31 March 2016

Emissions Trading Scheme Review Consultation

To Ministry for the Environment Officials managing the National Government's ETS Review

Copied to 121 x Members of the New Zealand Parliament
74 x Chairs / Mayors of Regional / City / District Councils and their Councillors
20 Chairs of District Health Boards
ca 100 x selected media, business, medical, scientific, and environmental organisations and individuals

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fig[a]

fig [b]

fig [c]

My response to the summary of Consultation questions (refer pp28-30 of Consultation document)

Q1: (do I agree with drivers for the review). Answer: no.
Q2: (other factors the Government should consider in the ETS review). Answer: whether to scrap the ETS altogether.
Q3-8: (moving to and managing costs of full surrender obligations). Answer: not relevant.
Q9, 10: (business planning). Answer: not applicable since I'm no longer in paid employment.
Q11-25: (other issues). Answer: not relevant.
Q26: (barriers/market failures to the uptake of low emissions technology). Answer: current ETS is a barrier/market failure.
Q27: (role for the Government in addressing these barriers/market failures). Answer: scrap the ETS altogether.

Gravity waves, anthropogenic global overheating (AGO), and a mental disorder (AGO denial)

[1] About a billion years ago a colossal storm raged as two huge black holes collided and merged, sending a ripple through space time itself. That ripple entered the Milky Way galaxy 40,000 years ago just as modern humans were beginning to expand across planet Earth. On 14 September 2015 it finally arrived at Earth and was detected as a "chirp" by humanity's most powerful detector, the Laser Interferometer Gravitational-Wave Observatory (LIGO) at two separated US sites in Louisiana and Washington. The detection is serendipitous because it occurred 100 years after physicist Albert Einstein published his General Theory of Relativity and marks the birth of gravitational astronomy by observational proof of Einstein's theories and the physical reality of black holes.

[2] AGO was first predicted 120 years ago by the Swedish physicist S A Arrhenius who postulated in 1896 that CO2 emissions from burning fossil fuels would cause global warming (see endnote [1]). Compelling observational proof of Arrhenius' conjecture has been provided by a multitude of peer-reviewed scientific papers since then including the Fifth Assessment Report (AR5) of the International Panel on Climate Change (IPCC) (see endnote [2] for a summary of AR5 for political and business leaders).

[3] It has become increasingly evident that a common **mental disorder, AGO denial,** has become endemic during the National Government's last two terms in office (fig [d] below), demonstrated by a growing divergence between historical/projected gross emissions (blue line in fig [e] below) and the path to meet election promises and international expectations (red line in fig [e] below).

fig [d] National Party ministers in deep discussion about responding to anthropogenic global overheating (source: see endnote [3])

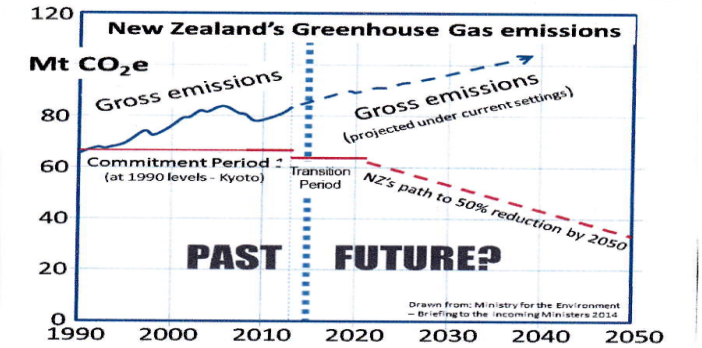

fig [e] Divergence between actual/projected gross emissions and required path to meet electoral promises and international obligations (source: see endnote [4]

[4] A **mental disorder** is any behavioral pattern that causes either suffering or a poor ability to function in ordinary life. The most widely accepted system that classifies mental disorders is the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (see endnote [5]) produced by slightly demented members of the American Psychiatric Association (APA). DSM-5 lists standardised diagnostic criteria and includes **AGO denial** that has caused immense suffering for the one million children in Africa currently starving to death (largely unnoticed) during an unprecedented drought and extreme El Niño event driven by AGO, and for: [i] polar bears (fig [a]); [ii] the residents of Kiribati who face inundation by rising sea levels not of their making (fig [b]), and [iii] Aylan Kurdi whose lifeless body (fig [c]) washed up on a Turkish beach (moving the entire world via social media) (see figures, p1).

[5] Kurdi's tragic fate was a consequence of extreme weather events attributed by scientists to AGO (see endnote [6]). A record extreme drought in Syria in 2011 causing forced mass internal migration out of rural areas lead to a surfeit of young, unemployed men in cities. It fomented a deadly war between extremist groups (Bashar al-Assad, Islamic State, and other Islamic religious fundamentalists) that the entire world is now increasingly embroiled in, for example by the current refugee influxes into Europe.

Key scientific warnings about future anthropogenic global overheating (AGO)

[6] Total anthropogenic carbon emissions continued to increase between 1970 and 2010 with larger absolute decadal increases toward the end of this period. Despite a growing number of climate change mitigation policies, annual carbon emissions grew on average by 2.2 % per year from 2000 to 2010 compared with 1.3 % per year from 1970 to 2000. Annual anthropogenic greenhouse gas emissions were the highest in human history from 2000 to 2010. Fossil fuel combustion and industrial processes contributed about 78 % of the total carbon emission increases between 1970 and 2010 (see endnote [2]).

[7] Globally, economic and population growth continue to be the most important drivers of increases in CO2 emissions from fossil fuel combustion. The contribution of population growth between 2000 and 2010 remained roughly identical to the previous three decades, while the contribution of economic growth has risen sharply. Between 2000 and 2010, both drivers outpaced emission reductions from improvements in energy efficiency. Without additional efforts to reduce carbon emissions beyond those currently in place, emissions growth is expected to persist driven by growth in global population and economic activities, and result in global **mean surface temperature increases in 2100 of between 3.7 °C and 4.8 °C** compared with pre-industrial levels (see endnote [2].

[8] Official UK Met Office, NASA, and NOAA data all confirm record global temperatures for **2015 as the hottest year on record** since systematic reporting began in 1850. The UK Met Office forecast for 2016 predicts a global average temperature increase of 1.14°C above pre-industrial levels, exceeding the record set in 2015, which itself exceeded a new record set in 2014 (see endnote [7]). These alarming forecasts came just five days after 195 nations had agreed to an historic deal to fight global warming at the UN summit in Paris by limiting the world's temperature rise to 2°C with a stated "ambition" to restrict the rise to 1.5°C.

[9] **Anthropogenic carbon emissions have locked in long-term sea-level rise** that poses profound challenges to coastal communities. Analyses based on previously published relationships linking AGO and sea level rise indicate that unabated carbon emissions up to the year 2100 will commit an eventual global sea-level rise of 4.3–9.9 m (see endnote [8]). According to the latest AR5 report (see endnote [2]), over the next 2000 years humanity faces a rise **of about 2.3 metres for each sustained 1°C** increase in global temperature. However the AR5 report published in 2013 is not the whole story. Peer-reviewed publications in 2015 reported that two massive glaciers in West Antarctica have already passed tipping points, inevitably adding another 1.2m to sea level rise. Expansion of warming oceans will add another 0.8m and retreating glaciers another 0.4m; i.e**. an additional 2.4m**.

[10] These estimates are conservative since they don't consider the melting of East Antarctica's and Greenland's icecaps. Radar soundings of Totten glacier draining East Antarctica's Aurora basin reveal a trough under the ice that will eventually let warm sea water in to flood the basin and trigger enough melting to raise sea level by 5.1m (see endnote [9]). A similar threat exists in East Antarctica's Wilkes basin where, once a small amount of ice on its margin is lost, it will disintegrate and release enough ice to raise sea level by 3.5m (see endnote [10]). During the Pliocene era 4 million years ago when the planet was 2-3°C warmer at times, sea level was 20m higher than todays. Researchers attribute much of this rise to ice melting in the Aurora and Wilkes basins.

[11] Support for these results came from an improved ice sheet model in 2016 that, for the first time, included dynamic processes such as cliff collapse resulting from ice sheets being undercut by warming waters (see endnote [11]). AGO could lead to past Pliocene levels of warming as early as the middle of this century unless emissions are not substantially cut very soon. In the improved model, the **West Antarctic ice sheet collapsed in a few decades** in response to this level of warming. However if the model has omitted other significant melting processes, its predicted short timeframes may not be the worst possible outcome. Similar research suggests that Greenland's icecap is also approaching a point of no return, potentially adding an additional 6m to sea level rise, probably over thousands of years since Greenland's ice mostly rests on land above sea level (see endnote [12]).

A comparison of science with religion

[12] The principal goals of Enlightenment thinkers were liberty, progress, reason, tolerance, and ending the abuses of the church and state. The **scientific method** as practised by scientists since the Enlightenment involves individual scientists or groups proposing a disprovable scientific conjecture as Arrhenius did in 1896. If a conjecture could not be disproven by peer review – i.e. other scientists agreed that the conjecture is strongly supported by evidence including reproducible observations, supporting

theories, and successful predictions - it eventually becomes accepted as **scientific fact**.

[13] AGO is now accepted by almost all reputable scientists as scientific fact. According to the US Secretary of State John Kerry (2014) (see endnote [13]) "*the science of climate change is … compelling us to act … let there be no doubt in anybody's mind … everyone and every country must take responsibility for human-induced climate change and act immediately … the science is unequivocal*". Notwithstanding Kerry's candour, "climate change" and "global warming" are euphemisms often used by fossil energy companies and their political acolytes for "anthropogenic global overheating" (AGO) to conceal their pariah activities (the genocidal pursuit of short-term profits by many companies; the avoidance of tough decisions required by politicians to stop AGO).

[14] By contrast, the **world's religions** are not supported by evidence including reproducible observations, supporting theories, and successful predictions, and so cannot be accepted as factual in the way that peer-reviewed science conclusions can. Religions commonly invoke the existence of supernatural deities (Jehovah, Buddha, A***** , ...) and their prophets (Jesus, M*******, …).

Neoliberal free market economics

[15] In many respects, **neoliberal free market economics has more of the attributes of a religion than a science**. Adam Smith recognised that a truly free market is a myth. Free trade in child labour, plutonium, or heroin would be unacceptable to most people. All markets are not only constructed and regulated but are also constantly manipulated. Behind the faith in a (mythical) free market is an ideology that the so-called "invisible hand" will optimally match supply and demand. No politician or economist has yet been able to explain its workings (see endnote [14])**.** In the aftermath of the greatest economic calamity in 80 years, two central components of the so-called "dismal science" (macroeconomics, financial economics) are now being closely re-examined. According to *The Economist* (see endnote [15]), macro and financial mainstream economists helped cause the calamity, failed to predict it, have no idea or cannot agree on how to fix it, and are now perceived as having been at best completely useless over the past 30 years and at worst positively harmful, which is patently absurd.

[16] Almost without exception, neoliberal free market economists since Adam Smith have believed that, despite evidence to the contrary, the free market is in a state of equilibrium by naturally balancing supply and demand, a belief contradicted by a continuing sequence of economic crises including global depressions and market crashes. There is compelling evidence that **the neoliberal free market theory of trickle down simply doesn't work**. The richest 85 people in the world now have as much wealth as the poorest half (3.5 billion), and concentration of wealth is increasingly rampant. Undeterred, governments measure their "economic success" by aggregated GDP data, failing to take into account wealth distribution, educational achievement, innovation, or even the welfare and health of the population they claim to represent, which is also patently absurd (see endnote [16]).

[17] **The most bizarre feature of neoliberal free market economics is an irrational belief in sustainable economic growth.** Most economists and politicians promote "sustainable economic growth" as their fundamental economic objective. In 1972, researchers at the Massachusetts Institute of Technology studying computer simulations of a future Earth published **Limits to Growth** (LtG) (see endnote [17]). The researchers' various simulations took into account accelerating industrialisation, rapid population growth, widespread malnutrition, resource depletion, and a deteriorating environment. Their BAU ('business-as-usual') simulation predicted overshoot and collapse in the global economy, environment and population beginning around 2015-2030.

[18] LtG's central point, strongly criticised by mainstream economists and politicians but self-evident to this retired physicist, is that the pursuit of any form of growth within a closed (finite) system is unsustainable including economic growth within Earth's closed biosphere, and will inevitably lead to "overshoot and collapse". Subsequent research by other researchers has shown that LtG's business-as-usual scenario projections (1972) have accurately tracked 40 years of real data collected subsequently by reputable international agencies including the United Nations, UNESCO, FAO, NOAA, and CIRSO (see endnote [18]).

[19] According to LtG's 1972 business-as-usual simulation, growing populations and demands for material wealth lead to increases in industrial output, resource use, and pollution. As diminishing resources become more expensive, capital is increasingly diverted to resource extraction. Consequently, industrial output per capita starts to fall from about 2015. As pollution increases and industrial inputs into agriculture decrease, food production per capita also begins to fall. Overstretched governments respond by cutting or privatising health and education services leading to increasing death rates from about 2020. In the real world, the pursuit of material wealth contributed to unsustainable levels of debt, to the global economic calamity of 2007-08, and to social and economic malaise – harbingers of the consequences of limits to growth that are increasingly evident today. It is not difficult to imagine that conflicts arising from forced migrations and economic collapse driven by AGO will make the planet ungovernable, threatening the very fabric of civilisation. Pre-eminent climate scientist James Hansen argues "the future is bleaker than we thought" (see endnote [19]).

The folly of applying neoliberal free market economics (religion) to mitigate AGO (scientific fact)

[20] The **Stern Review on the Economics of Climate Change** is a 700-page report released for the British government on 30 October 2006 by pre-eminent economist Lord Nicholas Stern, chair of the Grantham Research Institute on Climate Change and the Environment (London School of Economics (LSE)) and also chair of the Centre for Climate Change Economics and Policy (CCCEP) at Leeds University and LSE. The report considered the effect of climate change on the world economy, and is significant as being the largest and most widely known and discussed report of its kind.

[21] The Review concluded that **AGO (climate change) is the greatest and widest-ranging market failure in human history**, presenting a unique challenge for neoliberal free market economics. AGO exposes a fundamental failure of markets: those who damage others by emitting greenhouse gases generally do not pay for their emissions: i.e. carbon emissions are essentially regarded as a "free good" (see endnote [20]).

[22] The neoliberal free market approach to addressing AGO has been to create emissions trading schemes (ETS) that depend on allocating a market price to carbon emissions, and either giving, auctioning, or selling carbon emission permits to industry sectors responsible for carbon emissions. However the evidence for the ineffectiveness of current emissions trading schemes is compelling, both in New Zealand and in other countries.

[23] The New Zealand Emissions Trading Scheme (NZ ETS) is (quote) "**the Government's principal policy response to climate change**. It supports global efforts to reduce greenhouse gas emissions while maintaining economic productivity (?). The NZ ETS puts a price (?) on greenhouse gas emissions, providing an incentive (?) for people to reduce emissions and plant forests to absorb carbon dioxide. Certain sectors (?) are required to acquire and surrender emission units to account for their direct greenhouse gas emissions or the emissions associated with their products. An emission unit represents one metric tonne of carbon dioxide or the equivalent of any other greenhouse gas (carbon dioxide equivalent). There are lots of unit types (?) and a variety of emission units (?) are traded (?) throughout the world" (unquote: reservations denoted by (?) are mine; see endnote [21] for citation).

[24] I acknowledge that the Emissions Trading Scheme (ETS) Review Consultation is an attempt by the Government to improve the NZ ETS but have concluded that it is so fundamentally flawed - as demonstrated by its outcomes - that it should be abandoned altogether, consistent with my responses to Q2 and Q27 in the summary of consultation questions (see page 1 of this submission).

What's wrong with carbon emissions trading schemes?

[25] It is self-evident to this physicist that applying a market solution to the "greatest … market failure ever seen" is unlikely to succeed despite the faith of neoliberal free market believers in it. Put succinctly, "emissions trading is unfair, it is unethical, and it just doesn't work" (see endnote [22]. Pre-eminent climate scientist James Hansen told a carbon trading conference in New York that carbon trading is "a path focussed on corporate greed". It increases the cost of energy for the public, as utilities and industries purchase the right to pollute, with one hand adding it to fuel prices, while with the other hand taking back most of the permit revenues from the government. The costs and profits of the trading infrastructure are also added to the public's energy bill.

[26] The risks of emissions trading are exacerbated by the rise of truly transnational capital and a new global production and financial system into which all nations and much of humanity has become integrated. A world economy in which countries and regions were once linked to each other through trade and financial flows in an international market has been transformed into a global economy in which countries are linked through the trans-nationalisation of production, finance, and capital accumulation. No single nation-state can now remain insulated from the global economy nor prevent the penetration of the social, political, and cultural infrastructures of global capitalism. **This raises the spectre of 21st century fascism** (see endnote [23]).

[27] The basic mechanisms for carbon trading were outlined in the 1997 Kyoto Protocol, a climate agreement adopted by 192 countries. Currently there are more than 60 existing or planned carbon trading schemes worldwide. The World Bank valued emissions trading in 2012 as a $176 billion industry **despite the imperative to reduce carbon emissions, not trade them**.

[28] With so much at stake, it was inevitable that carbon trading would attracted a new class of criminals. In the EU system, $20 billion was lost to carbon fraud between the system's launch in 2005 and 2011 (see endnote [24]. According to Interpol, possible carbon crimes include stealing and reselling credits, tax and securities fraud, transfer mispricing, money laundering, phishing, and identity theft. In 2014, prosecutors in Italy investigated a $1.4 billion carbon trading scam that funded terrorist groups operating in the Middle East.

[29] However the worst crimes from an environmental perspective are sales of non-existent credits where polluters, commonly in the developed world, pay for carbon emission offsets generated elsewhere. George Monbiot compares carbon offsets to indulgences sold centuries ago by the Catholic Church i.e. cash for forgiveness. In 2007, the Vatican received a certificate declaring the Holy See to be the world's first carbon-neutral sovereign state made possible by offsets promised by a reforestation project in Hungary. Not a single tree of the "Vatican Climate Forest" was ever planted (see endnote [25]). The inherent flaw in carbon trading lies in the difficulty of substantiating transactions that involve nothing palpable. Interpol identifies a risk that the carbon market can be exploited by a single significant vulnerability distinguishing it from other markets - the intangible nature of carbon emissions.

What's wrong with the NZ ETS in particular?

[30] The NZ ETS is described as the Government's principal policy response to climate change by "supporting global efforts to reduce greenhouse gas emissions while maintaining economic productivity". **New Zealand risks achieving pariah status** in "supporting global efforts" when its indicative commitment of 11% reduction below 1990 levels by 2030 is compared with the commitments of the European Union to a 40% reduction (see endnote [26]), the United States to a 28% reduction, and China to a 20% reduction.

[31] Despite having an ETS, New Zealand's net emissions (including forestry offsets) **increased** by 111%, between 1990 and 2012, the 5th highest per capita increase among OECD countries. New Zealand has a non-binding unconditional target to reduce its net emissions to 50% of 1990 emissions by 2050 (see endnote [27]). During his successful election campaign in 2008, PM Key loudly promoted a 'Fifty by Fifty' slogan but has been conspicuously silent about this broken election promise since then.

[32] Indeed **under current policy settings, New Zealand's net emissions are officially projected to increase by 159% by 2030** relative to 1990 levels, rather than reduce by 11% required to meet its INDC target tabled at Paris (see fig [e], p1). I am old-fashioned enough to believe that politicians should be held accountable for broken election promises.

[33] Despite having an ETS, New Zealand has acquired a shameful international record on its response to climate change. For example **New Zealand's climate change protection policies rank fourth worst among 60+ countries** according to a reputable international Climate Change Performance Index (CCPI) (see endnote [28]). Arguably more relevant for this submission, **New Zealand's ETS ranks 25th of 26 countries** in a 2014 World Bank review of emissions trading schemes (see endnote [29]). Not many voters in the 2014 election were aware of that despite my best efforts (see endnote [30]).

[34] In my perception, political machinations have fatally flawed New Zealand's current ETS. Its reported objectives are "supporting global efforts to reduce greenhouse gas emissions while maintaining economic productivity". Any reduction in greenhouse gas emissions implicitly implies **quantified emission reduction targets**, for example specified as Mt CO2-e (megatons of CO2 emissions including other greenhouse gas emissions expressed as CO2 equivalents). **Targets should be based on climate science** that can predict the implications of carbon emissions targets for future mean global temperature.

[35] There is no apparent link between New Zealand's carbon emissions targets and its ETS. The parameters of New Zealand's ETS and indeed its emissions targets implicit in its Intended Nationally Determined Contributions (INDCs) have been determined politically without reference to any supporting science. Two examples of this ad hoc political approach are outlined below:

[36] Firstly, New Zealand's ETS explicitly exempts agriculture that contributes 50% of this country's carbon emissions. The decision to exclude agriculture, including dairy emissions, is entirely political and is not supported by rational scientific argument. Accordingly it immediately ensures that **New Zealand's ETS is a half-baked scheme** that subsidising agriculture at a cost to the rest of the economy.

[37] Over the past two decades, **dairy production in New Zealand has intensified** requiring increased external inputs of fertiliser, feed, and water. Intensified dairying has massive impacts not paid for by dairy farmers. These "negative externalities" are left for the wider population to pay for, economically and environmentally. They are also counter-intuitive because the dairy industry itself relies on New Zealand's "clean green" image to maximise its returns. Recent peer reviewed research (see endnote [31]) shows that the total external costs of intensive dairying caused by nitrate contamination of drinking water, nutrient pollution to lakes, soil compaction, and greenhouse gas emissions exceeds total dairy export revenue i.e. on rational economic analysis the **costs of intensive dairying exceed its economic benefits**. Exempting dairying from the ETS exacerbates this massive market distortion.

[38] Secondly, prior to the summit meeting in Paris in December 2015 that decided the future of Earth's climate, countries were required to prepare their INDCs that indicate their proposed emissions reduction targets. The process followed by (then) Climate Minister Groser was to: [i] invite the public to make submissions on INCDs to take to Paris giving them just four weeks to respond; [ii] publish a pseudo-econometric consultation document that overestimated the costs of action and underestimated the much larger costs of inaction (see endnote [32]); and [iii] conduct rushed consultation meetings around the country at which no Ministers fronted.

[39] Dispensing with peer-reviewed scientific research, Minister Groser's discussion document provided a plethora of excuses for Government inaction: "why we should wait and see; action will cost New Zealanders dearly; much of our energy is renewable already; requiring farmers to pay for emissions will lead to global starvation; anything New Zealand does will make very little difference"; and - most execrable of all - "we are committed to doing our fair share and taking responsibility for our emissions". After receiving 17,000 submissions, mostly from "uninformed climate activists", the Minister predictably exercised his prerogative to ignore almost all of them including one from the Royal Society of New Zealand (RSNZ) that represented the consensus view of New Zealand's top climate scientists and was based on peer-reviewed science. In its submission, the RSNZ reasserted that the world must restrict global warming to 2°C to avoid droughts, temperature extremes and wildfires wreaking havoc. "Significant action must be taken as a matter of urgency", the RSNZ warned. Furthermore "as one of the globe's highest per-capita emitters of greenhouse gases, New Zealand has an opportunity to demonstrate leadership in reducing its emissions". The RSNZ recommended a target for New Zealand of 40% reduction in net emissions (below 1990 gross emission levels) by 2030, a target supported by most of the other submissions.

[40] Displaying not-uncharacteristic arrogance, Minister Groser tabled New Zealand's INDC for an emissions reduction target of merely 11% below 1990 levels with no scientific justification whatsoever, thus **confirming New Zealand's pariah status** in its response to AGO as reflected by its international rankings.

Evidence for fraudulent trading under the New Zealand ETS

[41] In late 2015, the Government released climate change reports on its obligations under Kyoto Protocol CP1 and also CP2 (to which New Zealand is no longer a party). It has been alleged (see endnote [33]) that these documents expose fraudulent trading that would further discredit New Zealand's already tarnished climate change policy (see endnote [28]).

[42] Under the Kyoto protocol, New Zealand has accepted a target of limiting its net average emissions over the 2008 - 2012 period to gross 1990 levels, that in practice meant a target of 309 million tons over five years. However New Zealand's emissions continued to actually increase by 20% over this period, but could be covered by forestry offsets reductions. By this means, New Zealand could meet its CP1 target fairly within the (broadly accepted) Kyoto rules. According to these rules, any surplus could be banked against targets for later commitment periods.

[43] However according to New Zealand's CP1 reporting, a substantial volume of actual emissions were paid for using international units. Most of these were ERU's under Kyoto's Joint Implementation mechanism, including: [i] 86 million tons from Ukraine where massive credits were found to be issued fraudulently as part of an international criminal scam; [ii] 16 million tons of Kyoto Certified Emissions Reductions (CERs) issued under the Clean Development Mechanism. CERs are also hugely problematic: about half of them were issued for the destruction of refrigerant gases manufactured solely to be destroyed to claim carbon credits. For this reason, CERs are no longer accepted and cannot be used in Kyoto's second commitment period CP2.

[44] But Kyoto CP1 Assigned Amount Units (AAUs) can be used. By paying for CP1 obligation with dubious and probably fraudulent credits, New Zealand acquired a surplus of 124 million tons of AAUs, equivalent to about two years' worth of real domestic carbon emissions. Predictably New Zealand is using this banked credit to meet its self-imposed CP2 target reductions.

[45] Summarising, New Zealand has allegedly bought fraudulent credit in CP1, laundered them into AAUs, and has effectively used these AAUs to meet this country's CP2 reduction targets. New Zealand will undoubtedly attempt to carry over that surplus, plus any other fraudulent credits it is able to launder, to meet its (self-imposed, not legally binding) INDC target of 11% by 2030 offered at Paris. In the interim, New Zealand's carbon emissions will continue to rise (see fig [e] on p1).

[46] As a scientist I find these allegations are not only credible but also deeply disturbing. If verified, then New Zealand's climate change policy is based on an outright scam which would speaks volumes about the honesty and commitment to real change of this country's political and economic leaders who collectively are responding totally inadequately to anthropogenic global overheating.

A rational science-based approach to determining INDCs

[47] In my 17th submission to all MPs and other worthies on 20 May 2015 (Budget Day), I suggested alternative proposals for New Zealand's INDCs. These proposals dispensed with the pseudo-econometrics that characterised much of the discussion document and worked backwards from an essential goal of net carbon neutrality by 2070 as determined by peer-reviewed science. New Zealand's emissions are nominally 80Mt (CO2-e) in 2015 (see endnote [34]). Achieving this goal requires a 100% reduction in net emissions over 55 years, or nominally a constant 1.82% reduction or 1.45 Mt (CO2-e) reduction in emissions per year.

[48] Applying Ockham's razor (see endnote [35]) by assuming that the required decrease in net emissions is linear, New Zealand's INDC commitments would be 9% by 2020 (5 years hence), 27% by 2030 (15 years hence), and 64% by 2050 (35 years hence). Under my alternative proposals, New Zealand's commitment by 2030 (27%) would be marginally less ambitious than the European Union's commitment (40%) but would closely match the United States' commitment (28%), perhaps giving PM John Key some political comfort. Furthermore, my alternative proposals are evidence-based and consistent with IPCC and RSNZ conclusions.

What should replace the NZ ETS?

[49] In responding to Q27 (addressing barriers/market failures to the uptake of low emissions technology, see p1), I have argued that the Government should scrap the ETS altogether (refer paras [25] to [46]). In its place, I suggest that the Government should introduce: [i] a **science-based carbon budget** (refer paras [50] to [55] below); and [ii] a **carbon tax** (refer paras [56] to [65] below).

[i] A science-based carbon budget

[50] A United Nations Conference on Environment and Development (UNCED) in 1992, commonly referred to as the Rio Earth Summit, achieved agreement on a Climate Change Convention that eventually led to the Kyoto Protocol intended to limit anthropogenic global warming. The Kyoto protocol came into force in 2005. A common expectation, post-Rio, was that imposing a rising price on carbon through (for example) an emissions trading scheme would inevitably reduce carbon emissions and thereby reduce the threat of anthropogenic global overheating.

[51] Tragically the reality post-Kyoto has been that carbon prices have continued to fall whereas anthropogenic carbon emissions have continued to rise inexorably. An overwhelming consensus among climate scientists is that, despite a plethora of carbon emission trading schemes operating globally, there is already too much carbon in the atmosphere. Levels exceeded 400ppm (parts per million) CO2-e for the first time in 2015 that can be compared with: [i] pre-industrial levels of ca 270ppm; and [ii] 350ppm considered by most scientists to be the upper "safe" level if catastrophic global overheating is to be averted.

[52] The concept of a global 'carbon budget' emerged about a decade ago when scientists began to calculate how much more oil, coal and gas could still safely be burned while restricting human-induced global warming (to date 0.8°C) to 2°C as agreed at Copenhagen in 2009. Robust climate science predicts further human-induced global warming of an additional 0.8°C even if human-induced carbon emissions ceased immediately. This additional increase is required to restore Earth's radiative equilibrium.

[53] New Zealand's excess emissions are currently not manifest as large bills because the National Government is offsetting growing excess fossil emissions by claiming credit for: [i] carbon sequestered in plantation forests; and [ii] probably fraudulent trading under the New Zealand ETS (refer paras [41-[46] above). This situation will dramatically worsen when many trees are felled in the 2020s and forests revert from carbon sinks to carbon sources, causing excess emissions of 78-90Mt (see endnote [36]).

[54] **Carbon budgeting is essential to robust planning for serious emissions reductions** by putting emphasis on essential outcomes based on science rather than carbon pricing inputs based on economics. A carbon budget would detail expected carbon flows (sources and sinks) and practical actions to reduce or increase these flows as appropriate. It would set limits on total emissions and develop action plans for each sector of the economy. **Accounts would be expressed in Mt of (CO2-e) carbon, not dollars** nor carbon credits (largely intangible). A Climate Commission has been proposed to run the carbon budgeting process by: [i] working with stakeholders to explore options, costs, and sector action plans; [ii] consider the impacts of pricing instruments and complementary regulation; and [iii] test combinations of these against the Government's financial constraints (see endnote [36]).

[55] If humanity eventually unites to halt catastrophic AGO (Paris 2016 was not that point), carbon reductions will necessarily be enforced through international trade sanctions. **Under current NZ ETS settings, gross emissions in 2030 will be just 0.4% lower** than if the Government had taken no action whatsoever (see endnote [37]). New Zealand risks severe penalties in the future by ignoring its ethical responsibility to act, shown by its shameful international record on responding to AGO (see endnotes [28], [29]).

[ii] A carbon tax

[56] According to Benjamin Franklin, **there are only two certainties in life: death and taxes** (see endnote [38]).

[57] The **Carbon Tracker Initiative** (see endnote [39]) is a team of London-based financial analysts and environmentalists that advises financial market investors on the risks that AGO poses for stock portfolios. Their award-winning analyses based on proprietary fossil-fuel databases showed that: in 2012: [i] only **565Gt** of emissions remained in a safe carbon budget for Earth's atmosphere; and [ii] there are **2,795Gt** of potential emissions in total proven fossil-energy reserves owned by fossil energy states and companies. Accordingly only 20% (565/2795) of known fossil-energy reserves can be burned safely; hence **80% are unburnable "stranded assets" that must be left in the ground to avert an AGO catastrophe**. The Carbon Tracker Initiative's 2011 analysis was substantially re-validated in 2013 by the **International Energy Agency** (IEA) which concluded that **69.1**% of proven fossil energy reserves must be left in the ground (see endnote [40]).

[58] AGO has been described as the greatest market failure in human history (refer para [21] above) and accordingly it is simply implausible that market solutions alone (such as emissions trading schemes) would fix it. It also seems highly implausible that fossil-energy companies and investors in them would willingly relinquish 80% of their fossil-energy resources market value (in monetary terms US$21.6 trillion). It is also simply implausible that market forces alone could force them to do this. These numbers show that planet Earth has an enemy far more committed to action than governments or individuals: pariah fossil-energy companies and countries behaving recklessly over the survival of human civilisation. "Wrecking the planet is their business model - it's what they do" (see endnote [41]).

[59 What is desperately needed in place of ineffective emission trading schemes is carbon pricing applied across all fossil fuel sources by: [i] politically-regulated **increasing carbon taxes applied at points of extraction or emission**; and [ii] politically-**imposed resource use consent conditions** that enforce the phasing out of fossil energy extraction. Political interventions may be feasible in democracies like New Zealand where Governments are able to regulate (up-to-a-point) strong vested interest groups, but problematic in democracies like the United States where vested interest groups undoubtedly influence Government decisions by lobbying for political concessions. Big money talks (see endnote [42]).

[60] International agreements between countries on respective carbon tax rates will undoubtedly prove difficult, but not impossible once all countries recognise that the growing threat of climate catastrophe will not respect national borders. Recalcitrant nations could be dealt with through punitive import duties. New Zealand already risks severe penalties in the future by currently ignoring its ethical responsibility to act now on AGO (refer paras [53] - [55]).

[61] The basic concept are that: [i] a carbon tax is charged at points of extraction or importation of fossil energy and may be extended to carbon emissions generated by farming, deforestation etc; [ii] the tax is progressively increased; [iii] the tax revenue is returned to the general public equitably and in full. To maximize effectiveness, the level of carbon tax is regulated politically, based on scientific and economic assessments that balance the level of tax and rate of tax progression. Further details of how a carbon tax would operate are beyond the scope of this submission but are for example set out in Hansen (2009) (see endnote [43].

[62] New Zealand's political and business leaders are uniquely placed to show desperately-needed, strong, credible international leadership in reducing carbon emissions. This country already has 70% electricity generation through renewable energy resources (hydro, geothermal, and wind). New Zealand has previously shown strong international leadership over the existential threat of global nuclear war triggered by superpower confrontation. Nuclear-Free New Zealand is now part of this country's psyche.

[63] There is also self-interest (i.e. economic) justification for strong, credible international leadership in reducing carbon emissions rather than being a pathetic "fast follower" (PM John Key's own words). New Zealand's principal exports currently depend heavily on its (tarnished) "100% Pure" brand. In a world facing increasing the harsh realities of AGO, strong, credible international leadership would undoubtedly benefit the New Zealand economy.

[64] Indisputable maths (the difference between **2,795Gt** and **565Gt**) and the dire warnings of climate scientists that 80% of proven fossil-energy reserves must be left in the ground demand that all proposed new energy initiatives must be curtailed immediately if this country is to demonstrate such leadership. "Fossil fuel industries do not have a future: if they do, then bluntly, we don't … Looking for more oil is like growing tobacco to fund hospitals" (see endnote [44]). What is it about these simple facts that Energy Minister Simon Bridges didn't understand when he announced in 2015 a major expansion of offshore oil and gas prospecting?

[65] The Labour opposition's position on offshore prospecting is at best ambivalent. Ironically a previous Labour Government showed commendable leadership in proposing a carbon tax, but was defeated by ridicule, for example by the uninformed National MP who drove his farm tractor up the steps of Parliaments to denounce Labour's proposed "fart" tax (more correctly a "belch" tax).

My conclusions

[66] It is 120 years since the physicist Arrhenius postulated in 1896 that carbon emissions from burning fossil fuels would cause anthropogenic global overheating (AGO), and 100 years since the physicist Albert Einstein published his General Theory of Relativity. Compelling observational proof of Arrhenius' conjecture has been provided by a multitude of peer-reviewed scientific papers including the IPCC's AR5. In late 2015, gravity wave were detected from two black holes that had collided more than a billion years sending a ripple through space time itself and entered the Milky Way galaxy 40,000 years ago, just as modern humans were beginning to expand across planet Earth.. The detection of gravity waved marked the birth of gravitational astronomy and provided observational proof of Einstein's theories and the physical reality of black holes.

[67] It is just 28 years since the physicist Stephen Hawking published *A brief history of time: from the big bang to black hole*s (see endnote [45]). In the book's Introduction, pre-eminent astronomer Carl Sagan notes that Hawking is attempting, as he explicitly stated, "to understand the mind of God". Hawking's conclusions are "a universe with no edge in space, no beginning or end in time, and nothing for a Creator to do." These reflections raise significant questions for me including: [i] whether modern humans are alone in the universe (answer: unknown); and [ii] how modern humans should respond to the existential threat of AGO (answer: not yet decided). What is increasingly certain for me is that a wrong answer to question [ii] potentially renders question [i] unaskable.

[68] Influenced by Hawking's analysis, I have concluded that the mitigation of AGO (a **scientific fact** that potentially presents an existential threat to human civilisation and perhaps to modern humans) should **NOT** be attempted by applying neoliberal free market economics (essentially a **religion,** refer pp 2-3) that is inherent in emissions trading schemes. My summary response to Q27 (role for the Government in addressing barriers/market failure to the uptake of low emissions technology, see p1) is that the **Government should scrap the ETS altogether (refer paras [25] to [46] above) and in its place introduce a science-based carbon budget (refer [50] to [55] above) and a carbon tax (refer paras [56] to [65] above).**

Endnotes

[1] Arrhenius SA (1896). 'On the influence of carbonic acid (CO2) in the air upon the temperature of the ground', *Philosophical Magazine*, (41): 237-76.

[2] https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf

[3] http://cementeclipses.com/Works/follow-the-leaders/ (sculpture by Isaac Cordal)

[4] Post-election briefing for the Incoming Minister, Ministry for the Environment, 2014.

[5] www.psychiatry.org/psychiatrists/practice/dsm/dsm-5

[6] "Climate change as a conflict trigger", *New Scientist*, 7 Mar 2015, p6.

[7] http://www.theguardian.com/environment/2016/jan/20/2015-smashes-record-for-hottest-year-final-figures-confirm

[8] http://www.pnas.org/content/early/2015/10/07/1511186112

[9] *Nature Geoscience*, doi.org/27w (2015).

[10] *Nature Climate Change*, doi.org/snz (2015).

[11] *Earth and Planetary Science Letters*, doi.org/42m (2016).

[12] *Nature Climate Change*, doi.org/kkw (2015).

[13] John Kerry (2014) speaking to civic leaders and government officials in Jakarta on 16 Feb, 2014. The entire speech is available at: http://www.state.gov/secretary/remarks/2014/02/221704.htm#.UwEe-hfRKHU.twitter

[14] Ja Hoon Chang, 2010. *23 Things They Don't Tell You About Capitalism*. Penguin Books, 2010. ISBN 978-1-60819-166-6

[15] *The Economist*, Editorial, 18 July 2009, p2.

[16] http://www.theguardian.com/commentisfree/2014/jan/20/trickle-down-economics-broken-promise-richest-85

[17] See Meadows DH, Meadows DL, Randers J, Behrens WW, 1972. '*The Limits to Growth'*, 205pp. ISBN 0-87663-165-0

[18] In 2008 the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) validated LtG's analysis by showing that its business-as-usual simulation in 1972 accurately tracked actual outcomes up until 2008 i.e. 36 years later (see Graham Turner et al, CSIRO working paper ISSN 1834-3638), replicated in 2014 by researchers at the University of Melbourne. See http://sustainable.unimelb.edu.au/files/mssi/MSSI-ResearchPaper-4_Turner_2014.pdf; see also www.theguardian.com/commentisfree/2014/sep/02/limits-to-growth-was-right-new-research-shows-we're- nearing-collapse

[19] *New Scientist*, 23 July 2015. See also "Climate change as a conflict trigger", endnote [6].

[20] http://www.theguardian.com/environment/2007/nov/29/climatechange.carbonemissions
[21] http://www.mfe.govt.nz/climate-change/reducing-greenhouse-gas-emissions/nz-emissions-trading-scheme
[22] http://www.theguardian.com/environment/2010/jan/12/james-hansen-carbon-emissions
[23] http://www.globalresearch.ca/global-capitalism-and-the-global-police-state-crisis-of-humanity-and-the-specter-of-21st-century-fascism/5444340
[24] Marius-Cristian Frunza, *Fraud and Carbon Markets*, Routledge (2013), ISBN-13: 978-0415657013.
[25] http://foreignpolicy.com/2015/01/30/climate-change-hack-carbon-credit-black-dragon/
[26] http://newsroom.unfccc.int/unfccc-newsroom/eu-submits-its-climate-action-plan/
[27] http://silverlinings.com/new-zealands-journey-toward-a-low-emission-future-todays-climate-change-landscape
[28] Burck J (2014). *The Climate Change Performance Index: Results 2015*. See http://germanwatch.org/en/download/10407.pdf
[29] https://www.worldbank.org/en/news/feature/2014/05/28/state-trends-report-tracks-global-growth-carbon-pricing
[30] Immediately prior to the 2014 General Election I submitted a factual letter setting out New Zealand's international ranking on climate change protection policies and on emissions trading scheme to 25 of New Zealand's metropolitan and regional newspapers. It was published by just three of the regional newspapers, which was concerning.
[31] Foote KJ, Joy MK, Death RG. *New Zealand dairy farming: milking our environment for all its worth*. Environmental Management, 22 April 2015. ISSN0364-152X, ISSN1432-1009. Springer US.
[32] The costs of inaction were calculated by Treasury to be up to $52 billion for New Zealand
[33] norightturn.blogspot.com (Dec 17, 2015).
[34] http://www.mfe.govt.nz/publications (estimated from latest available figure for 2012 of 77.0Mt CO2-equivalent units
[35] Occam's razor is a problem-solving principle devised by William of Ockham (c. 1287–1347) that states that among competing hypotheses that predict equally well, the one with the fewest assumptions should be selected.
[36] *Why carbon budgeting is key to serious progress*. A presentation to a Wise Response Strategy Workshop (27 Jan, 2016) by Simon Terry, Sustainability Council of New Zealand (www.sustainabilitynz.org).
[37] *ibid*. I acknowledge Simon Terry's outstanding contribution to my discussion of carbon budgeting in this Submission 18.
[38] http://www.brainyquote.com/quotes/quotes/b/benjaminfr129817.html
[39] http://www.carbontracker.org/carbonbubble
[40] *New Scientist*, 8 March 2014, pp8-9; *Redrawing the Climate-Energy Map*. IEA, 2013; Technology *Roadmap: Carbon Capture and Storage*. IEA, 2013.
[41] Naomi Klein reported in McKibbon (2012). See also *Rolling Stone* (2 Aug 2012) at http://www.rollingstone.com/politics/news/global-warmings-terrifying-new-math 20120719#ixzz21UvLKPiH.
[42] *Merchants of Doubt*, Erik M. Conway and Naomi Oreskes (June 2010). Publisher: Bloomsbury. OCLC: 461631066
[43] Refer chapter 9 ('An honest effective path') of Hansen (2009). *Storms of My Grandchildren: the truth about the coming climate catastrophe and our last chance to save humanity*. Bloomsbury, New York, 303pp. (ISBN 978-1-60819-200-7).
[44] Liz Springfield (2016) quoted in *a DomPost* letter.
[45] Stephen Hawking (1988). *A Brief History of Time: From the Big Bang to Black Holes*. Bantam Dell Publishing Group. ISBN 978-0-553-10953-5.
[46] Credentials: With a PhD in Physics (VUW, 1968), I am a retired 74yo upper atmospheric physicist (PEL / DSIR), futurist (CFF), tertiary teacher (VUW, CIT), disaster manager (MoCD), chief adviser (MoE), international education consultant (ADB, ILO, OECD, World Bank, UNESCO), and an environmental activist motivated by concern for my grandchildren. I am currently occupied in making (unpaid) submissions on **anthropogenic climate overheating** to MPs, Council mayors/ chairs, and others. **My previous 17 submissions (65,662 words) are listed in Annexe A**. In my former life I have been: [i] a DSIR scientist with peer-reviewed publications during an era when collaborative public good science still existed in New Zealand; [ii] an environmental activist sued for US$3.5m by a multinational company for claiming that one of its fine products was destroying Earth's vital ozone layer; [iii] a futurist sacked by PM Muldoon for publishing, under the auspices of the Commission for the Future (consequently disestablished), peer-reviewed publications on future contingencies including **anthropogenic climate overheating** (1981**)**, global economic collapse, and the effects of a nuclear attack on New Zealand (1982); [iv] the author of *Nuclear Disaster: a new way of thinking down under*. (1985). Asia Pacific Books (ISBN 0908583117); [v] an education bureaucrat in the Ministry of Education as Chief Adviser Tertiary who facilitated the (then) Labour government's goal of putting more 'bums on seats' to increase tertiary participation rates (ACHIEVED); [vi] a tertiary education consultant working for international agencies (ILO, World Bank, UNESCO, ADB) in 25 countries; and: [vii] a grandparent of six who do not deserve the uncertain future they face. The Montreal protocol protecting Earth's vital ozone layer from the products of multinational companies (despite non-compliance by New Zealand's continuing use of methyl bromide as a fumigant), New Zealand's current post-ANZUS nuclear free status, and New Zealand's substantially improved tertiary participation rates affirm that my previous efforts have not been entirely unproductive. In my free time I have run 60 marathons for 11 age-category firsts and also a 2nd place at London, and a 4th place at New York and: [i] confirm that **writing submissions on anthropogenic climate overheating is more onerous than running marathons**; [ii] hope that readers will take this comparison into account when considering my Submission 18: ETS Review Consultation.

Annexe A: my 17 previous submissions on anthropogenic global overheating

Submission 1: (undated) 2009 *Global Economic Crisis: could it ameliorate the current mass extinction event and coming human cull?*	672 words
Submission 2: 28 September 2009 *Global Economic Crisis and Copenhagen: missed chances for averting a human catastrophe?*	4819 words
Submission 3: 15 February 2010 *Anthropogenic climate change: should IPCC be believed? (real action is needed now to avert future climate catastrophe.)*	5166 words
Submission 4: 31 March 2010 *Three contrasting responses to anthropogenic climate change: Hon Tim Groser (inadequate; Lord Rees et al (reticent); Solid Energy Ltd (expletive deleted).*	7473 words
Submission 5: 31 May 2011 *A Key letter, Brash physics, lignite mining, Fatih Birol, Lord Stern, the Bishop of Stafford, physics v flawed economics, flying PIGS, how NZ might save the planet, and crimes against humanity*	6465 words
Submission 6: (undated) August 2011 *World on the Edge: How to prevent environmental and economic collapse: Lester R Brown, Earth Policy Institute*	4461 words
Submission 7: 15 March 2012 *World3: Building a brighter hotter future.*	2300 words
Submission 8: 16 May 2012 *Game over for the climate*.	1384 words
Submission 9: 10 June 2012 *Discredited economic groupthink and a 10km-wide asteroid headed towards Earth.*	3174 words
Submission 10: 6 August 2012 *We shall require a substantially new way of thinking if mankind is to survive (a pariah industry)*.	3350 words
Submission 11: (undated) 2012 *Submission on the Proposed Southland Regional Policy Statement 2012*.	1903 words
Submission 12: 4 September 2012 *Climate Change Response (Emission Trading and Other Matters) Amendment Bill 52-1 (201).*	1190 words
Submission 13: 20 October 2012 *A last –gasp deal saves world from financial/climate meltdown.*	1893 words
Submission 14: 15 April 2013 *Three Existential Threats: briefing note for your information: one mostly resolved, two unresolved/increasing)*.	7028 words
Submission 15: 20 March 2014 *Science rules OK?*	6891 words
Submission 16: 24 August 2014 *A Key election promise.*	2794 words
Submission 17: 20 May 2015 *A tragicomedy: setting emissions targets in an absurd world*.	4699 words
	---------- 65,662 words
Submission 18: 31 March 2016 (latest) *Emissions Trading Scheme Review Consultation.*	8080 words
	---------- 73,742 words