploring the technological feasibility of converting organic material into real WTI Crude oil could also be supported.

28 Poyck, S., Hendriks, J., McMillan, H., Hreinsson, E.O. and Woods, R. (2011) Combined snow and streamflow modelling to estimate impacts of climate change on water resources in the Clutha, New Zealand, *Journal of Hydrology (NZ)*, 50, 293-311.

29 http://bit.ly/super_storms

30 <http://www.power-technology.com/projects/pentland-firth-tidal-power-plant-scotland/>

Q15 What are the main opportunities and barriers to reducing emissions in industrial processes (such as the production of steel, aluminium and cement) and in product use (such as the use of hydrofluorocarbons in refrigeration and air conditioning equipment)?

130. Sequestering of CO₂ with the use of the 'Diagen' process, based on the utilisation of algae and organic sludge to produce crude oil as trialed at the Bromley site in Christchurch, could be further promoted. It should be noted that any sequestration process is a parasitic energy load on the existing process, and therefore a reduction in profitability. Novel financial incentives to maintain profitability may be needed if the production is deemed essential or in the national interest.

Q16 What policies and initiatives would best promote the design and use of buildings that produce low greenhouse gas emissions?

131. Generally the opportunities are at the more global end of the spectrum but all impact on emissions, albeit indirectly.
132. Reduce the demand for high energy products. Create opportunities for alternative typologies. Introduce material labelling for energy content and point of origin.
133. Create a national organisation that has a strategic overview of the NZ Building Industry including material and human resource. Times have changed. Leaving it up to the market has been shown to be inadequate at best.
134. Understandably the large construction groups are apathetic to change. Thus an uncoordinated and inefficient industry lacks a strategic vision that may benefit NZers as a whole.
135. Most buildings are evaluated by construction costs at tender. Life cycle costing is virtually unknown and has been avoided by quantity surveyors and others for years. Government agencies (and CIC) have looked at performance based costs at the time of tender. The focus really needs to be at ground level with a greater emphasis on available resources and cost in use.
136. MBIE governance of the Building Industry has been inadequate. The 'tick boxes' mentality is a barrier to change and dumbs down the industry and is prohibitively expensive in a very small country. While administratively convenient it mitigates against innovation and specific design.

137. Do something about energy line charges. The way we now think about energy generation and use has changed. Maintaining inequitable line charges compromises the strategic interests of energy supply and use in NZ.
138. Existing building stock – incentives for adaptive re-use including materials. The construction of the Building Code was originally only applied to new builds and new alterations. Until recently many of our Standards originated in Australia until they began to change.
139. More recently BRANZ under MBIE has developed research that supports the code. That research underpins a performance local authorities expect for all buildings. The problem is that just about all of our existing stock does not comply.
140. Update the building regulations to include energy performance standards that are equivalent to climatically comparable advanced economies in Europe.
141. Urban planning for Mixed use. Medium density residential and commercial uses. Reduce the need to travel to work. Land use planning is a big issue. We seem to be reluctant to move away from earlier planning models and building typologies.

Q17 What are the main opportunities and barriers to reducing emissions in waste?

142. A major barrier is that we have come to view certain materials as waste rather than material resource. Certainly the quality and type of waste produced does make complete recycling in ways that might reduce emissions difficult. Contamination is a complicating factor so reducing emissions from waste needs to also address what we use and how it is manufactured. This of course presents difficulties in a market economy.
143. Arguably too the extent to which we waste and hence produce GHG is an indicator of the extent to which we are unsustainable. But it is also dependent on the huge quantities of cheap energy so the trend in EROEI will automatically and significantly reduce this problem.
144. There are also many perverse incentives that promote wasting in the short-term interests of business and could easily be resolved with minor regulation

for system changes. Accepting green waste at landfills contributes to emissions when such material could be building soils for food production.

145. Bio-digesters are increasingly being used on dairy farms to capture gas and produce useful fertilizer³¹. This option would appear to have much wider potential for village and urban application to create more benign closed systems.

Q18 Policies to lower emissions from particular sources, technologies and processes can have interactions with emission sources in other parts of the economy. What are the most important interactions to consider for a transition to a low emission economy?

146. The Issues Paper (p 63) states that: "Finally, decoupling economic growth from carbon emissions is not only possible, but already underway for many countries, including major economies such as the US, France and Germany." If it were true it would be great, but it is not.
147. In a recent article called "Is Decoupling GDP Growth from Environmental Impact Possible?"³² the "illusion of decoupling", Ward and his colleagues argue, has been maintained through the following misleading techniques:
- substituting one resource for another;
 - financialisation of GDP, such as through increasing "monetary flows" through creation of new debt, without however increasing material or energy throughput (think quantitative easing);
 - exporting environmental impacts to other nations or regions, so that the realities of increasing material throughput can be suppressed from data calculations.
 - growing inequality of income and wealth, which allows GDP to grow for the benefit of a few, while the majority of workers see decreases in real income - in other words, a wealthy minority monopolises the largest fraction of GDP growth, but does not increase their level of consumption with as much demand for energy and materials.

31 https://www.grassland.org.nz/publications/nzgrassland_publication_2720.pdf

32 Ward JD, Sutton PC, Werner AD, Costanza R, Mohr SH, Simmons CT (2016) Is Decoupling GDP Growth from Environmental Impact Possible? PLoS ONE 11(10): e0164733.

<https://doi.org/10.1371/journal.pone.0164733>

148. Ward and his co-authors sought to test these factors by creating a new economic model to see how well it stacks up against the data. They found that continued economic growth in GDP “cannot plausibly be decoupled from growth in material and energy use, demonstrating categorically that GDP growth cannot be sustained indefinitely.”

149. Et al³³ make the point that many other assumptions apparent in support of the decoupling narrative are questionable:

- historically unprecedented decoupling rates required;
- misconceived carbon budget assumptions;
- extraordinary proposals to plant agriculture land with carbon sequestering plants, without presenting a convincing case for how to achieve this;
- deep reliance on CCS technology which to date is not commercially viable;
- highly optimistic assumptions about resource efficiency;
- Assumptions that no resource scarcity challenges will interfere with this long-term vision of economic growth.

If any one of these assumptions turns out to be misconceived or unachievable cumulatively the narrative must be considered, at best, not established, and, on balance, mostly likely false.

150. To add weight to the research, Tim Jackson³⁴ also makes the simple and very important point:

"Ultimately, at the global level, what counts of course is the rate at which resources are extracted from the ground. So the final arbiter on material decoupling – and the possibilities for escaping the dilemma of growth – are worldwide trends on primary resource extraction". These have continued to increase annually to date.

33 <https://doi.org/10.1016/j.ecolecon.2017.08.014>

34 Prosperity without Growth: Economics for a Finite Planet 1st Edition by Tim Jackson

151. And physicist Dr Tim Garrett's "Thermodynamics of wealth" analysis³⁵ points to the fact that no absolute decoupling has occurred.

Ratio of energy to wealth

Q19 What type of direct regulation would best help New Zealand transition to a low-emissions economy?

152. Please refer to our comments on waste in Q18

Q20 Acknowledging the current review, what changes to the New Zealand Emissions Trading Scheme are needed if it is to play an important part of New Zealand's transition to a low-emissions future?

153. Wise Response have participated in the two stage Consultation process that MfE have conducted throughout the country. Our concerns with the process and our desired outcomes were set out in a letter to Matthew Cowie, Senior Policy Analyst, MfE dated the 17 April, after the second consultation meeting.
154. Government recently announced its decision to pay \$1.4 billion annually over ten years, to buy carbon credits from overseas Carbon Markets to fulfil our obligations to the Paris Climate Accord. This feels reminiscent of the \$200 million spent on phoney 'hot air' Russian and Ukrainian credits that the Morgan Foundation exposed last year, as an alternative to initiating effective mitigation measures here. This is both short-sighted and totally reprobate, representing a massive subsidy to agriculture and risks leaving our industries seriously lagging and exposed to rising carbon prices in the transition to a sustainable economy.

Key issues and flaws with the ETS as proposed

155. The targets the ETS, set to meet (NZ's Intended Nationally Determined Contributions: INDC), are too weak and insufficient to play New Zealand's fair part in retaining global warming below a 2 deg.C average increase on pre-industrial levels.

³⁵ <http://www.inscc.utah.edu/~tgarrett/Economics/Economics.html>

156. Exemptions for agriculture (responsible for 50% of NZ's emissions) and trade-exposed industries further compromise the ETS - all emissions must be included to allow the market to adjust to the new imperative
157. Relying heavily on overseas unit off-sets and local forestry (especially if it will eventually become a net emitter) is shonky and of little value unless accompanied by a serious national reductions programme.

Key requirements for an effective climate change response, we proposed were:

158. Our assumptions and values shape our patterns of behaviour. So above all we need a public consultation process which considers these before setting what we believe are just and responsible emissions goals.. Supporting policies need to include:
- A sinking lid on permissible emissions to reach zero net emissions at least by 2050
 - A fiscally neutral carbon levy, imposed at points of import and emission, with all dividends returned equally to citizens to incentivise emission reductions
 - Annual reporting on CO2 reductions in relation to milestones and an agreed budget
 - Any other revenues from the ETS be directed to hasten the transition to renewable energy and low emissions landuse
 - The need to capture not just industry but all citizens, and promote behaviour change for practical action.
159. Given the above concerns, and that we have one chance to avoid planetary over-heat, Wise Response Society considers a more directive, outcome-focused process is required: failure must not be an option.
160. Once the budget limit is set, market mechanisms may be used to allocate between emitters, but will not provide an optimum outcome without accompanying interventions and complementary methods like carbon efficiency regulations.

161. In essence, why should we feel we have the right to prolong our profligate carbon-rich lifestyle by purchasing huge quantities of overseas carbon credits, at great cost to the taxpayer, while other countries shoulder our carbon debt? Like withdrawal from the Paris accord for the USA, this policy will be highly detrimental to our international standing. Inevitably we, but particularly future generations, will pay a much higher price, financially, socially, politically, and environmentally, to our country's enduring shame.

Q21 What type of market-based instruments would best help New Zealand transition to a low-emissions economy?

162. Climate change has been described as the greatest market failure ever by the Stern Report. Market based instruments are patently incapable of dealing with the need to change, as the current situation proves. Jevon's paradox, or the 'rebound effect' applies, in that the majority of improvements in efficiency are taken as increased throughput/profit rather than as actual savings.
163. Add to this growing population, and other compounding factors, and the reality is that market based solutions are proven to be ineffective in create reductions in absolute emissions that the transition requires.

Q22 What type of support for innovation and technology would best help New Zealand transition to a low-emissions economy?

164. The technology most urgently required at this time is social, rather than high-tech machines. Changes to our economics and helping the New Zealand public to develop an awareness of the fundamental problems, and the mind set of sufficiency, or 'enough', can help us to prepare for the constraints that are coming.
165. Refer to our answer to question 40 for more on how our outlook must change, and the values we must stress to change our thinking on this issue.

Q23 How can New Zealand harness the power of financial institutions to support a low-emissions transition?

166. The NZ Government, through funds and organisations (such as the NZ Superfund, EQC, various state pension funds, Kiwisaver, university, local

Government, and trusts and banks where it appoints board members) and through financial institutions that it uses (such as banks and insurance companies), has considerable influence in directing and encouraging

1. divestment from companies, funds and sectors that contribute to global warming (negative screening);
2. investment in ways that provide solutions to solving these issues (positive screening).

167. The Mercer study shows that medium to longer term, returns on fossil fuels (and coal in particular) will significantly diminish. This was used by NZ Superfund to justify divestment from fossil fuel activities (ref: Howell)³⁶.

Q24 What type of alternative approaches (such as voluntary agreements or support for green infrastructure) would best help New Zealand transition to a low-emissions economy?

168. Due to the resource constraints we have described, the low emissions economy will be realised. We need to recognise that getting ahead of the curve, both to limit carbon emissions, and to reduce the severity of the impacts, is paramount.
169. Alternative economic options - alternative economy, complementary/parallel currencies, etc must be explored. Alongside reform of predominantly neo-classical modelling to include life cycle, and ecological considerations, following the ecological economics³⁷ line of thinking.

Q25 In addition to “core” climate policies and institutions, what other changes to policy settings or institutional frameworks are required to effectively transition New Zealand to a low-emissions economy?

170. The Resource Management Act is failing to meet its intent. It looks at resource management decisions on an individual basis, failing to take the systems level understanding into account. It leads to a ‘death by a thousand cuts’ situation.

36 Investing in People and the Planet (Howell, R. 2017. ISBN 978-0-473-38418-0)

37 Ecological Economics takes as a starting point that the human economic system is embedded within a finite environmental system. Ecological Economics can, therefore, be considered to be the science and management of sustainability, linking environmental, social, and economic systems together.

171. Changes that could help remedy this are to take the current Section 32a reports, which give benefit/costs analysis using the overly-simplistic economic analysis of NZIER, etc and replace it with systems dynamics modelling processes such as those undertaken by Prof. Marjan van den Belt (now VUW) in Vermont, and Drs Alexandra MacMillan and David Rees in the public health sector in NZ and elsewhere.
172. The aim is to take a more nuanced approach to determining benefits and costs, whilst at the same time building understanding of the key things that drive systems behaviour. This radically improves the chances of policy and resource management decisions that actually meet the goal of a reduction in absolute emissions demanded by the Paris Accord.
173. Coal is one of the dirtiest fossil fuels and therefore offers the best opportunity to significantly reduce emissions whether the product is used in NZ or exported. This implies that bulk coal extraction must be phased out as quickly as possible and alternative employment schemes offered.
174. Continuing to consent new mines (and activities that depend on the product such as boilers) and prospect for fossil fuel deposits in and around NZ, is entirely at odds with the need is to reduce cumulative emissions recognised by this inquiry. That this can happen illustrates that the RMA and related resource management legislation is not fit for purpose.

Q26 What are the main uncertainties affecting New Zealand businesses and households in considering investments relevant to a low-emissions future? What policies and institutions would provide greater confidence for Investors?

175. The failure and inadequacy of the main international economic model, the neo-classic economic paradigm, is now becoming much more widely accepted, but it will not be rapidly replaced and its predictive limitations will continue to add uncertainty and confusion in laying out the necessary investments for public, private and civil society institutions.
176. Technology will contribute some solutions to these threats, but will only have a partial effect in mitigation because of the limits of rare earths³⁸.

38 The Elements of Power by David Abraham, 2015: Yale University Press, (<http://a-resilient-world.blogspot.co.nz/2016/08/book-review-elements-of-power.html>)

Infrastructure investment, particularly energy and transport infrastructure, is dependent on the NZ Government, both central and local, taking the lead.

177. Investors will have greater confidence in policies and institutions if they are told the truth and are informed of some of the difficult choices that NZers face. There is a need for much more education of the financial sector which has been generally sceptical of the global warming science. Much more resource and effort needs to be put into education of the public through TV and other media forms. Businesses should report on their ecological footprints and future risks. There are overseas examples of where this is done to much greater effect than current NZ practice.
178. Governments have an important role in ensuring there are meaningful standards and transparent public discussions. In recent years in NZ the integrity of Government is eroding due to a disregard of the Official Information Act, transparency of Government ministers and departments, murky deals struck and clampdowns on attempts to get accountability.
179. An Otago Daily Times editorial stated "There is a slow, steady and insidious eroding of transparency in too many areas, however. Smokescreens, part-truths, secrets, semantics, brain fades, fudgings, refusals to comment, commercial sensitivities, redacted documents, and the shutting down of discussion about issues of interest and concern have become too frequent in officialdom"³⁹

Q27 What approaches, such as regulatory frameworks or policy settings, would help embed wide support among New Zealanders for effective reduction of domestic greenhouse gas emissions?

180. Getting the wider community on side in emissions reduction is crucial for success. As proposed in the CCCA Statement (see Q28), we consider that there is enormous potential for such education in the use of scenario modelling (such as C-Roads⁴⁰) scenario testing and for key groups, participatory model construction. The latter is modelling with rather than for people as a method of learning.

39 Edwards, B. Dec 15 2015. Political Roundup the struggle for integrity.
http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11561446

40 <https://www.climateinteractive.org/tools/c-roads/>

Q28 Is New Zealand's current statutory framework to deal with climate change adequate? What other types of legislation might be needed to effectively transition towards a low-emissions economy?

Climate Consensus Coalition Aotearoa Proposal

181. As indicated in the introduction to this submission, Wise Response has facilitated the development a Position Statement and Action Plan for NGOs under the name Climate Consensus Coalition Aotearoa (CCCA).
182. It is based on the assertion that if dangerous global warming is to be avoided, as a responsible nation state, New Zealand must do its fair share to limit greenhouse gas emissions. The urgency and enormity of the challenge we face to stay below 1.5 deg (RCP2.6 pathway) is clearly illustrated by James Hansen in the graph below⁴¹
183. The full CCCA statement is appended to this submission but the CCCA Statements purpose and key elements may be summarised as follows.
Purpose:
- Align New Zealand's NGOs and civil society behind agreed climate response strategy **bottom lines and a fair process**
 - Help **raise public awareness** of the urgency of the climate situation we face
 - Expedite a timely, robust and **united response by Government**
184. Key elements:
- Development of an **Integrated Emissions-Reduction Plan**
 - **Achieve Zero Net Carbon Emissions** by no later than 2050⁴² and on NZ's own account.

41 http://www.columbia.edu/~jeh1/mailings/2017/20171006_NorthDakota.pdf

42 Rogelj, J., G. Luderer, R. Pietzcker, E. Kriegler, M. Schaeffer, V. Krey, and K. Riahi (2015) 'Energy system transformations for limiting end-of-century warming to below 1.5 degrees C', Nature Climate Change, 5, 519-527 doi: 10.1038/nclimate2572

- A collaborative and fully representative **Climate Change Forum** to develop the strategy
- An independent **Climate Change Commission** providing advice to Government and reporting to Parliament
- A **Climate Change Adaptation and Mitigation Fund** for relief and to drive relevant research⁴³
- **Cross-Party Political Agreement** to fully implement the emissions reduction Plan developed
- **Consistency with Te Tiriti o Waitangi**
- **Supports and integrates other Climate Change Initiatives**, including Gen Zero's proposed Zero Carbon Act, the Climate Declaration, Globe-NZs statement, the Compact of Mayors, and the Parliamentary Commissioner's recommendations. Gen Zero's proposed Zero Carbon Act, for instance, sets out how a Climate Commission might be structured and established.

185. Just how the proposed new institutions would interrelate with existing instruments of governance is diagrammatically represented in below.

Concept of the main information flows proposed under CCCA (with new institutional entities highlighted)

186. Given the expertise and enormous NGO support behind the development of the CCCA Proposal (currently approximately 100 organizations representing 330,000 members), we appeal to the Productivity Commission to give it most serious consideration as a suitable new statutory framework to deal with climate change.

187. The CCCA Action Plan is based on the assertion that if dangerous global warming is to be avoided, as a responsible nation state, New Zealand must do its fair share to limit greenhouse gas emissions. As noted in the Issues Paper, Government has acknowledged the concept of "fair share" in tackling

⁴³ Boston and Lawrence (August, 2017) "The Case for a New Climate Change Adaptation Funding Instruments." Victoria University, Wellington. 39pp

climate change, but qualified it in relation to relative costs of mitigation compared with other developed countries (2015).

188. Given the already extreme challenge we face as a globe, to avoid extremely dangerous climate impacts and that a changed climate will not distinguish between developed and undeveloped countries (witness the recent series of hurricanes that have impacted the Caribbean and US Gulf States), we submit that our best chance of success now is for all countries to set a scientifically robust (but conservative) target for net zero emissions and set the limits necessary to achieve it.
189. We proffer a "conservative" (low risk) target based on a track record of "bad news" about what it will take to stabilize the climate. Most recent of these is a report indicating revised calculations of methane produced per head of cattle show that global livestock emissions in 2011 were 11% higher than estimates based on data from the UN's Intergovernmental Panel for Climate Change (IPCC). They state: "A sharp rise in methane pollution could jeopardise the goal – enshrined in the 196-nation [Paris climate pact](#) – of capping global warming below 2C, a consortium of 81 scientists warned in December"⁴⁴.

Values, beliefs and goals

190. Before moving on from the CCCA, we wish to draw your particular attention to clauses 8 and 9 in the Statement because we have identified them as essential components of successful process which are all too often overlooked with disastrous results.
191. They are that because climate change effects society as a whole any formal process to address it needs to be fully representative. e.g. not just those with economic or technical interest
192. The second is that we start by building public consensus with a conversation about common deeply held values, goals and responsibilities before beginning the more detailed study of how we will respond. This is because

44 Revised methane emissions factors and spatially distributed annual carbon fluxes for global livestock

Julie Wolf¹[Email author](#) Ghassem R. Asrar² and Tristram O. West^{2,3}

Carbon Balance and Management 2017 **12**:16

<https://doi.org/10.1186/s13021-017-0084-y>

responding effectively to climate change is essentially an ethical problem, not economic or technological.

193. It is because of the importance of the above components in an inquiry of this nature (on top of concerns about the TOR) that we fear the Productivity Commission, with its emphasis on economics, may not be the most suitable institution to undertake it. We envisage the Climate Commission with a less constrained brief and wider expert representation as a more appropriate vehicle.

Recommendation

194. Before addressing the other questions raised by the inquiry, we wish to emphasise that we are of the view there are just 4 key elements that are critical to this inquiry and which are addressed in the CCCA.
1. the need for a just emissions limit and goal for NZ,
 2. the acceptance of the remaining budget quantum that limit implies,
 3. the least-risk staging of the trajectory to meet it and
 4. a politically independent institution (i.e. a Climate Commission) to ensure it is effectively implemented, irrespective of short-term economic implications.

A Climate Commission could then get on and recommend a mechanism by which to allocate the remaining budget between socio-economic sectors and the sectors can then determine just how they are going to alter their operations to comply with their allocation.

Resource Management Act replacement

195. Another failure of the regulatory framework is the RMA. As we reach limits such as GHG emissions, fossil fuel supply or any finite resource, the essential problem we encounter shifts from one of acceptable advice impacts above a bottom line to one of resource allocation and optimization. If the quantity or quality of resources starts to shrink, the problem we have has been compared with musical chairs (Tverberg)⁴⁵. Each time the music stops, there is one less chair available.

⁴⁵ <https://ourfiniteworld.com/author/gailtheactuary/>

196. To add to this, the requirement in the Act for Councils to achieve "integrated" resource management has been largely ignored so we are suffering from the effects of a profound lack of coordination at catchment level. Being effects-based, Councils administering the Act can easily find themselves in reactive mode at the expense of forward planning. This and many other inefficiencies have been compounded by piecemeal amendment and a lack of direction from central government with NPS.
197. Accordingly, it is not optimal for the advanced planning at scale, necessary for this new environment. For this reason, and not because it is "holding up development", it requires a complete review focusing on building whole community resilience and minimising trade-offs.

Resource Management Act review

198. Failing that, the 2004 amendment to the Resource Management Act, which prevents consideration of the effects of any development on climate change (but not the reverse), is a major and serious inequity and requires urgent attention. Wise Response submitted to this effect to the Review of the RMA, but to no avail.
199. A mechanism for implementing the CCCA Plan could be by enacting a NPS for Greenhouse Gas Management, designed to fully meet our Paris COP21 obligations. To be effective, we consider this needs to be based on a per capita global allocation of the remaining carbon budget that achieves the target in the CCCA. Carbon budgeting provides a direct, reliable and accountable mechanism to progressively decarbonise the economy and plan for resilience against shocks.
200. As it currently stands, the RMA has two particular provisions that are clearly contrary to the spirit of the Paris Agreement, and there are two additions to the RMA that provide an opportunity to demonstrate New Zealand's commitment to urgently addressing the effects of our activities on climate change and to the aspiration of the 1.5 deg.C target.
201. Sections 70A and s104E should be repealed as they do not allow consideration of the effect of the emissions of greenhouse gases to be regulated or controlled at the local authority level. Instead, reliance is placed

on a centralised regulatory approach of a NES (s70B). No such standard has been produced in the decade since these provisions were introduced to the RMA in 2004, and it seems that such a regulatory approach would be difficult, costly, and not allow sufficient flexibility for local authorities which wish, and are able, to move quickly on such matters. The RMA needs to be amended to enable local authorities to 'act locally' while 'thinking globally'.

Q29 Does New Zealand need an independent body to oversee New Zealand's domestic and international climate change commitments? What overseas examples offer useful models for New Zealand to consider?

202. Refer to proposal for a Climate Commission in the CCCA under Question 28 above.

Q34 Who are the most important players in driving forward New Zealand's transition to a low-emissions economy?

203. Oversight of central government in close liaison with local government must play the lead role, with appropriate policy and legislation.

Q35 What measures should exist (and at what scale and duration) to support businesses and households who have limited ability to avoid serious losses as a result of New Zealand's transition to a low-emissions economy?

204. The concept of a two speed economy has been mooted. Build local and regional community resilience using agro-ecological design in parallel with trying to sustain export production on the current model. This would be a strategic hedge that could prevent unnecessary hardship, and a proactive transition strategy. This should be country wide, and for as long as the transition takes. By meeting fundamental needs locally, you minimise the potential severity of any economic meltdown.

Q36 What are the essential components of an effective emissions-mitigation strategy for New Zealand that will also be economically and politically sustainable?

205. All businesses, including farming, now need to provide annually a full-cycle emissions budget for scrutiny of the likes of a Climate Commission. This will be necessary for all operators to show compliance with the budget allocated to their activity sector.

Q37 Should New Zealand adopt the two baskets approach? If so, how should it influence New Zealand's emissions reductions policies and long-term vision for the future?

206. We endorse the case made by Generation Zero for a 'two-baskets approach' in dealing with emissions reduction in New Zealand.

Q40 What does your long-term vision for a low-emissions economy look like? Could a shared vision for New Zealand be created, and if so, how?

207. The Wise Response vision is of a world of potentially deeply fulfilling "frugal abundance" as a condition of survival. Accordingly it is a world where economic activity operates within the natural constraints required by environmental overshoot, declining net energy available from our energy systems, and the imperative of a fair, just, and therefore high wellbeing society. The kind of features such a new economy is likely to exhibit are summarised in the document "A Simpler Way" by Ted Trainer⁴⁶. He states that: "We cannot achieve a sustainable and just world unless we change to:

- A new economy, one not driven by profit or market forces, and a zero-growth or steady-state overall economy, which [necessarily] produces much less than the present economy.
- Simpler lifestyles, much less production and consumption, much less concern with luxury, affluence, possessions and wealth.
- Small, highly self-sufficient local economies, largely independent of the global economy.
- More cooperative and participatory ways, enabling people in small communities to take control of their own development.
- Some very different values, especially cooperation not competition, and frugality and self-sufficiency not acquisitiveness and consuming."

208. It is obvious that general acceptance of such a radical change in living arrangements will not come easily. NZ's record of failure in emission reduction over the last 20 years demonstrates that simply looking to do better will not get us there. We consider therefore that we will only transition

46 <http://www.resilience.org/stories/2016-07-02/sustainability-the-simpler-way-perspective/>

successfully if the plan is developed by back-casting from a future sustainable level of emissions and other resource uses that sets the parameters we must work within.

209. We hope that this captures for the Commission both the imperatives for change, and the type of changes that are likely to produce a sustainable lower emissions economy that offers wellbeing for all New Zealanders.

Thank you for the opportunity to submit and we wish you well for your deliberations.

Appendix

Climate Consensus Coalition Statement of Position and Action Plan as presented to MPs with the support of GLOBE-NZ at Parliament on behalf of its creators and supporters on 16 August 2017.

CLIMATE CONSENSUS COALITION AOTEAROA

Statement and Action Plan Initiated by the Wise Response Society

SUMMARY

This position statement represents the views of NGOs, other organizations and members of Civil Society, on the need for a comprehensive greenhouse gas (GHG) emissions reduction plan for New Zealand to achieve, in timely manner, a net zero carbon economy. It is commended to the Government by signatories to the Statement.

BACKGROUND

Pursuant to the Paris COP 21 Climate Agreement (Dec 2015), this Position Paper of the Climate Consensus Coalition Aotearoa (hereafter "the Coalition") is to provide a means for civil society groups and individuals to support development of an effective "Emissions Reduction Plan".

Essential objectives of the Paris Agreement were to:

- ❖ strengthen the global response to the threat of climate change by keeping a global temperature rise well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase even further, to 1.5°C;
- ❖ strengthen the ability of countries to deal with the impacts of climate change;
- ❖ put in place appropriate financial flows, a new technology framework, and an enhanced capacity-building framework to achieve these ambitious goals;
- ❖ provide for enhanced transparency of action and support through a more robust transparency framework.⁴⁷

There is therefore a clear global imperative for urgent action by everyone to ensure a sustainable climate for humankind and other biota and ecosystems, both for their own intrinsic worth and the many services they provide.

Wealthy countries like **New Zealand can no longer afford to free-load** or game the system. Our country is already well behind many other developed nations in responding to climate change. Should New Zealand take ambitious action to reduce emissions, it could position as a leader on this critical issue and profoundly influence issues like human rights, public health, social justice and morality.

The main hurdle to an effective response is not technological but one of assumptions, beliefs and political resolve. Thus, discussions on just how we respond to this threat must logically begin with an explicit examination of values, priorities and responsibilities held by New Zealanders, and thereafter, to seek a common vision.

Any response must be consistent with **Te Tiriti o Waitangi** which establishes the requirement for Maori to be fully involved in the development of proposals that may affect their interests or resources.

⁴⁷ http://unfccc.int/paris_agreement/items/9485.php

CLIMATE CONSENSUS COALITION AOTEAROA

Statement and Action Plan Initiated by the Wise Response Society

The Coalition will participate in any process with the aim of advancing the objectives set out below. Signatories to this Statement support incorporation of the following principles into any plan or process concerning New Zealand's response to the Paris Agreement.

OBJECTIVES:

1. Consistent with the Paris Accord, Aotearoa New Zealand will achieve, on its own account, **net zero GHG emissions by 2050** or at such other earlier date that new information shows is necessary for all nations together to restabilise the climate⁴⁸.
2. **Secure sufficient political resolve** to fully implement an Emissions Reduction Plan consistent with this objective.

KEY PLAN ELEMENTS:

3. To ensure continuity of commitment, **political cross-party agreement is needed** on an emissions reduction pathway, consistent with delivery of the primary objective. The form of this pathway will be based on fairness, transparency and intergenerational justice.
4. Planning the remaining carbon allocations will be based on a **comprehensive inventory** of New Zealand's GHG contributions - including agriculture, all industries, and relevant international travel.
5. We must apply **set timeframes, milestones, progress-monitoring** and revision, and agreed methods of measurement. The Coalition recommends setting ambitious, annual and 5-year emissions budgets (i.e. not just fixed-point emissions-reduction targets) covering all GHGs⁴⁹ up to four budgets ahead (i.e. looking out to 20 years). For this there may be advantages to treating long-lived and short-lived GHGs separately.
6. The plan will be **comprehensive and fully integrated** across policies such as energy, transport, urban form, economy, agricultural and forestry, engaging central and local government, business, and community.
7. The preferred emissions reduction pathway must align with **peer-reviewed science and incentivise all citizens** and businesses to do all they can to reduce their carbon footprints. Once a reduction plan is formulated, it will be made public, with the rationale for the formulation clearly set out.

PROCESS:

48 Rogelj, J., G. Luderer, R. Pietzcker, E. Kriegler, M. Schaeffer, V. Krey, and K. Riahi (2015) 'Energy system transformations for limiting end-of-century warming to below 1.5 degrees C', *Nature Climate Change*, 5, 519-527 doi: 10.1038/nclimate2572

49 Greenhouse gas emissions include carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons, and perfluorocarbons

CLIMATE CONSENSUS COALITION AOTEAROA

Statement and Action Plan Initiated by the Wise Response Society

8. Because climate change will impact across society, **any collaborative process needs to be representative of society** as a whole. Shaping the process will be part of the process agenda.

9. The process should **inform the public** about the nature of the climate problem and our options to address it, and build public consensus through conversation about common deeply-held values, goals and responsibilities. A tool supported for this process is **participatory model construction** of New Zealand's climate account.⁵⁰

10. The procedural terms of engagement for any multi-party collaborative process **are fair and equitable, and of adequate scope.**⁵¹

11. As a starting point, the **Coalition supports legislative establishment of a Climate Change Forum**, a Climate Change Commission, and a Climate Change Adaptation and Mitigation Fund (refer Appendix A).

INITIATIVES SUPPORTED:

12. The coalition generally endorses the following four current climate and energy initiatives for an emissions reduction mitigation pathway, consistent with delivery of this statement's objectives.

- ❖ The cross-party GLOBE-NZ Group initiative representing all political parties
- ❖ The Zero Carbon Act⁵² as proposed by Generation Zero (April, 2017)
- ❖ The Global Covenant of Mayors for Climate & Energy⁵³ and commitment to it by Local Government NZ.
- ❖ Our Climate Declaration⁵⁴

50 This is not modelling for precision, but for fact finding, interpretation and interconnecting to explore broad scenarios and leverage points. ie It is modelling with rather than for people as a method of learning.

51 Includes information flow and recording, dispute use of outcomes, confidentiality, the extent to which parties are bound by process and outcomes, government commitment and Coalition representation.

52 www.zerocarbonact.nz

53 <http://www.globalcovenantofmayors.org/>

54 <http://www.ourclimatedeclaration.org.nz/>

CLIMATE CONSENSUS COALITION AOTEAROA

Statement and Action Plan Initiated by the Wise Response Society

APPENDIX A

1. Climate Change Forum:

The forum would consider the major policy challenges posed by the Paris Agreement, and provide an opportunity to:

- ❖ share information and examine possible transition pathways for reducing emissions;
- ❖ build a common understanding of the real causes, implications and challenges of climate change including values, assumptions and beliefs;
- ❖ secure a consensus on the best policy approaches for mitigation and adaptation that will achieve the primary objective;
- ❖ seek cross-party consensus based on the health and social co-benefits, including well-being and justice;
- ❖ consider the need for changed institutional and physical structures to achieve the necessary social transformations.
- ❖ collaborate with the work of government-commissioned technical advisory groups and departments to help build the evidential base

2. Climate Change Commission:

The committee would be generally modelled on the Committee on Climate Change established under Britain's Climate Change Act 2008. It would have a legislative mandate to provide independent and authoritative advice to Government and report to Parliament on progress. Progress toward stated objectives would be made readily accessible to the public on all matters relating to climate change.

The committee would not be a decision-making body. Rather, it would be a multi-disciplinary grouping with the necessary breadth of expertise and influence to advise Government on what is needed to achieve the objective and effectively report to Parliament on the following:

- ❖ New Zealand's long-term emissions-reduction targets;
- ❖ multi-year GHG budgets;
- ❖ costs and benefits of mitigation and adaptation strategies and policies;
- ❖ international obligations, including assistance to vulnerable nations, particularly Pacific communities;
- ❖ equity implications of actions and inactions by Aotearoa New Zealand at home and abroad;
- ❖ emerging international approaches and standards (and their adoption here);
- ❖ Government's progress in ensuring the nation meets its targets;
- ❖ impacts on the specific rights of Maori under the Treaty, Pacific people in Aotearoa New Zealand and in the Pacific (especially where there is legal jurisdiction or friendship) and on UN indigenous rights;
- ❖ evidence of social transformations;

CLIMATE CONSENSUS COALITION AOTEAROA

Statement and Action Plan Initiated by the Wise Response Society

- ❖ meeting international treaty obligations, including the UN Sustainable Development Goals.

The committee would have its own secretariat and be independent of government departments like the Ministry for the Environment.

3. Climate Change Adaptation and Mitigation Fund:

The fund would help to manage and fund the process of climate-change adaptation, drive research and provide limited financial relief to those negatively affected by major climate change impacts, such as sea-level rise and acidification. It would operate at both a local and a national level.

Concept of main information flows as proposed under CCCA (New institutional entities highlighted)

June 2017

Signatories in support of this statement and action plan are to be found on the following pages - As lodged on the Climate Consensus Coalition Aotearoa website since 1 July 2017 (www.climateconsensus.nz).

NGOs who helped develop this Statement and Action Plan include:

Forest and Bird, NZ Quakers, Engineers for Social Responsibility, Ora Taiao (NZ Climate and Health Council), Sustainable Aotearoa, Ngati Makino Heritage Trust,

CLIMATE CONSENSUS COALITION AOTEAROA

Statement and Action Plan Initiated by the Wise Response Society

ECO, Network Waitangi Otautahi, Coal Action Network, NZ Alpine Club, Congestion Free Wellington, Gen Zero, Pure Advantage, Making a difference for Central Otago, Pacific Institute of Resource Management, Public Issues: Methodist Church, Choose Clean Water, Sustainable Wairarapa, Sustainable Energy Forum and Wise Response, as well as a number of academics.

NGOs who have officially endorsed this Statement and Action Plan so far:

Our Climate Declaration, Coal Action Network Aotearoa, One Voice Te Reo Kotahi, 350 Aotearoa, OraTaiao: NZ Climate & Health Council, Sustainable Business Network, WWF-New Zealand, Coastal Otago River Communities, Blueskin Resilient Communities Trust, Network Waitangi Otautahi, The Renewables-Motueka, Living Streets Aotearoa, The Religious Society of Friends (Quakers), Sustainable Otautahi Christchurch, Ngati Makino Heritage Trust, Working Waters Trust, Fair Intelligent Transport Wellington, Zen Peacemakers Aotearoa, Papatowai and District Community Association, The Stone Paper Company Limited, Wainui Consulting Limited, Appropriate Technology for Living Association, Grandchild Action, Climate Justice Taranaki, Taranaki Energy Watch, Future Living Skills, BRaid - Braided River Aid, Water Action Initiative New Zealand, Coromandel Film Collective, Sustainable Future Aotearoa New Zealand, Well Spring Health, New Zealand Dominican Sisters, Project Lyttelton, 350 Otautahi/Christchurch, Engineers for Social Responsibility Inc. (ESR), The Sustainable Energy Forum Inc, Catholic Archdiocese of Wellington, New Zealand Alpine Club, Anglican Diocese of Wellington, Sustainable Aotearoa NZ (SANZ), Sustainable Otautahi Christchurch (SOC), Nelson Science Society, Peace Movement Aotearoa, New Zealand Institute of Chemistry, Bioenergy Association, New Zealand Public Service Association, UNICEF NZ, Public Health Association, Bluff Hill Motupohue Environmental Trust, Cambridge Tree Trust, Hampden Community Energy Inc, NZ Post-carbon, Forest and Bird Nelson-Tasman, Just Community, SuperGrans Western Bay of Plenty Charitable Trust, Tauranga Carbon Reduction Group, Sustainable Dunedin City, Anglican Climate Action Network, Otago University Tramping Club, Otago University Animal, Aquatic, Plant, Ecological Society, Plastic Diet, Indigo Ltd., Climate Karanga Marlborough, Redcliffs Residents Association, Central Otago Environmental Society, Water Rights Trust, Fish and Game NZ, Environmental Defense Society (EDS), Women's International League for Peace & Freedom, Aotearoa Section; Ecologic Foundation Mackenzie Guardians Inc., Royal Forest and Bird Protection Society of NZ