Questions to guide your feedback

Your submission may address any aspect of the discussion document, but we would appreciate you paying particular attention to the questions posed throughout and listed in this form. You may answer some or all of the questions. To ensure your point of view is clearly understood, you should explain your rationale and provide supporting evidence where appropriate.

Contact information

Name	**This submission was written by the following members of the Faculty of Science at The University of Auckland**: Associate Professor Niki Harre, Dr Helen Madden, Associate Professor Mary Sewell, Associate Professor Quentin Atkinson, Dr Alex Taylor, Mr Blair Sowman, Ms Gaby Free, Dr Anna Santure, Ms Sandra Anderson, Ms Angie Chin, Associate Professor Mark Costello, Dr Margaret Stanley, Dr Brendon Brewer, Dr Georgianne Griffiths, Dr James Russell, Associate Professor Virginia Braun, Ms Sue O'Shea, Professor Robin Kearns, Dr Mark Holmes, Dr Elizabeth Peterson, Professor Penny Brothers, Dr Cate Macinnis-Ng, Dr Jade Le Grice, Ms Kelly Booth, Associate Professor Jacqueline Beggs
Organisation (if applicable)	
Address	Faculty of Science, The University of Auckland, Private Bag 92019, Auckland 1142
Telephone	09 3737599
Email	n.harre@auckland.ac.nz

Objectives for the contribution

1a. We have set the following three objectives for our contribution:

- **it is seen as a fair and ambitious contribution – both by international and domestic audiences**
- **costs and impacts on society are managed appropriately**
- **it must guide New Zealand over the long term in the global transition to a low emissions world.**

1b. What is most important to you?

We agree with (most of) objective three that our contribution to the new international climate change agreement must guide NZ to a low emissions world. We are not certain what is meant by the "long term". In our view NZ should be heading as rapidly as possible toward a low emissions world, which will involve a fundamental reconsideration of our current economic, technological, and social structures. As well as some of the initiatives outlined in the discussion document, many of which we support but would like to see better resourced; we suggest that we will need to carefully consider our built environment, transport system, dependence on dairying, and our use of energy. We would also like to see a much greater emphasis on protecting NZ's biodiversity and increasing areas of native tree cover that will provide carbon sinks as well as other environmental benefits.

In our view targets should be set not by what "can" be managed, but by what *must* be managed if we are to take appropriate cautionary action given the scientific evidence on climate change and its relationship to greenhouse gas (GHG) production and other anthropogenic causes. As is clear from your discussion document the planet will warm (or not) because of our actions and it will not wait for us to transition in a non-urgent fashion that preserves all aspects of "business as usual", however desirable a slow transition may seem. The absolute minimum target we should set is that required on a per capita basis to have a reasonable chance of avoiding warming greater than 2 degrees C.

While NZ may be less vulnerable than some countries to the physical effects of climate change, we have more opportunities than many countries to show leadership on this issue and it is in our best interests to do so. This is due to NZ's image on the world stage as a socially progressive nation with a "clean green environment". Taking leadership on this issue would enable us to demonstrate that this image reflects modern NZ and our priorities for a healthy, vibrant population and land that is well cared for. We are also aware that climate change will have a severe impact on many of our Pacific neighbours and believe it is vital we demonstrate leadership as a relatively large South Pacific nation.

In relation to objective two, we agree that the costs and impacts must be managed appropriately, but again do not believe this means we should lower our target. Once our target is set, we should work out how best to meet it. Fairness must be considered. For example the biggest emitters must make the biggest changes and bear the greatest costs (in cases where changes are "costly" – many are not). This is not currently the case. We would also like to point out, as we are sure the government appreciates, that the costs of runaway climate change are astronomically larger than the relatively small costs of taking ambitious action now. The costs of a 40% reduction target for example (as provided in the discussion document) are tiny compared to what we would face if hit with severe storms, sea level rise, climate refugees, loss of productive farm land, tropical diseases (e.g. dengue fever) and so on. For example, the nationwide 2013 drought cost NZ an estimated $1.3 billion in lost agricultural production. Such extreme events will be more severe and frequent in future climates. Even more importantly the impacts of climate change are likely to result in huge threats to wellbeing for our people, for our Pacific neighbours and for people in other nations.

There is also likely to be an increase in pests (particularly weeds and insects), and those that are already established in New Zealand are likely to spread further south. Tropical or subtropical pests will expand their range under climate change scenarios of fewer frosts, higher temperatures, elevated CO2 levels, and increased disturbance from extreme events. Extreme events can also exacerbate our GHG emissions profile. For example, measurements taken in response to the drought of 2013 showed that some areas of kauri forest switched from a carbon sink to a carbon source. While weeds and pests will threaten biodiversity, there are also likely to be very large impacts on the productive sector (particularly agriculture and horticulture). Climate change is also likely to threaten coastal ecosystems through the impacts of ocean acidification. This threatens species that are important in providing habitat, our wild fisheries and aquaculture (e.g. green-shell mussels, oysters).

On the other hand, the costs of reductions can be made through the adoption of many initiatives that - while some people may be averse to them at first - actually improve quality of life. Also, if we delay taking action it is likely our emissions profile will worsen, making it harder and more costly to take action. Clearly it is far more cost effective to take action now than to become even more dependent on industries and practices that contribute to climate change.

Many of the technologies for reducing our emissions (or providing carbon sinks) are already available. There are several ways to manage farms, for example, that ensure carbon rich soils, which would help mitigate the GHG produced by agriculture. For example biochar from orchard prunings and logging waste can sequester carbon in soils, increase microbial activity, and capture excess nutrients from dairy waste as can careful planting. Increasing the diversity of grasses has shown some promising results. These technologies would not only improve our emissions profile but would also make our products more sustainable in the long term, both for our own people and for people in countries with a less productive agricultural sector.

Technologies for sustainable transport are also numerous: electric vehicles (particularly trains and buses), electric bicycles (which would eliminate the only substantial physical barrier to cycling in cities such as Wellington, Dunedin and Auckland – hills), and better infrastructure for public transport, walking and cycling. The only fundamental barrier to these is the ideology that people are entitled to drive fossil-fuel propelled cars with complete discretion and at low cost on publically funded roads. We understand this is an extremely deep-rooted ideology, but there are many, many organisations (including ourselves) who would be very pleased to work with the government on promoting discussions about the way of life we aspire to as New Zealanders and how transport fits into that. We strongly question the construction of new roads, and strongly support substantial investment in the alternatives outlined.

What would be a fair contribution for New Zealand?

2. What do you think the nature of New Zealand's emissions and economy means for the level of target that we set?

We believe that a "fair" target should be on a per capita basis, not in relation to our "special circumstances". Every country has "special circumstances". We suggest our circumstances are seen as leadership opportunites, not as reasons for us to set a less ambitious target than other nations.

It may well be possible that dairying, *on the scale and with the intensity* we currently operate, is no longer viable in a low emissions world. We would be much better off taking measures to address this now, as part of our climate change plan, rather than waiting until some point in the future, when we have poured even more effort into this industry at the expense of others. Given the proportion of our GHG that come from agriculture, changing the balance of our products away from livestock and toward crop production could have a very positive impact on our emissions. This is also consistent with a large body of evidence that suggests livestock cause a greater strain on almost all environmental measures than do crops. Intensive dairying, for example, is very problematic for our waterways and may lead to biodiversity loss. The current maximum production models maximise milk production (and exports) but may be less efficient overall (due to increased feed and fertiliser costs) as well as exacerbating the environmental impacts. A reduction in intensity (cows per hectare) is likely to increase efficiency while reducing impact. At present, the overseas income produced by dairy exports is not adequately weighted against the long-term costs of cleaning up the pollution we are seeing from intensive farming. For example, intensive dairying increases the nutrient load in waterways. In some parts of the Canterbury region, nitrate loads are so high that it is no longer safe

to fish or swim in waterways and groundwater supplies are also highly contaminated. With drought likely to become more severe and frequent under future climates, it is even more important that we look after water resources as they become more scarce. Dairy NZ in their "Strategy for Sustainable Dairy Farming 2013-2020" itself recognizes the inherent dangers of climate change through drought, volatility of markets (e.g. for supplementary feed, price per kg milk solids) and changes to El Nino weather patterns.

We are not calling for an end to dairying, which we acknowledge plays a useful role in NZ society. We are calling for more considered dairying and a more varied agricultural sector. Not only would this improve our emissions profile it would also decrease the vulnerability resulting from heavy dependence on a small number of industries (e.g. fluctuations in milk prices, as we have seen recently).

Our good performance on renewable energy could be improved even further with energy efficiency, and with much greater support for localised and domestic solar production and wind turbines. We are world leaders in renewable energy, and the need to consider our GHG emissions is an excellent opportunity to build on that.

On a more general level, NZ has a well educated, creative and innovative population. This helps put us in a position to lead by example and set a strong target.

How will our contribution affect New Zealanders?

3. What level of cost is appropriate for New Zealand to reduce its greenhouse gas emissions? For example, what do you think would be a reasonable impact on annual household consumption?

Again, we do not believe this question is the best one, given that our target should not be set by what is "manageable" but by what we *must* manage if we are to mitigate climate change. The cost of a 40% target seems to us to be extraordinarily low given the far, far greater financial, social and environmental costs of not taking strong action now. It is the absolute minimum we should consider and *only* if it results in us achieving what we need to on a per capita basis as outlined earlier. We are puzzled however, as to why this cost is assumed to be evenly spread across households. The necessary actions will need to be taken by the government, business, city councils and the agricultural industry (for the most part). Any "costs" should be born primarily by emitters. Many positive actions to improve our emissions profile also result in *savings*. For example, sustainable forms of transport are generally cheaper overall – cycling and walking are much cheaper than driving. Domestic solar panels and better home insulation have the potential to reduce the electricity costs of households. By taking a strong leadership position in lowering emissions, we could also improve our image overseas. This in turn, is likely to make our products more attractive to overseas buyers.

From another angle, this question could ask what are the "appropriate costs for failing to take strong action" and ask if these are reasonable. This brings us to a request for a *full and detailed plan* that shows the source of our emissions and carbon sinks, and provides a breakdown of the ways in which

we could improve our profile. We feel such a detailed analysis is essential, and will help us move from the question of "cost" to the question of how best to organise ourselves to take leadership on climate change and protect our people and the biodiversity of our ecosystems.

We also feel that we should not be relying on overseas offsets. We believe there are many ways in which we could reorganise ourselves to have a very favourable emissions profile and it would be very unwise to rely on buying carbon credits from other countries. For example, we are fully in favour of creating and maintaining protected areas of native forest that would provide carbon sinks and help with biodiversity.

4. **Of the opportunities for New Zealand to reduce its emissions (as outlined on page 15 of the discussion document), which do you think are the most likely to occur, or be most important for New Zealand?**

We should not rely on unknown technologies in setting our target or in deciding how to manage ourselves in the face of it. We should make our plan around known technologies – of which there are many – and put considerable effort into discussions throughout our schools, cities, towns and rural areas about how various communities and sectors can contribute. As we see it, this can be an exercise that strenghtens our identity as socially progressive, innovative and open-minded – a nation who helped lead the world forward, rather than guarded itself and helped hold it back.

As indicated earlier we are in favour of a thorough plan to rehaul our transport sector and suggest that we do not build new roads but use that money for public transport, cycling and walking initiatives. For example, in Auckland public transport is currently prohibitively expensive and time consuming for many commuters, but these costs to the individual could be substantially reduced through a concerted effort to increase efficiency and attract greater patronage. Electric bicycles are also a very viable option in NZ. Bicyles are of course highly popular in many European cities with similarly socially progressive aspirations and a strong premium on the health and wellbeing of their citizens (as we have too).

Another important area that has not been considered is our built environment. More attention should be placed on building regulations that mandate for all new buildings to meet emissions targets, and which strengthen the push to insulate older houses and other buildings. All public buildings should also be required to meet ambitious targets for energy efficiency.

Summary

5. **How should New Zealand take into account the future uncertanties of technologies and costs when setting its target?**

Furture uncertainties should be taken into account by primarily cutting emissions through strategies that are controllable – including efficiency and reduction targets in government enterprises and industry. New technologies also produce new problems. If they come on line and enable us to exceed our targets then that is highly desirable, but this should be treated as a bonus.

Other comments

6. Is there any further information you wish the Government to consider? Please explain.

As noted earlier we would like to see a series of national discussions hosted by schools, universities, cities and other regional authorities to consider how we can meet these challenges. Businesses should be involved in these discussions as they can be leaders in new, sustainable innovations and will no doubt rise to the challenge of supporting NZ's identity as a leader in this field. It is also crucial that young people are included as they will need to manage the effects of the climate change created by the choices of today's adults. None of the initiatives currently suggested include plans to get people together to work out how they can contribute. The lifestyle changes that they forsee and commit to could help us to meet an ambitious target. New Zealanders are well known for getting behind causes. For example, in water shortages people generally want to play their part – this could also be the case with climate change.

Finally, the document makes little mention of the importance to New Zealand of thriving oceans. These are valuable in and of themselves, particularly as we are an island nation and pride ourselves on caring for our natural environment. In addition, climate change will make it more difficult to farm and fish from the sea. The Government's Aquaculture strategy is to increase sales in the aquaculture sector from current levels ($200 million) to $1 billion by 2025. A changing climate involves warming of the oceans and changing pH (ocean acidification). We have already seen the effects of climate change on this industry through the closureof Sanford's mussel processing plant in Christchurch due to warming seawater temperatures affecting growth (Chief executive, Sanfords, Volker Kuntzsch, April 2015). The desirability of protecting biodiverse and thriving ocean ecosystems also speaks to the need for NZ to take a leadership position internationally and to set an ambitious emissions reduction target.

When your submission is complete

Email your completed submission to climate.contribution@mfe.govt.nz or post to Climate Change Contribution Consultation, Ministry for the Environment, PO Box 10362, Wellington 6143.

Submissions close at 5.00pm on Wednesday 3 June 2015.