

# Wise Response Society Submission on the Emissions Trading Scheme

Final for 21 September 2018 (with amendments 25 September)

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## Introduction

1. We are aware that this consultation on the Emissions Trading Scheme (ETS) is not asking if it is an appropriate mechanism but for submissions on how it might best function.
2. Wise Response (WR) has submitted strongly against the ETS in favour of a "Fee and Dividend" as we consider that an ETS can no longer be counted on to reliably reduce New Zealand's Greenhouse Gas (GHG) emissions at a rate that might meet our Paris obligations.
3. More specifically, WR supports employing a carbon "Fee and Dividend" instrument beneath a scientifically-based national emissions cap as the primary mechanism to drive the low carbon transition and distribute obligation. We agree that political consensus for the policy settings and institutional arrangements are vital. We recommend a very conservative budget that makes highest rates of emissions decline in the first years and does not rely on technical breakthroughs.
4. We therefore consider it inappropriate to make submissions on the design of a mechanism that we feel will fail. Given what is at stake here, the only thing we feel we can do is reconfirm the reasons why the ETS should be scrapped.

## Context

5. So what is the context for establishing a mechanism by which to reduce NZs GHG emissions at a rate that might meet our Paris obligations? The United Nations Secretary General has recently sent a stark warning of a Dangerous Tipping Point on Climate Change

*"If we do not change course by 2020, we risk missing the point where we can avoid runaway climate change," Mr. Guterres said at United Nations headquarters in New York.*

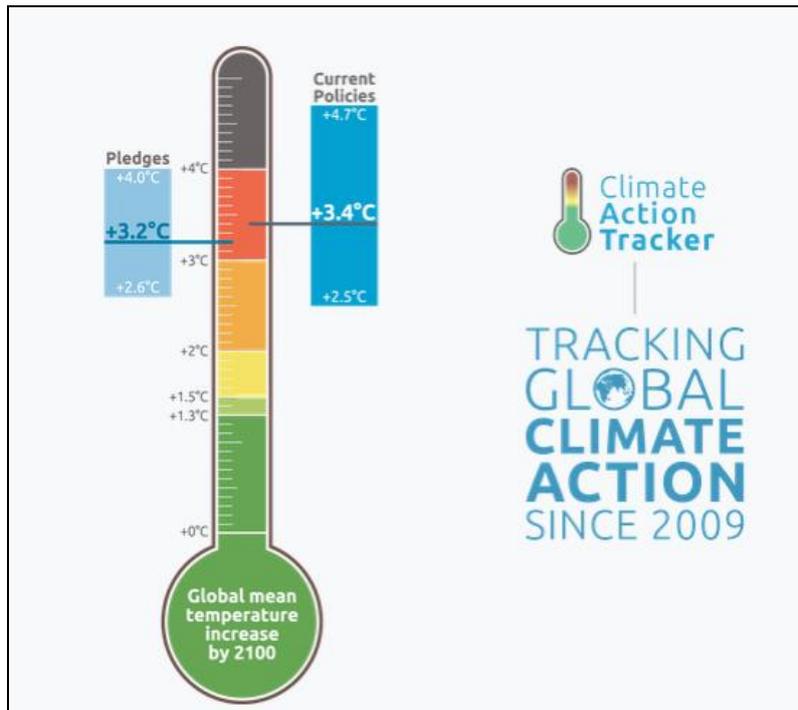
*"Climate change is the defining issue of our time, and we are at a defining moment," he said. "Scientists have been telling us for decades. Over and over again. Far too many leaders have refused to listen."*

...

*"The time has come for our leaders to show they care about the people whose fate they hold in their hands," Mr. Guterres said, without taking questions from reporters. "We need to rapidly shift away from our dependence on fossil fuels."*

6. If all parties kept their pledges made in COP21 at Paris, the planet is still most likely to warm by 3.2 degrees C, above pre-industrial levels by 2100 - a level considered potentially disastrous by the Intergovernmental Panel on Climate Change (IPCC) (see figure below). **Thus, the situation is critical and we can not**

afford to do anything less than pick the pathway that is most likely to re-stabilise the climate.



## ETS vs Fee and Dividend

7. It is not possible to “scientifically” or otherwise “price” the existence of our support system as an externality. We have a scientifically determined physical target: 1.5 °C (or 2 °C) to prevent runaway climate change. We know what has to be done in terms of emissions reductions to keep below this target<sup>1</sup>. For 1.5 °C, this amounts to permissible emissions of around 600 Gt CO<sub>2</sub> from the year 2010. For 2.0 °C this amounts to emissions of around 900 Gt from 2010<sup>2</sup>
8. The basic process needed is the placement of an initial carbon fee at a level that will incur those reductions which would need to amount to between 4 to 8% pa, depending on the temperature chosen and the start year. If the required reduction rate is not achieved in the initial years, then the carbon fee must be raised. If we exceed the target, then the fee can be relaxed. If the fee is not revenue neutral, funds might be used to progress alternative fuels and to incentivise further reductions. With more fairness in mind, any surplus should be returned back to those vulnerable to energy price increases. This would remove

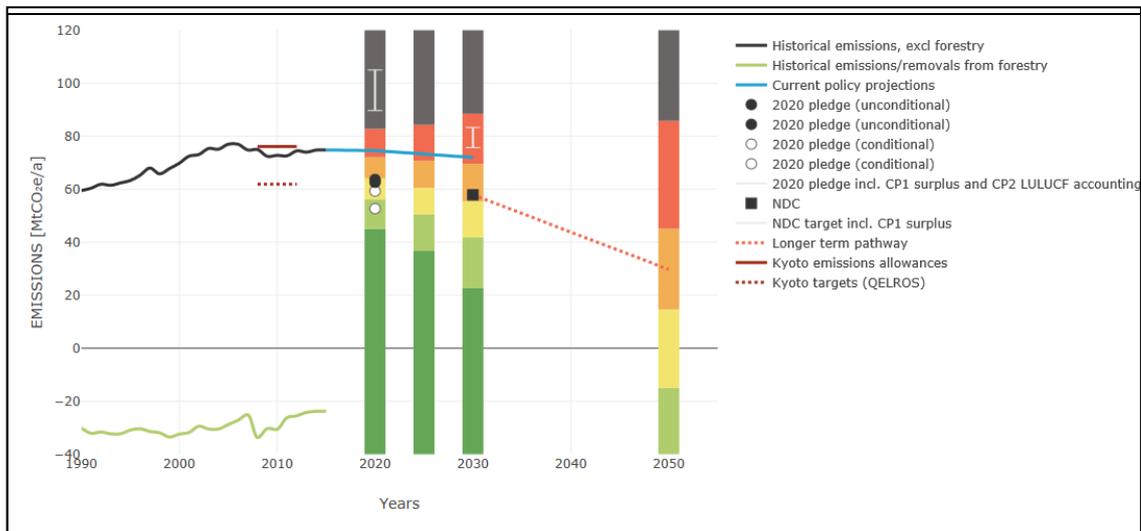
<sup>1</sup> IPCC 5th Assessment Report with associated probabilities

<sup>2</sup> IPCC 5AR 2014 for 2.0 degrees and for 1.5 degrees Rogelj et al at Nature Climate Change | VOL 8 | April 2018 | 325–332 | “Scenarios towards limiting global mean temperature increase below 1.5 °C”

the bluntness of a pure carbon tax which may well fall harder on lower income groups.

9. Because of the magnitude of the challenge that we are faced with in terms of emissions reductions (realising that the cost of failure is very much higher), we are of the view that the best chance of actually making the necessary emissions reductions will be to use the 2050 limit as a benchmark and design compatible economic activity by "hindcasting". Tweaking our existing economic activities is not sufficiently reliable.
10. Other key reasons we support a Fee and Dividend scheme rather than a trading scheme include:
  - The value and **affordability of an emissions** unit differs between participants. Thus, even with a maximum (and minimum) unit price, units will tend to gravitate to those actors who can most afford them. This outcome is most unlikely to be optimal for society as a whole.
  - As the rate of **emissions permissible declines**, it will become increasingly difficult to maintain access to units and eventually, for the market to function.
  - A fee regime **maintains the greatest control**, and minimises the opportunity for fraudulent practice, is simpler to enforce and can be structured to ensure that access for critical purposes is maintained.
  - If a **new plantation forest** is planted with the associated credits, it is increasingly vulnerable to fire, wind damage and disease, as the globe warms, and is at best only effective for a limited time (e.g. 20 - 30 years for *Pinus radiata*).
  - **Examples of less than satisfactory outcomes** using a pricing system for resource access are the QMS, and transferable water rights, and rights to discharge nutrients.
  - With respect to carbon dioxide emissions, we consider a weakness is that an ETS aims to limit climate change indirectly by controlling emissions rather than directly by limiting fossil fuel use. This indirect approach **undermines precision and introduces uncertainty** and offers more scope to subvert the scheme. An example is the attempts to link freshwater outcomes with stocking rates and management systems through the OVERSEER model. Confusion over its reliability has delayed effective action for years.
  - OVERSEER is thus also **NOT a suitable tool for GHG emissions allocation**. To avoid distracting from the point we're making here, whilst giving due attention to this fundamental issue, refer to Appendix B for reasoning and examples regarding its misapplication.
  - And with a market the business opportunity **creates incentive to trade, not emissions reduction**. The same direct principle of controlling inputs could be extended to reduce other gases e.g. methane controlled by stocking rates and nitrous oxide by fertilizer application rate.

11. An issue with both approaches is that they do not directly compel individual citizens to proactively find ways they can support emissions reduction. Even for people who are aware of the global warming issue, there is very frequently a deep rift between their everyday decisions (e.g. consumption and travel) and our collective emissions. One scheme that sets out to address this issue is the Tradable Energy Quotas (TEQ) scheme (see Appendix A)<sup>2</sup>. It would start to bridge the rift by forcing individuals to maintain a personal energy budget (within the frame of a national budget) and carefully allocate its use.
12. If there is to be a market, then we think trading energy input rather than emissions output offers more certainty of complying with the emissions budget and target.
13. Controlling inputs, while we understand may be politically more difficult, is the only way we see of guaranteeing that the targeted emission reductions will actually be achieved. The graph below indicates how far NZ is from tracking to comply with the Paris Agreement and 2050 target, let alone taking responsibility for our own emissions<sup>3</sup>.



14. In this context, we disagree with the findings of the Productivity Commission, that the deep uncertainty associated with the future presents a credible commitment problem for policy development. Nor do we see the need to spend potentially a lot of time seeking "broad agreement" on emissions targets (beyond political consensus for the Carbon Act). The science is settled, so we know what we need to do to avert disaster, and we have an internationally agreed target. The issue is simply mustering the political will to get on and meet it. Refinements can be made along the way.
15. In developing the budget, we should seek to diminish emissions at a maximum possible rate in the early years, as this is when greatest progress is likely to be possible. And we can not afford to rely on "silver bullet" technical "breakthroughs", and other to reduce carbon, like widespread Carbon Capture and Storage (CCS) or (Biomass Energy with Carbon Capture and Storage (BECCS), or methane vaccines. If they eventuate, then the reductions can be employed to further reduce risk. While a healthy economy during transition is desirable, given

how pressing the climate threat is now, playing our part in (at a minimum) achieving the 2050 target has to be the priority. The best way we see to protect the economy is to become experts in transition.

## EU Experience with ETS

16. The ETS has now been running in the EU for over a decade and there remains little evidence that it has brought about reductions in greenhouse gas emissions.<sup>3</sup> The following five reasons why the ETS should be scrapped have been identified from this experience:
- ETS (EU) has **not reduced emissions**; neither has the NZ scheme reduced GHG emissions
  - ETS (EU) is **used to undermine** other climate and emissions control policies
  - The ETS (EU) **sets a ceiling on climate ambition**- It is not clear even if the NZ scheme has a ceiling, and both industry and agriculture are exempted from the trading mechanism. Leaving out these two largest sectors makes the scheme worthless. As WR has noted, reducing agricultural emissions is vital.
  - ETS (EU) has **not been cost-effective** and has subsidised polluters at tax payers' expense; ditto NZ - free credits to industry in NZ: therefore no meaningful, effective emissions reduction action has been taken.
  - The ETS (EU) remains **susceptible to fraud and gaming**; ditto the NZ one. MfE anticipates that the Commerce Commission would control this as there would only be a few traders but this opens the door for collusion.
17. EU Environment Ministers have been concerned about “carbon leakage” and this is echoed in the NZ Interim Tax Review Report (20 Sept, 2018). But in the EU carbon leakage - the perceived risk that caps on emissions could price business out of Europe and into less regulated markets, contributing to an overall increase in greenhouse gas emissions – is not happening. The most thorough study of the issue, funded by the Commission itself, is unequivocal: “We found no evidence for any carbon leakage.”
18. A \$25 per tonne CO<sub>2</sub> levy is equivalent to 6 cents per litre of petrol. The proposed scheme excludes all industry and agriculture, leaving mostly transport as the only sector exposed to the tax. To hope to get to zero emissions by 2050 by price only, the tax would have to increase around 50 fold, i.e. to \$3.00 per litre or more (in constant 2018 NZ\$). This would be equivalent to \$1250 per tonne (or more), of carbon as CO<sub>2</sub>.

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<sup>3</sup> <https://corporateeurope.org/environment/2015/10/eu-emissions-trading-5-reasons-scrap-ets>

## Improving Public Acceptance of a Fee

19. When carbon revenues go towards the general government budgets, some studies of the EU experience have found that public acceptability is lower. If instead, carbon revenues are earmarked for a specific purpose - notably as targeted green investments or transfers to particularly affected groups - citizens report greater acceptability of carbon pricing<sup>5</sup>.
20. High carbon industries have often successfully lobbied against stronger carbon pricing policies, but establishing a direct, public dividend from emissions would be more likely to survive successive partisan changes in government if it benefits constituencies across the political spectrum.
21. **There are calls for a climate change tax that is "strong, comprehensive, rising over time and, crucially, allows other taxes to be greatly reduced", which are suggested could additionally help cut general income tax as well as VAT for citizens, thereby potentially further boosting support for climate action** says Chris Page, Emeritus Reader in Policy Modelling at Cambridge Judge Business School<sup>4</sup>.
22. "The economy will not suffer, it will grow more strongly, and other countries will see this and follow our lead. With a climate change tax, the deadly threat of a warming world can be averted cheaply, and everyone wins"

## Forest Offsetting

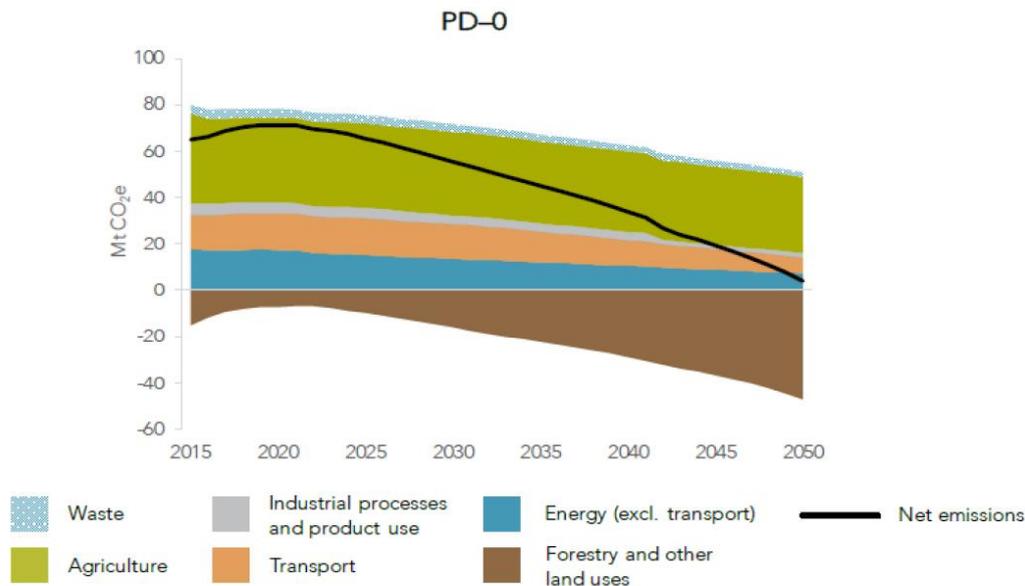
23. Too much reliance is being placed on plantation forestry as a primary carbon offset, when its continuity is always at risk and is acknowledged as a temporary offset at best, and at worst a potential GHG source in the future. The figure below from the Productivity Commission's Final Report<sup>5</sup> (Low Emissions Economy, Sept 2018) shows that in the Policy Driven decarbonizations pathway we would be planning to reduce our emissions by only approximately 33%, and the rest would be achieved simply by offsetting against forestry.
24. In an earlier ETS submission to the MfE (29 April 2016), we suggested about 60% of reductions in GHG emissions should come from gross emissions reductions and no more than 20% from each of domestic afforestation and global credit trading (provided a credible framework for the latter has been agreed). Such a limit on both forestry and offshore mitigations is desirable so as to put a strong focus and incentive on reduction of domestic emissions and to build transition expertise and technology.

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<sup>4</sup> <https://www.chrisshopepolicy.com/2018/07/feeling-the-heat/>

<sup>5</sup> [https://www.productivity.govt.nz/sites/default/files/Productivity%20Commission\\_Low-emissions%20economy\\_Final%20Report\\_FINAL\\_2.pdf](https://www.productivity.govt.nz/sites/default/files/Productivity%20Commission_Low-emissions%20economy_Final%20Report_FINAL_2.pdf)

## Policy Driven Decarbonisation to Net Zero in 2050



25. Regarding the use of forests to offset fossil fuel emissions, the graph of emissions v CO<sub>2</sub> in the atmosphere has been linear for many decades - with 44% of emissions staying in atmosphere. From this relationship it is clear that to reduce atmospheric CO<sub>2</sub> we have to reduce CO<sub>2</sub> emissions from fossil fuels. Using offsets will allow fossil fuel emissions to continue, thus allowing atmospheric CO<sub>2</sub> to continue to increase (albeit at a slower rate).
26. The urgent need is to reduce CO<sub>2</sub> emissions with concurrent reduction in atmospheric CO<sub>2</sub>. As already indicated, it may be too late to do this, as feedback effects may override any reductions in emissions:

## The economic framing of this existential threat is the issue

27. The following from Richard Heinberg is a good exposition from a resource flow perspective as to why market-based solutions that are predicated on supporting growth are a waste of precious time and resource:

*"In our view, at some point scientists and policy makers must begin discussing the one scenario that world leaders seem to want to avoid at all costs, i.e. managed economic contraction. The irony is that this scenario could reliably cut greenhouse gas emissions and is achievable without appeal to magic (CCS or decoupling). Absent forethought and planning, contraction could spell ruin to economies addicted to growth. But with planning and management, communities could re-localise, and human needs could be met more simply. Population levels could decrease in deliberate and humane ways.*

*The world's leaders have saddled the climate science community with a hopeless task. Climate scientists, after all, have dedicated their careers to studying natural*

*systems and are likely terribly concerned about the impacts of a warmed planet on humanity and other species. Now they are being required to come up with societal responses that are narrowly constrained within the parameters of what governments believe is politically acceptable. If it turns out that what is actually needed to counter the threat of climate change is political poison, what then? Will policy makers listen and redefine what is politically acceptable? And how long might this back-and-forth continue before an effective response to the climate challenge emerges?"<sup>6</sup>*

28. This perspective that says managed economic contraction is the only solution is supported by thinking and evidence from the physical sciences and Biophysical Economics (e.g. Garrett, 2012<sup>7</sup>, Clarke, 2017<sup>8</sup>, Hall et al, 2013<sup>9</sup>, Smith, 2015<sup>10</sup>, Tverberg, 2016<sup>11</sup>), but not by the theoretically deficient economic analysis, that is structurally blind to energy considerations. Many writers point to this, and in our experience, the evidence once comprehended, is startling (Wahl, 2017<sup>12</sup>, Ahmed, 2017<sup>13</sup>, Kent, 2016<sup>14</sup>, Monbiot, 2014<sup>15</sup>, Greer, 2016<sup>16</sup>, etc).

## Urgency that the economic framing of the science dismisses

29. 'We Are Climbing Rapidly Out of Humankind's Safe Zone': New Report Warns Dire Climate Warnings Not Dire Enough<sup>17</sup>
30. Quoting the linked report's Introduction verbatim (it's by Hans Joachim Schellnhuber, who is a professor of theoretical physics specialising in complex systems and nonlinearity, founding director of the Potsdam Institute for Climate Impact Research (1992-2018) and former chair of the German Advisory Council on Global Change. He is a senior climate advisor to the European Union, the German Chancellor and Pope Francis):
31. *"What Lies Beneath is an important report. It does not deliver new facts and figures, but instead provides a new perspective on the existential risks associated with anthropogenic global warming. It is the critical overview of well-informed intellectuals who sit outside the climate-science community which has developed over the last fifty years. All such expert communities are prone to what the French*

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<sup>6</sup> What Will it Take to Avert Collapse? Richard Heinberg, David Fridley, originally published by Resilience.org September 19, 2018

<sup>7</sup> <http://bit.ly/2L3Z7BY>

<sup>8</sup> <http://bit.ly/oilocene>

<sup>9</sup> <http://stanford.io/1yifujq>

<sup>10</sup> <http://bit.ly/2dKlzpB>

<sup>11</sup> <http://bit.ly/1qEorV1>

<sup>12</sup> <http://bit.ly/2FHLN7Q>

<sup>13</sup> <http://bit.ly/2vRVI51>

<sup>14</sup> <http://bit.ly/2eXMNrb>

<sup>15</sup> <http://bit.ly/2pl2DAj>

<sup>16</sup> <http://bit.ly/2vPXpPU>

<sup>17</sup> <http://bit.ly/2ByUfW2>

*call deformation professionnelle and the German betriebsblindheit. Expressed in plain English, experts tend to establish a peer world-view which becomes ever more rigid and focussed. Yet the crucial insights regarding the issue in question may lurk at the fringes, as this report suggests. This is particularly true when the issue is the very survival of our civilisation, where conventional means of analysis may become useless. This dilemma notwithstanding, the Intergovernmental Panel on Climate Change (IPCC) bravely perseveres with its attempts to assess the multiple cause-and-effect relationships which comprise the climate problem. After delivering five fully-fledged assessment reports, it is hardly surprising that a trend towards “erring on the side of least drama” has emerged. There are many reasons, both subtle and mundane. Let me highlight just one of each.*

32. *Firstly, the IPCC is stricken with the Probability Obsession. Ever since statistics was established in the 16th century, scientists have tried to capture the complex, stochastic behaviour of a given nontrivial object (such as a roulette wheel) by repeating the same experiment on that object many, many times. If there was a set of well-defined outcomes (such as the ball ending on the red or black of the wheel), then the probability of a specific outcome was simply the number of experiments delivering that outcome divided by the total number of experiments. This sounds reasonable, but can we even imagine applying that approach to global warming? Strictly speaking, we would have to redo the Industrial Revolution and the greenhouse-gas emissions it triggered a thousand times or so, always starting with the Earth system in its 1750 pre-industrial state.*
33. *Then calculate the averaged observed outcome of that planetary experiment in terms of mean surface-temperature rise, global biological productivity, total number of climate refugees, and many other variables. This is a nonsensical notion. Of course, climate scientists are not trying to treat the Earth like a roulette wheel, yet the statistical approach keeps on creeping into the assessments.*
34. *How many times did the thermohaline circulation collapse under comparable conditions in the planetary past? How often did the Pacific enter a permanent El Niño state in the Holocene? And so on. These are valuable questions that can generate precious scientific insights.*
35. *But we must never forget that we are in a unique situation with no precise historic analogue. The level of greenhouse gases in the atmosphere is now greater, and the Earth warmer, than human beings have ever experienced. And there are almost eight billion of us now living on this planet.*
36. *So calculating probabilities makes little sense in the most critical instances, such as the methane release dynamics in thawing permafrost areas or the potential failing of entire states in the climate crisis. Rather, we should identify possibilities, that is, potential developments in the planetary make-up that are consistent with the initial and boundary conditions, the processes and the drivers we know.*
37. *This is akin to scenario planning, now being proposed for assessing climate risks in the corporate sector, where the consequences of a number of future possibilities, including those which may seem highly unlikely, but have major*

*consequences, are evaluated. This way one can overcome the probability obsession that not only fantasizes about the replicability of the singular, but also favours the familiar over the unknown and unexpected. As an extreme example, the fact that our world has never been destroyed previously would conventionally assign probability zero to such an event. But this only holds true under steady state assumptions, which are practically never warranted.*

38. *Secondly, there is the Devil's Advocate Reward. In the magnificent tradition of the Enlightenment, which shattered so many myths of the ancient regimes, scientists are trained to be sceptical about every proposition which cannot be directly verified by empirical evidence or derived from first principles (such as the invariability of the speed of light).*
39. *So, if a researcher comes up with an entirely new thought, experts tend to reflexively dismiss it as "speculative", which is effectively a death warrant in the academic world. Whereas those who criticize the idea will be applauded, rewarded and promoted! This phenomenon is evident in every seminar, colloquium or learned-society assembly.*
40. *In turn, this means that scientific progress is often driven from the periphery, or occasionally, by eminent personalities whose seniority is beyond doubt. This does not at all imply that hypotheses need not be vindicated in due course, but out-of-the-box thinking is vital given the unprecedented climate risks which now confront human civilisation.*
41. *In conclusion, one should not be overly critical of the IPCC, since the scientists involved are doing what scientists are expected to do, to the very best of their ability in difficult circumstances. But climate change is now reaching the end-game, where very soon humanity must choose between taking unprecedented action, or accepting that it has been left too late and bear the consequences.*
42. *Therefore, it is all the more important to listen to non-mainstream voices who do understand the issues and are less hesitant to cry wolf [Ed. Wise Response considers itself such a voice].*
43. *Unfortunately for us the wolf may already be in the house."*

## Compromised compromises

44. It is noted that in recent days, the Tax Working Group (TWG) came out in favour of the ETS. According to Group member Dr Marjan van den Belt (personal communication), the ultimate question for the TWG was; would it be convincingly cheaper on public administration and more effective - at this point in time - to scrap ETS and start over with a carbon tax? There was no evidence that could convince the TWG as a whole to support such a recommendation at this point in time.
45. However, rather than a blanket endorsement of the TWG for the ETS, the interim recommendation also includes that:

1. The ETS starts to behave more like a tax and sets caps, minimum prices, uses prices to include externalities (currently too low) and considers pricing for structural behaviour changes.
  2. It brings in more revenue if it includes more domains (e.g. biological emissions from agriculture).
  3. It also opens a consideration to recycle revenue to assist a transition toward a low-emission, circular economy.
46. The report appropriately acknowledges that it is up to the Climate Change Commission to make these recommendations as part of a comprehensive view on desired outcomes.
  47. Taking a step back: for some reason, NZ seems rather endeared with the 'market-mimicking' policy instruments like ETS. The nitrogen trading scheme for lake Taupo is another example in the water space.
  48. It would be good to look at this phenomenon from the point of view of the help or hindrance served by these instruments in transitioning to a more desirable and sustainable society. In other words, how well does the ETS serve "fairness"? Does it add to the "speculative economy" rather than true productivity? It is good to consider 'when to use tax, use policy and/or market-mimicking instruments' in this context.
  49. If you read the Interim report, you see that the conversation of 'tax or policy' worked its way toward 'tax and policy' with a transitioning mindset. A next step could include a closer look at how 'market-mimicking instruments' seem to increasingly find their way into the policy tool box and if or not this is a helpful trajectory when up-scaling the efforts.
  50. GHG or nitrogen 'markets' are not real markets and the public/private sector is designing the rules for the 'board game', which equally comes with (public) administrative costs.
  51. That having been said, there are some bright spots, such as the purpose of taxation in the interim report is stated as 'wellbeing' and not 'economic growth'.

## Conclusion

52. It's time for some honesty. It's time to really think about the situation we are in! And it's time to recognise that tweaking the old tools is not going to get us there. And if that happens, there is no second chance!
53. Practically, that means we need to design a pathway that has a better chance of success than the 66% probability given by the IPCC AR5 scenario, to keep us below 2.0 degrees (RCP2.6).
54. Given the tight link between carbon emissions, energy and resource throughput, and GDP activity, we must accept that to drive GHG emissions to the required levels effectively requires the market to limit, or decrease its output. From the

market perspective, it is the same conundrum as asking a waste management company, to promote waste minimisation, at the source.

55. The honesty and the urgent need to reduce emissions means that we must commit to the emissions reductions without referral to the economic situation that the emissions reductions might occasion. There is no GDP activity on a dead planet!
56. The bottom line is that the ETS is simply not sufficiently reliable This is aggravated by reliance on models like OVERSEER. That is why we of Wise Response recommend unequivocally, that it be scrapped and replaced with a Fee and Dividend approach.

## Appendix A - Tradable Energy Quotas in Brief<sup>18</sup>

1. Tradable Energy Quotas” (TEQs) is a system to enable nations to reduce their emissions of greenhouse gases along with their use of oil, gas and coal, and to ensure fair access to energy for all.
2. There are two reasons why energy-rationing may be needed: i) Climate change: to reduce the greenhouse gases released into the air when oil, gas and/or coal are used. ii) Energy supply: to maintain a fair distribution of oil, gas and electric power during shortages.
3. TEQs are measured in units.
4. Every adult is given an equal free Entitlement of TEQ units. Industry and Government bid for their units at a weekly Tender.
5. At the start of the scheme, a full year’s supply of units is placed on the market. Then, every week, the number of units in the market is topped up with a week’s supply.
6. If you use less than your Entitlement of units, you can sell your surplus. If you need more, you must buy them.
7. All fuels (and electricity) carry a “rating” in units; one unit represents one kilogram of carbon dioxide, or the equivalent in other greenhouse gases, released when the fuel is used.
8. When you buy energy, such as petrol for your car or electricity for your household, units corresponding to the amount of energy you have bought are deducted from your TEQs account, in addition to your money payment. TEQs transactions are automatic, using credit-card or (more usually) direct-debit technology.
9. The number of units available on the market is set out in the TEQs Budget, which looks 20 years ahead. The size of the Budget goes down year-by-year – step-by-step, like a staircase.
10. The Budget is set by the Energy Policy Committee, which is independent of the Government.
11. The Government is itself bound by the scheme; its role is to find ways of living within it, and to help the rest of us to do so.
12. TEQs are a national scheme, enabling nations to keep their promises, guaranteeing their carbon reduction commitments within whatever international framework applies at the time.

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<sup>18</sup> <https://www.flemingpolicycentre.org.uk/EnergyAndTheCommonPurpose.pdf>

## Appendix B - Issues with OVERSEER as a tool to calculate emissions allocations

57. After a number of years of use, it is clear that OVERSEER is not a reliable means of estimating emissions from agriculture, be they nutrient or GHG. This is a key reason why we advocate controlling inputs rather than outputs. The following assessment is compiled from comments by Dr Alison Dewes and Dr Mike Joy on the Wise Response discussion list earlier in the 2018.
58. The problem therefore is not just the lack of validation of the model, but 90% lies in how it is being used by policy makers in its invalidated state. This, along with the lack of trust now in the model given Nitrogen Discharge allowances (to water) have jumped around by more than 5 times in 3 years in a catchment as small as Rotorua (all due to version changes and “bug fixes”)
59. The key issues that are now irretrievable and unable to be fixed with a simple step of publicly funded validation - as suggested by some - are as follows:

### **Ownership**

1. It is still owned by Fertresearch with MPI and AgResearch being a far smaller shareholder.
2. Closed source model. This introduces unnecessary bureaucratic overhead trying to get clarity on the calculations, etc, and hinders transparency.
3. Who owns the data? (web-based repository of all farmers farm system data) – is it Fert Research?

### **Validation and soils**

4. Unvalidated on many soils around NZ (only around 4/40 soils validated with a dearth of a good mix of soil types and systems still to have robust ground-truthing)
5. Soil info is changing on a regular basis, and the Profile Available Water is updated by less coarse soils information, this is being updated sometimes without users being told.
6. In some cases, this raises the leaching from the root zone significantly (20-30%) on some farms, when this is tied to policy and land values and catchment modelling and nitrogen buy out pricing, as in Rotorua Catchment, it is fraught.
7. Bug and Version changes in past 4 years have left farmers and agribusiness consultants startled and non-trusting of outputs – changed Nitrogen Discharge allowances from root zone are more frequent every year.

### **Climate routine**

8. Climate Change model not working – the GHG outputs to atmosphere is not calibrated properly and has had a bug in it for over 6 months (in early 2018).

### Examples of problem applications

9. Used by **Canterbury** Land and Water Plan (CLWP) to do catchment load modelling in the Selwyn catchment – this underestimated the N load from the CPW scheme by around 50%. Now with a new version the catchment is in overshoot.
10. Used by **Bay of Plenty** for modelling catchment as well, using old data from the earlier versions of the model, (5.4.6) – now the loads have doubled in Overseer (6.2.3) from the root zone. This cumulative change when linked to a catchment model is significant.
11. The model has been used to dictate exact outcomes for allocation purposes for N discharges, yet in the past 5 years the output number that has been generated from the root zone on farm has doubled, while the catchment load has not been updated. This also results in ratepayer buy back of loads from **Rotorua and Taupo** that are now understood to be very different from that which was modelled earlier.
12. In **Waikato**, PCI the old version of the model (old...5.4.6) was used to determine catchment loads. There is not a linear relationship of changes on farm between models, the Waikato Regional Plan used the old version of the model to determine current state of the catchment load.  
  
Dairy for example was calculated in the old model (5.4.6) as leaching 26 kg N per ha per year from the root zone, yet the latest model (6.2.3) suggest it is more like an average of 48 kg N per ha per year for the Waikato, yet the PC1 tech reports all used the old model and the old data (almost half what we understand is the more correct number now)
13. **Horizons Regional Council**: Instream limits are totally flawed. The Nitrate limits (which have become targets) are based on the completely non-existent and non-scientific scam called “nitrate toxicity”. The real issue is algal proliferation leading to oxygen depletion, as I have shown with a Manawatu River example attached you can have a site scoring A for nitrate and periphyton biomass and have lethally low levels of oxygen. You can see this happening live right now (set the time to one year to see [https://www.horizons.govt.nz/environment-data/chart?measurement=DO%20Saturation%20\[Dissolved%20Oxygen%20\(%\)\]&site=Manawatu%20at%20Hopelands](https://www.horizons.govt.nz/environment-data/chart?measurement=DO%20Saturation%20[Dissolved%20Oxygen%20(%)]&site=Manawatu%20at%20Hopelands))  
  
It is self evident, “fish cannot die twice”, when you have lethal O2 levels at < 1mg/l then they cannot later die when it gets to 6.9 mg/l. So currently we are using flawed models to decide on allocation of pollution based on flawed targets (toxicity 6.9 mg/l vs. Ecosystem health 0.5 mg/l – the median for the Manawatu site you can observe live is ~0.65 mg/l).

### Grandparenting

14. The model outputs are being used to grandparent different sectors, In **Waikato**, Dairy has been typically allocated around 4-5 times the N

Reference Point of dry stock, and 10 times that of forestry. The N discharge allowance is linked to land values. The more you have allocated, the more valuable the land is

15. This encourages gaming and perverse behaviours to lift the N outputs. This can vary by 20-30% for a farm due to data input interpretation and manipulation.
16. Similar has occurred in **Canterbury** where straight grandparenting allocation has been used based on Overseer outputs alone, linked to historical land uses, despite land use capability and versatility. This also encouraged perverse behaviour to lift N output as far as possible to gain more N output.
17. While **Rotorua** has tried to deal with version changes and bug changes to the model (all very regular occurrences now) This has led to a chronic dissociation and mistrust of the model and the outputs, and the way that the council manages the version changes and bug upgrades is using an assumption that the change is linear for farms, between models. This is not the case. Farmers do not trust the outputs anymore.
18. The cost to farmers to have to get a model done is around \$3-5,000 per farm. Every time it changes, the farmer will have to pay again, as well as a farm environment plan, yet the model is still unvalidated for so many soils and not open source and many councils – such as Waikato, still don't know how to deal with the version changes upgrades and disruption that is being witnessed by this occurrence. The biggest concern is how Waikato will cope with this, and resource it.

### **Ideological flaw**

60. Furthermore, one of the reasons we have got into this pickle of using overseer: “it might not be perfect but it's the best we have got” is due to a philosophical policy insistence of trying to measure all contaminants with accounting-grade accuracy (NPS-FM and NOF).
61. We've got into that problem because an economist [Beatson] who understands nothing about the complexity of natural systems thinks:
  1. it's possible to measure, to be able to attribute sources
  2. it's necessary, in order to do something useful about water quality.
62. The ideological factors contributing to this are:
  1. The RMA takes an activity neutral and effects-based philosophy to managing adverse effects on the environment. In the case of diffuse pollution with long time horizons before the effect is measurable, this philosophically pure approach is quite impractical. It's not possible to create perfect effect attribution links, and in many cases the horse has bolted and it's impossible to respond in a timely fashion to the ecological threats that some activities pose (e.g. irrigating N into groundwater).

2. The NPS-FM NOF takes a cost-accounting approach to the allocation of “rights” to discharge specified contaminants. Cost-accounting is a closed set and requires accurate counting. Natural systems are semi-open set and are very demanding and expensive to measure/count.
3. Both of these ideologies use output/outcome measurement as the starting point for a source by source attribution exercise on things that are very difficult to measure accurately. The main causes of the contaminants are well known. So why therefore distract ourselves with attempts at pinpoint accuracy attribution when using 80:20 management will address the main significant sources?

### How Councils and policy makers are using OVERSEER

63. It is recommended we assess the regulatory ideology/food chain from the top. **What is driving Councils away from obvious responses (generally simple regulatory) that tackle known dumb stuff, and into drawn-out no-win allocation arguments that distract from and delay implementation of useful responses?**
  - Question: Can policy drafters “fit the policy to the model, not contort the model to the policy”? (e.g. version changes, modelling uncertainty etc.)
  - Answer: Yes. But it requires that policy is designed in such a way that it accommodates the design purpose and uncertainties of the OVERSEER model.
64. Most policy drafters appear to either not understand the constraints of this model or are prepared to try to contort its design purpose to meet their [entirely different] policy needs, despite strong advice from the modellers not to.
65. Overseer is a comparative model. It was designed to do within system comparisons - single-time, single-site, single-system comparisons. The numbers it produces are relative to each other.
66. The OVERSEER model is not designed to produce absolute numbers - which are what is necessary if the purpose is to sum inputs to a catchment.
67. It isn’t designed to
  1. accurately reflect the whole N pathway from on-farm inputs to N appearing in a lake or stream, because it stops modelling at the bottom of the root zone and doesn’t include activity in groundwater.
  2. provide a consistent answer for all output files over time. Version changes may result in changes to the relative impacts between systems between versions.
  - Question: Can a comparative model be used to allocate absolute numbers?
  - Answer: No. It is not appropriate to use it for that.
  - Question: Can a comparative model be used at all in creating policy to manage N discharges?
  - Answer: Yes. as an adjunct to other measurement systems.

### **Alternative approaches and methods?**

68. Alternative approaches to using models in regulation. Are they feasible?
1. Regulation without OVERSEER? - Yes. There are farm management actions that are well proven to have significant effect that can be directly regulated with simple rules that are simple to monitor. Fertiliser application quantity, location and timing. Riparian protection.
  2. Using OVERSEER in a relative sense? If it's used as a management aid to determine lower/lowest contaminant options as a risk-based approach with farm environment plans? Yes. Provided the Farm Environmental Plans have regulatory effect.

### **Overseer for Emissions Budgets?**

69. How can OVERSEER be best used in allocating emissions budgets, within plans?  
As a decision support tool. Non regulatory.
70. Bridget Robson is an expert in forestry and has a planning / agriculture and policy background. She has provided excellent evidence on the Rotorua plan regarding why overseer should NOT be used as an allocation tool (as it has been across 60% of NZ second gen plans). Her evidence is available at <https://www.boprc.govt.nz/media/601292/cni-iwi-holdings-ltd-christine-bridget-robson-evidence-submitter-49-fs-6.docx>