KAURI
Oil & Gas (NZ) Ltd

15 March 2021

Submission to Climate Change Commission

Summary

The Climate Change Commission recently released for public consultation its draft advice to government for three emissions budgets covering the period 2022-2035.

This submission by Kauri Oil & Gas (NZ) Ltd documents:

1. The fundamental flaws in the science on which the advice is based. Carbon dioxide is a very minor component of the atmosphere and has a very limited capacity to absorb and emit infrared radiation. The actual emissions **have been measured** and are insignificant compared to water vapour. Furthermore, carbon dioxide is merely the courier, it does not generate energy or heat; if it were removed from the atmosphere the energy would be transferred by water vapour. Anthropogenic methane is so minor it is simply irrelevant.

2. The increase in temperature in **some** parts of the world over the last 60-70 years is due to an increase in incoming shortwave radiation that reaches the earth's surface. This is most likely the result of ozone depletion. Ozone absorbs and reflects incoming shortwave radiation. The amount of shortwave radiation being reflected has been declining. **This has been measured**. Depletion is further evidenced by the ozone hole and the melanoma rates in NZ and Australia. The destruction of ozone was happening at the same time that CO_2 emissions were increasing; the wrong correlation was identified as the problem.

3. The opportunity cost to New Zealand of a decarbonisation strategy. By pursuing the decarbonisation pathway, New Zealand is risking $1 trillion dollars or more in oil and gas revenues. No substitute industry has been identified that could bring in as much foreign capital. The Green economy appears to be no more than employing New Zealanders to build huge unnecessary electrification infrastructure to sell power to ourselves.

3. An alternative vision for New Zealand. The Commission describes a thriving (used 19 times in the Draft Advice), equitable (used 44 times), inclusive (used 33 times), climate-resilient (used 21 times), flourishing society, all to come about because CO_2 and methane emissions are reduced, which will have no effect on the climate. High value industries – oil & gas, farming, tourism (including film-making), aviation and reliable electricity generation are to be sacrificed or severely reduced to achieve this vision, with apparently no impact on GDP. Kauri sees a society rich in oil & gas reserves, with full high-value employment, adequate funding for world class health, education, housing, and welfare, responsible stewardship of the environment, and the elimination of food banks and charities providing shoes, raincoats and food to children.

If, indeed, policy is to be directed by evidence-based science, then direct measurement and observation must be given more credence than models that faithfully incorporate user assumptions and bias in their projections.

Given the consequences of current government Climate policy on every aspect of the New Zealand economy, and in particular the oil & gas industry, Kauri Oil & Gas (NZ) Ltd has completed a review of current climate science. I preface my conclusions by stating I am a petroleum geologist and an unapologetic advocate of fossil fuels, and in particular natural gas which is energy-rich, plentiful, cheap, reliable, and environmentally benign. I make no claim to being a climate scientist, but then do not consider any of the government's scientific advisers to be climate scientists either, as none has the breadth or depth of knowledge necessary. As an exploration geologist, however, I am experienced in integrating disparate datasets and testing multiple hypotheses. I have also learnt through painful experience, because my ideas are immediately tested by the drill bit, that I am wrong more often than I am right and it is essential to keep an open mind – science is never settled. Despite being consistently wrong in forecasts for the last 40 years, climate scientists have clung to the Greenhouse paradigm. I have documented my understanding and am happy to be corrected on factual errors.

The review (*A Geologist's Perspective on Climate Change 15 March 2021*) can be accessed on our website www.kaurioilandgas.co.nz and contains details which are not included here.

The Science

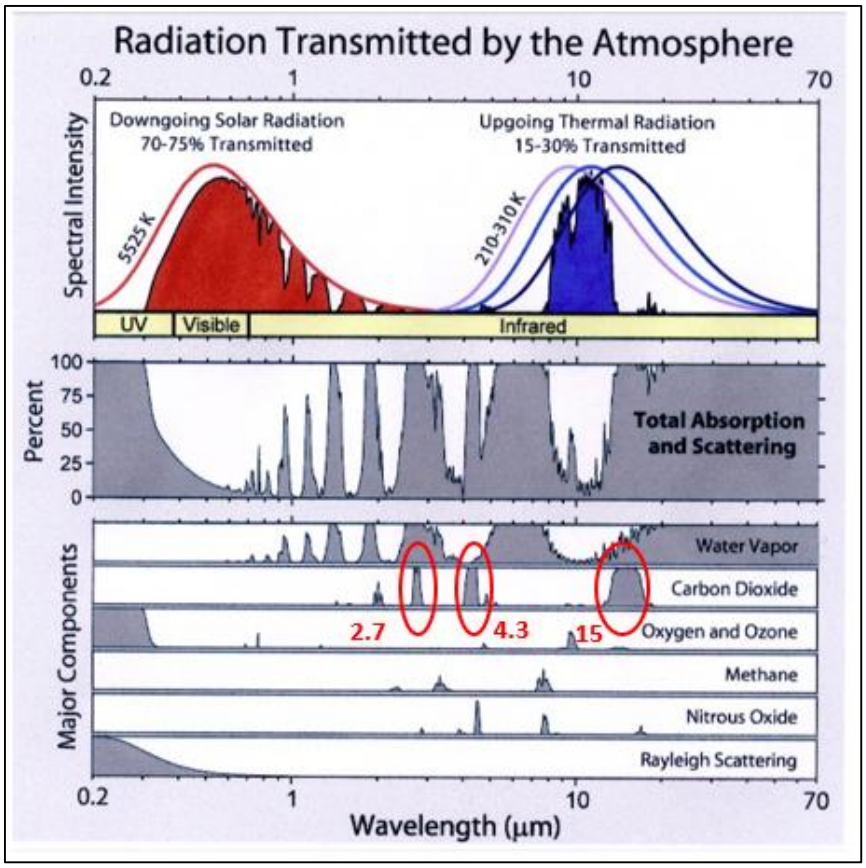
The Greenhouse Model was developed in the 1850s to explain the warmth of earth's atmosphere (which would not be possible with direct sunlight only given nights and winters) and the evidence of past ice ages. It recognised the capacity of certain gases in the atmosphere to absorb and emit infrared radiation. By far the dominant gas to do so is water vapour. Carbon dioxide and methane, because of their very low concentrations, would be expected to have a negligible effect and recent high precision measurements have confirmed this.

The surface of the earth receives on average, 490 $w.m^{-2}$ of downward radiative energy. Of this, 160 $w.m^{-2}$ is short wave solar radiation (ultra violet, visible and infrared) and 330 $w.m^{-2}$ is long wave (infrared) radiation from the atmosphere.

CO_2 currently constitutes up to 0.04 % of atmospheric gases and (on average) 1.6% of Greenhouse gases (those capable of absorbing and emitting infrared radiation). Water vapour makes up 98% of greenhouse gases and absorbs energy over a far wider range of the electromagnetic spectrum. CO_2 absorbs very little shortwave radiation (refer figure below). Based on volumetric proportions, the current concentration of CO_2 in the atmosphere should be responsible for less than 5.3 $w.m^{-2}$ (1.6%) of longwave radiation and 1.1% of the total radiative energy.

Feldman et al (2015) reported on high resolution measurements using Atmospheric Emitted Radiance Interferometer (AERI) data, taken at two locations, of the changing intensity of the 15 µm CO_2 band of the downgoing spectrum and calculated a change in radiative forcing of **0.2 $W.m^{-2}$ over a decade** (2000-2010). Atmospheric CO_2 increased by 22ppm over this period. These data indicate that, of the 490 $w.m^{-2}$ total radiative energy, CO_2 is emitting 3.7 $w.m^{-2}$. The pre-industrial concentration of CO_2 was around 280ppm, therefore, even if we assume all the 130ppm of added

has been due to human activity (disregarding the natural sources of CO_2 which are still unquantified) that is 1.1 $w.m^{-2}$, or 0.002%, of the total energy budget.



Incoming (red) and outgoing (blue) electromagnetic spectra for earth.

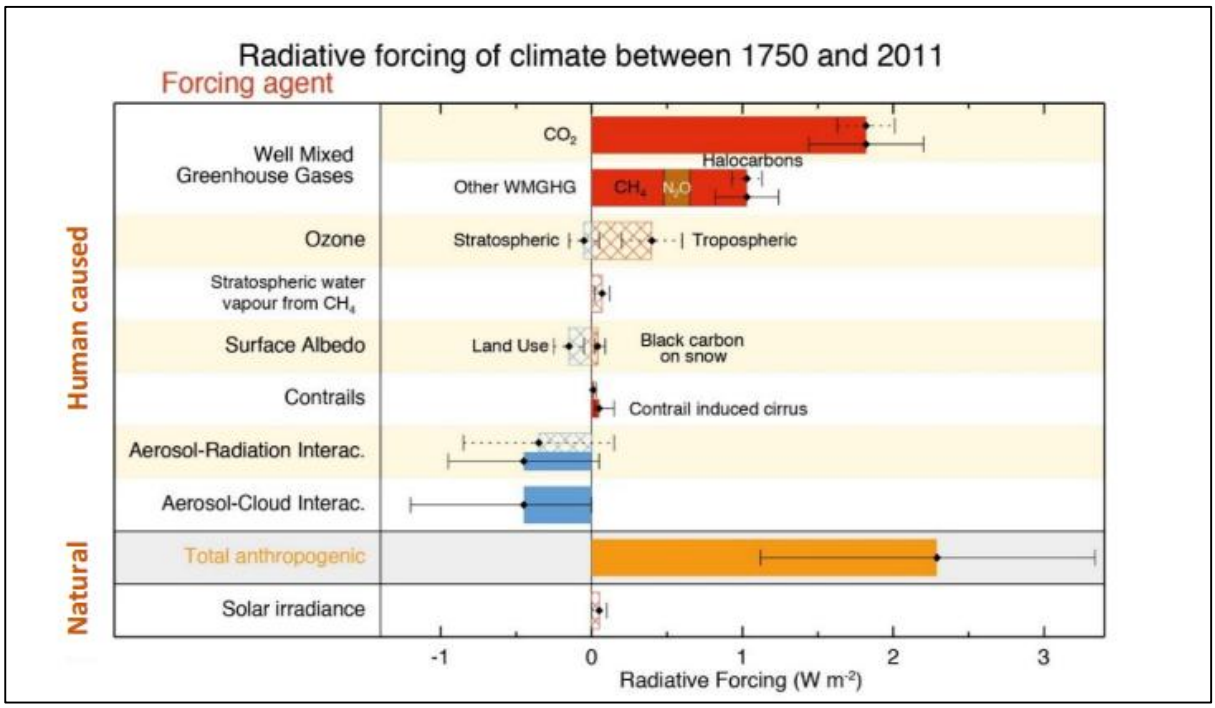
Kauri estimates that radiative energy constitutes 60% of total energy, with the remaining 40% the result of convective and conductive heat transfer from the earth's crust via the water column. CO CO_2 therefore 0.006% of the total budget, with the maximum contributed by human activity is **0.001%**

Shortwave radiation reaching the earth's surface increased by **2.4 $W.m^{-2}$ over a decade** while incoming shotwave radiation at the top of atmosphere remained relatively constant and outgoing (reflected) shortwave radiation decreased by **2.4 $W.m^{-2}$** over 17 years, equivalent to a decadel decrease of **1.9 $W.m^{-2}$** (Hatzianastassiou et al 2005). Longwave (downward) radiation has been increasing since the 1970s by an average of **1.8 $W.m^{-2}$ /decade** (Wang and Dickinson,2013).

Fossil fuels, and CO_2 in particular, are not the cause of any recent temperature increase. The most likely cause of increasing (average global) temperatures is an increase in shortwave radiation. CO_2 therefore represents around 5% of the increase, certainly higher than pre-industrial rates, but still insignificant compared to water vapour.

The contribution of carbon dioxide is consistent with its very low concentration and its very limited range of absorption frequencies. The contribution of CO_2 is negligible when compared with other

sources, both natural and as a result of human activities. Were all CO_2 removed from the atmosphere it would have little or no influence on climate.



Radiative Forcing Elements

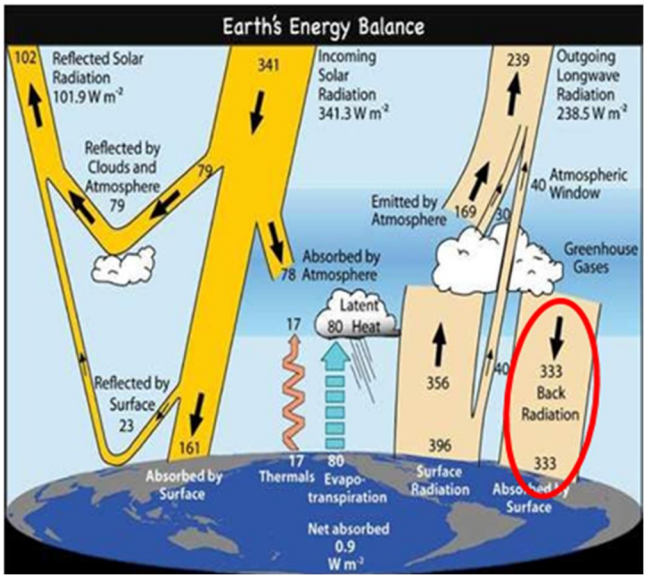
The diagram above is from Chapter 1 of the Commissions draft (The Science of Climate Change) and shows the estimated radiative forcing of CO_2 (**1.8 W.m^{-2}**) and methane (**0.5 W.m^{-2}**) over 211 years, which is consistent with the measured values. The impact of ozone depletion (**2.4 W.m^{-2}** shortwave+ **1.6 W.m^{-2}** longwave/ decade, or approximately **24 W.m^{-2}** over 70 years) is not shown. The Ozone layer was not discovered until 1913 and ozone depletion (evidenced by the ozone hole) was not recognised as a problem until 1985, the same year that the initial meeting of what would become the IPCC was held. The conventional wisdom (dogma) had already been established by his time that CO_2 drove temperature and a doubling of CO_2 would lead to a temperature increase of 2 degrees.

Greenhouse Model

The Greenhouse model was developed in the 1850s as a possible explanation for the warmth of the atmosphere and the occurrence of glacial periods. The theory states that shortwave electromagnetic radiation from the sun is transformed into long wave (infrared) radiation at the earth's surface and re-radiated back into space. A portion of the longwave radiation is trapped by so-called Greenhouse gases (mainly water, carbon dioxide and methane) in the atmosphere, warming the planet.

Satellite measurements of incoming and outgoing radiation are detailed in the diagram below. The first point to note is that the model assumes all energy driving the climate is solar, discounting heat from within the earth as inconsequential.

Secondly, incoming short wavelength solar radiation (341.3 W m^{-2}) is equivalent to outgoing radiation (101.9 W m^{-2} of reflected shortwave plus 238.5 W m^{-2} of longwave radiation). On this simple basis, the Greenhouse model is invalid.



Earth's Energy Balance, (after Trenberth et al 2009 as used by IPCC)

Of the 341 W m^{-2} that enters the atmosphere, 102 W m^{-2} is reflected as shortwave energy and 78 W m^{-2} is absorbed by ozone,water vapour and oxygen, leaving 161 W m^{-2} to reach the surface. 80 W m^{-2} and 17 W m^{-2} are utilised in evaporation/thermals, leaving only 64 W m^{-2} to be converted directly to outgoing longwave radiation, yet outgoing longwave radiation is 239 W m^{-2} .

The average surface temperature of the earth is 14 deg C. Blackbody radiation calculations indicate a body at this temperature radiates 396 W.m^{-2}. This surface recycled solar radiation is combined with 333 W m^{-2} of longwave radiation in the atmosphere to make the total radiation of 396 W m^{-2}. The question, therefore is where does the 333 W.m^{-2}originate? Once we add shortwave converted in atmosphere (78 W m^{-2}) plus longwave emitted by evaporation and thermals (80+17 W m^{-2}) this still leaves a **shortfall of 157 W m^{-2}**

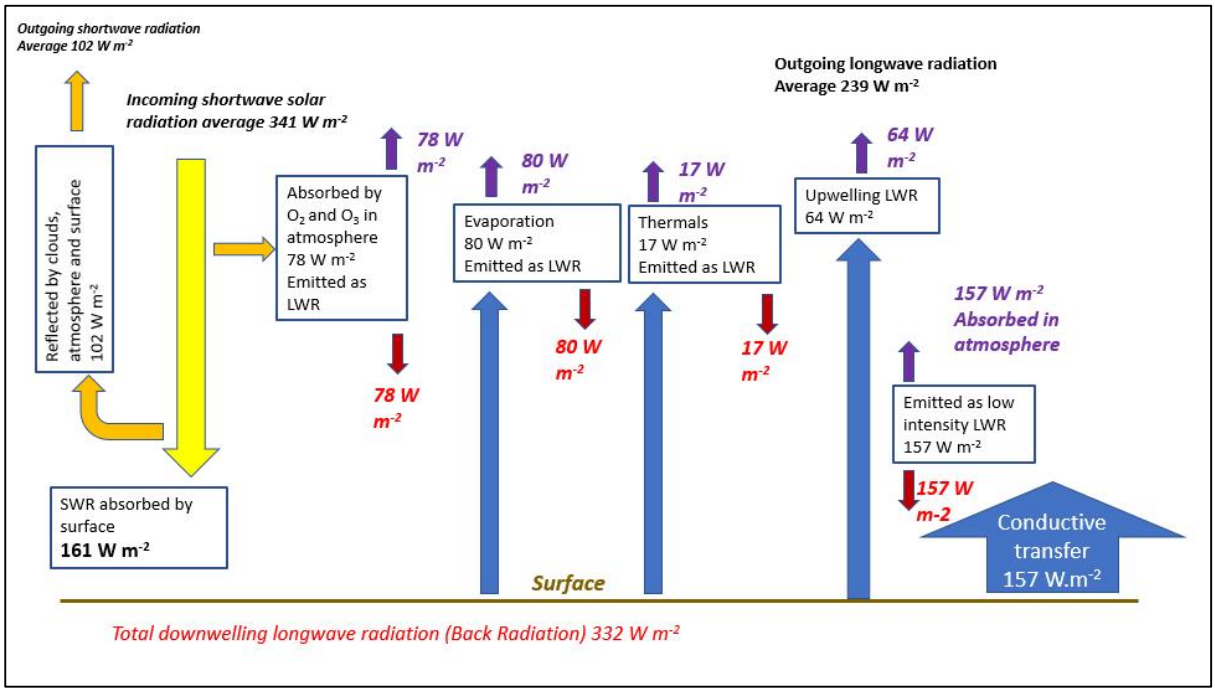
The IPCC model has input energy of 239 W m^{-2} (incoming shortwave radiation absorbed by atmosphere + shortwave reaching the surface) and output of 239 W m^{-2}, but creates 157 W m^{-2} in the atmosphere to explain measured back radiation of 333 W m^{-2}.

Rutherford Model

The earth is hot and temperatures increase with depth. This is a combination of a cooling core and radiogenic decay in the crust, which generates heat. This is transferred to the atmosphere via conductive and convective transfer through the water phase. The heat flux at the earth/atmosphere interface is a function of the temperature difference across the boundary. Subsurface temperature measurements, taken in oil and gas wells and deep mines, indicate temperature equilibrium across the earth/atmosphere boundary – the atmospheric lapse rate is a continuation of the subsurface geothermal gradient, but with a lower gradient reflecting vapour. The average temperature of the subsurface is the same as the average temperature of the surface (14 degrees C).

The heat flow from the earth, without the buffer provided by water, is 157 W m^{-2}. This confirms that, far from being 100% solar, the energy in the atmosphere is contributed roughly 60/40 by solar and subsurface. This heat flow is spread across the atmosphere and oceans/groundwater.

The Energy Balance can then be redrawn as below; this is informally referred to as the Rutherford Model, as it was Ernest Rutherford who identified heat generation in the crust due to radiogenic decay. The 157 W m^{-2} is low intensity energy, transferred to the atmosphere via conduction and convection and emitted as longwave radiation, part of the 332 W m^{-2} of Downwards Longwave Radiation recorded at the surface.



The Rutherford Energy Model incorporates energy from the earth

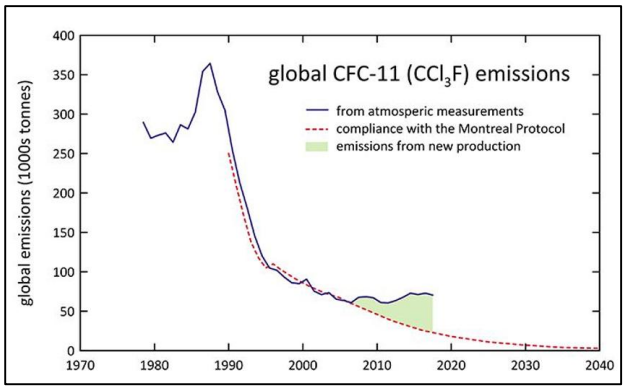
The lower 10m of the atmosphere accounts for 36% of total surface downward longwave radiation.

Ozone Depletion

The probable cause of a warming trend since the 1950s is ozone depletion. The destruction of ozone enables more high-intensity short-wavelength radiation to enter the atmosphere and reach the earth. This is absorbed not only by ozone but also by oxygen and water (vapour and liquid). Increasing short wave radiation increases warming of the surface sea layers. It also increases evaporation, increasing the water vapour concentration in the atmosphere and thereby absorbing more incoming shortwave radiation.

The production of CFCs commenced in 1928 and associated emissions reached a peak in the 1980s. When the environmental damage was recognised the Montreal Protocol (1987) was signed by all nations. Emissions fell and this reduction created a pulse or signature that can be tracked through a number of climate-related datasets – ozone density, shortwave radiation at surface, UV Index, water vapour and ultimately temperature (the temperature pause of 1998-2012). In contrast, none of these bear any relation to the CO_2 concentrations which have consistently tracked upwards.

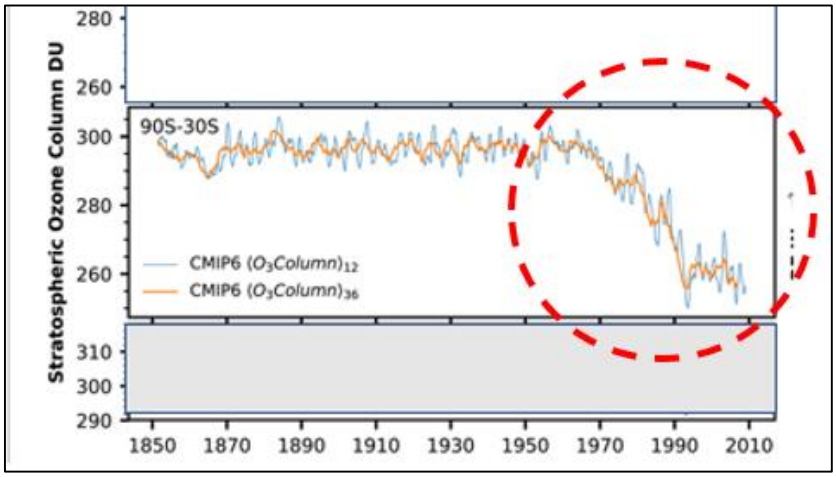
China recommenced production around 2008 and emissions are estimated to have grown by 7,000 tonnes/year. The plots below show global CFC emissions (the area in green reflects new production in contravention of the Montreal Protocol). Recent monitoring indicates these emissions have now stopped.



Global CFC Emissions (Paul Crumell, CSIRO)

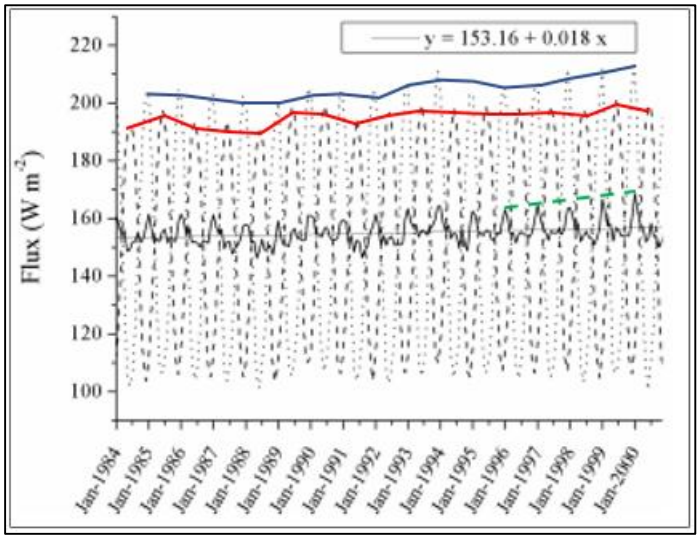
The correlation between CFCs and temperature has been noted numerous times, but only in the context of their capacity to act as Greenhouse gases. The mechanism proposed here is a sequence of reactions and physical processes.

Ozone is generated by high-intensity UV radiation splitting oxygen molecules in the thermosphere (approx. 80 km altitude). The oxygen recombines as ozone and falls towards earth. Chlorofluorocarbons (CFCs) deplete ozone by breaking molecules down with Chlorine; this is most marked in the southern hemisphere stratosphere. Ozone depletion started in the southern hemisphere in the 1950s and increased until the 1990s.



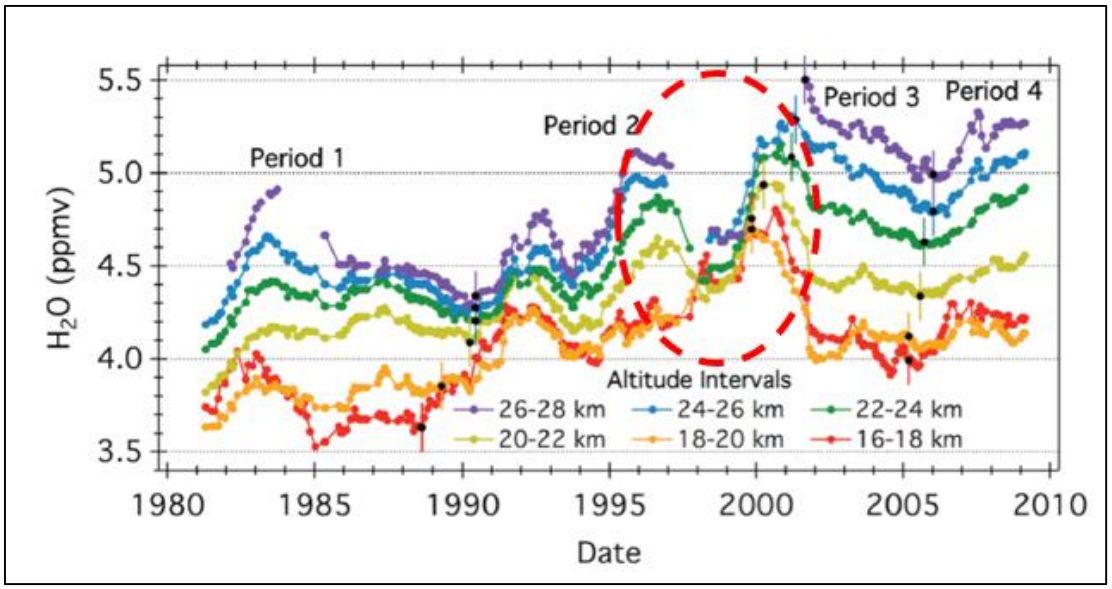
Ozone column in southern hemisphere (Checa-Garcia et.al, 2018)

The reduction in ozone is reflected in an increase of shortwave radiation at the surface.



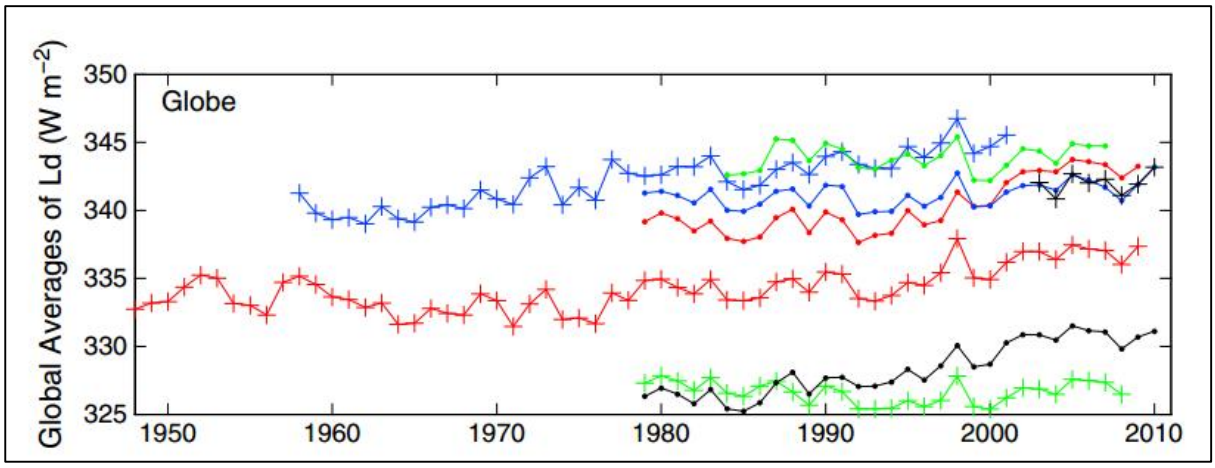
Time series of monthly average net downwards shortwave radiation at earth's surface 1984-2000. Blue line=southern hemisphere maxima, red = northern hemisphere. Hatzianastassiou et al 2005

The increased UV leads to increased evaporation, reflected in water vapour concentrations. The plot below shows data above Colorado, with water vapour increasing over time, but a significant decrease in the period 1997-2002. Depletion of ozone allows more UV to reach the surface and in turn results in more evaporation; evaporation increases water vapour content, which absorbs more UV radiation and condenses.

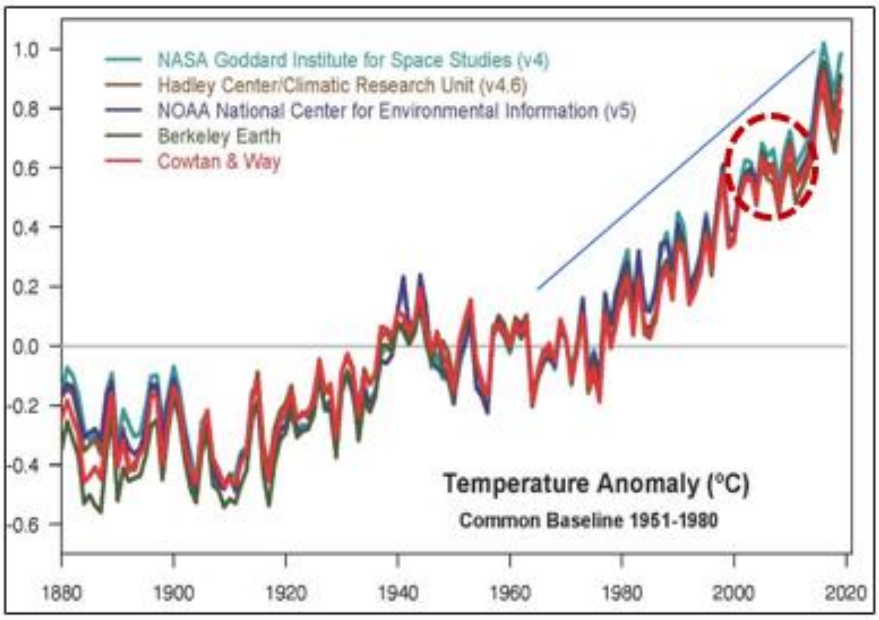


Stratospheric water vapour trends over Colorado (Hurst et.al, 2011)

This in turn leads to increasing downward longwave radiation (plot below).



Global Averages of downward longwave radiation compiled from different sources (Wang and Dickinson, 2013)

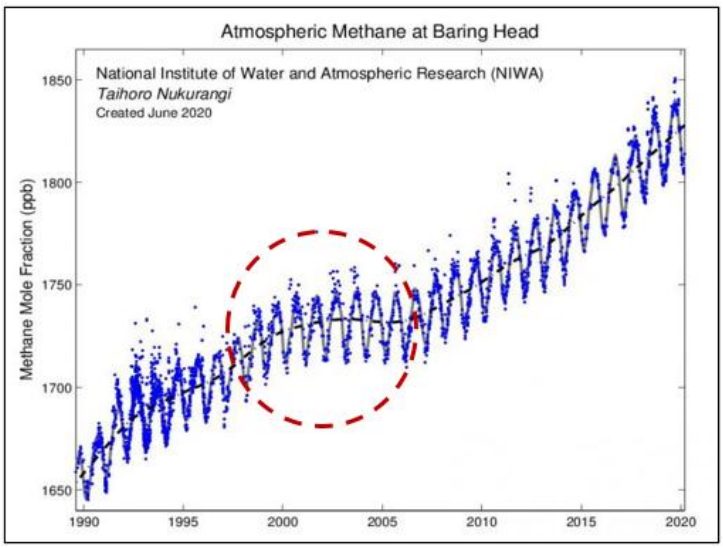


Global Temperature Anomalies (NASA)

The current trend of increasing temperatures started in the 1950s and continues to the present day at a rate of around 0.12 ^{o}C per decade, except for the period 1998 – 2012 (widely referred to as the **Temperature Hiatus**) when it slowed to 0.05^{o} C per decade.

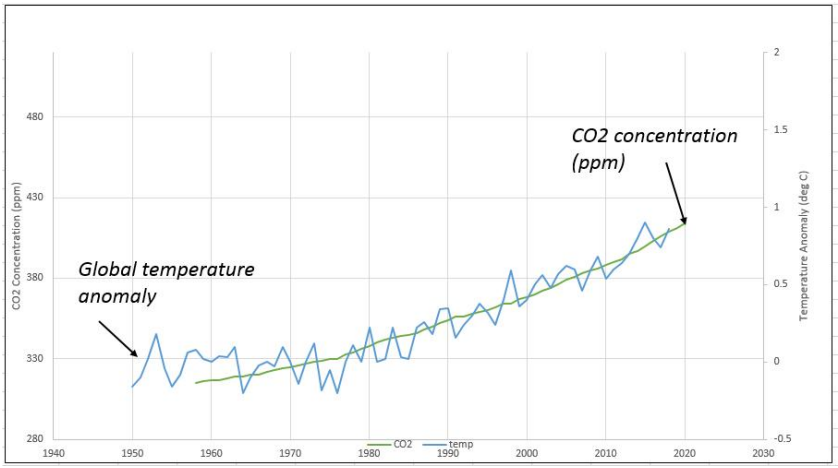
Methane is more complex. Methane can be generated from biogenic sources, and increases therefore follow periods of warming temperatures. Ozone reacts with methane rising from the surface to generate water and CO2. As ozone concentrations decline, more methane survives in the troposphere; hence increasing methane levels have little to do with increased emissions from

human activities. The pause in temperature increase is evident as a plateau in methane concentrations.



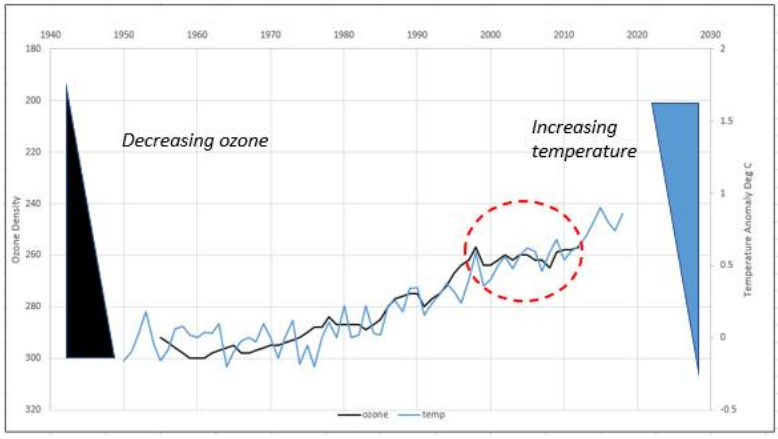
Methane concentrations, Baring Head, N.Z. (NIWA)

The fundamental premise of current Climate Science is an apparent correlation between atmospheric CO_2 concentrations and temperature (below). This visual correlation is of course entirley dependent on the scales used to plot these data and the CO_2 trend shows none of the short term variation evident in the temperature data.



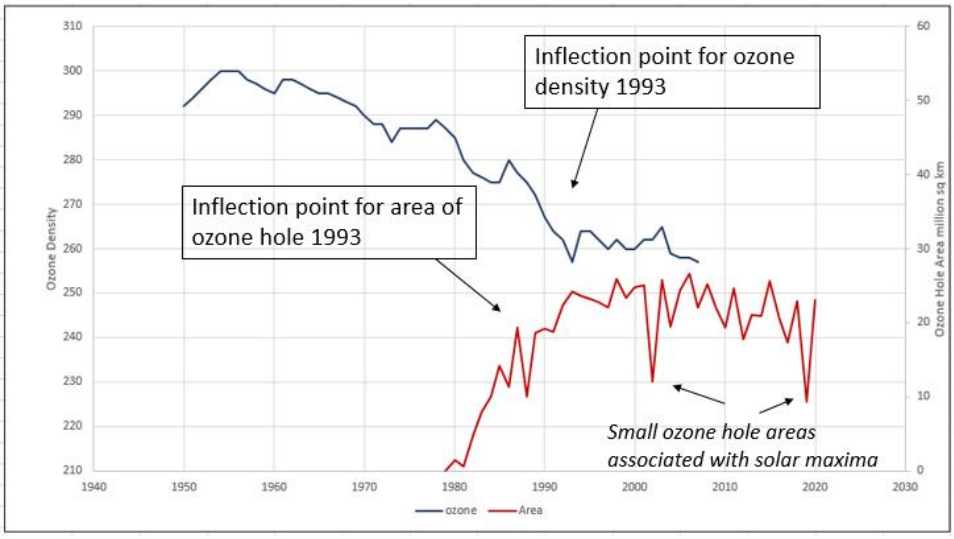
Plot of atmospheric carbon dioxide levels and the Global Temperature Anomaly

The correlation of temperature with ozone concentration (with a 5 year time lag) is a better fit.

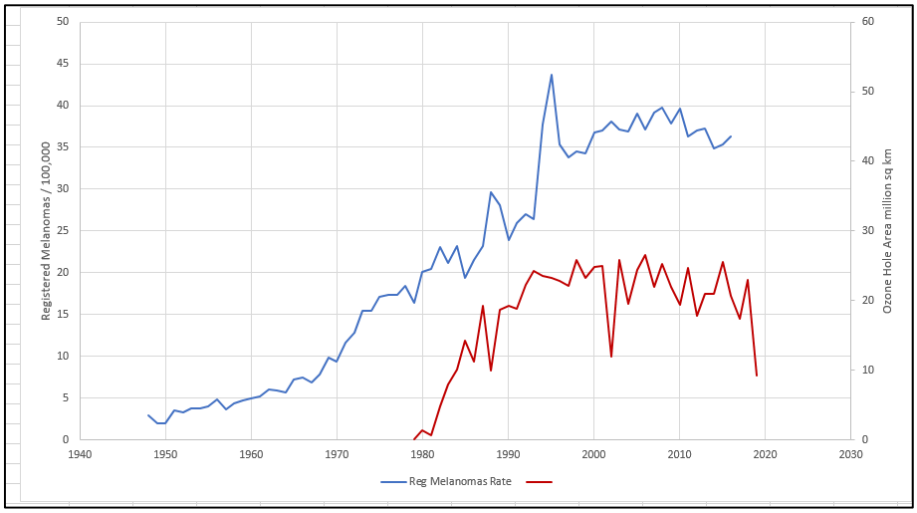


Plot of Global Temperature Anomaly and Ozone concentration (with a lag of 5 years)

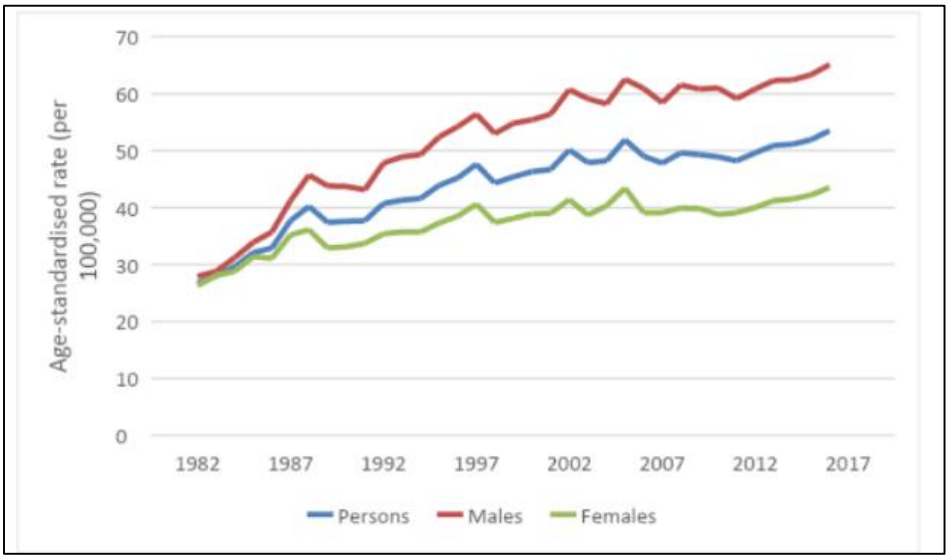
CFC production decreased by 57% between 1990 and 1999. Ozone depletion stabilised from 1993 (a lag of 3 years). The rate of temperature increase decreased by 58% between 1998 (a further lag of 5 years) and 2012. CO_2 concentrations increased steadily by 4% during both of these periods.
It is not Greenhouse gases that are to blame for rising temperatures and falling ocean alkalinity.
Ozone depletion is the cause of accelerated temperature increase since the 1950s. The Greenhouse Effect is slight, and carbon dioxide produced from combustion of fossil fuels is not responsible for current trends in climate. We know ozone depletion can be repaired and this is urgent – the southern hemisphere Ozone hole is healing very slowly and is still as large as it was in the 1980s and 1990s (23 million sq km in 2020, 19.3 million sq km in 1987).



Southern hemisphere ozone density (blue) and ozone hole area (red)



New Zealand melanoma rate (blue) and ozone hole area (red)



Australia melanoma rates (Aus Govt)

Technical Conclusions

- Climate change is real and continuous. The earth is a dynamic system and constantly readjusting and re-equilibrating. Climate has never been, and will never be, static and stable.

- Climate is the result of interactions between hundreds, if not thousands, of factors and processes, many of which are still poorly understood (e.g. the frequency and scale of volcanism and associated emissions of carbon dioxide or the scale of emissions of carbon dioxide and methane from sedimentary basins).

- Almost half of the warmth in the atmosphere is provided by the earth. The remainder comes from the sun. Temperature profiles in the troposphere are extensions of the subsurface temperature profile.

- The atmospheric concentrations of the so-called Greenhouse Gases (water, carbon dioxide and methane) have increased over the last 100 years and human activity is demonstrably a major cause.

- Temperatures in some areas have consistently increased since the 1950s; others have remained stable or decreased – while there is an anthropogenic component to climate change this is not global warming.

- The Greenhouse Model was developed in the 1850's. it is only recently that technology has provided the capability to measure the components of earth's energy budget. These measurements show several of the assumptions associated with the model to be wrong.

- The main driver for temperature increases has been an increase in the high-intensity shortwave solar radiation reaching the troposphere and striking earth's surface. This is due to depletion of ozone as a result of emissions of chlorofluorocarbons (CFCs). The effects of this are widely known – the ozone hole and the high melanoma rates in Australia and New Zealand. This shortwave radiation is then transformed into downgoing longwave radiation through evaporation etc, increasing the net radiative flux. The ozone layer was not discovered until 1913, after the Greenhouse Model had been adopted by climate scientists.

- The impact of increased shortwave radiation on water vapour is an order of magnitude more significant than the impact of increased carbon dioxide concentrations – and these have both been measured.

- The increased concentration of carbon dioxide and methane in the atmosphere have an inconsequential effect on temperatures. **Fossil fuels are not the cause of climate change**.

- A decarbonisation strategy is misdirected, futile, and potentially ruinous to western economies.

Renewables

This submission is pro- fossil fuels but not anti-renewables. Each source of energy has benefits, costs and risks. The emotive language used by the Commission detracts from an objective assessment of the options. Natural gas is not dirty energy; combustion produces water plus CO_2 and, contrary to claims based on the Greenhouse Model, CO_2 is not a pollutant. So-called Clean Energy options have their own drawbacks – primarily the lack of reliability for power generation, the area of land required for solar, the land or seabed required for windfarms, the danger to seabird populations of offshore turbines, the intermittent but incessant low frequency sound generated by turbines etc etc

Kauri's fundamental issue is that New Zealand has a world class resource in natural gas that could be transformational for the NZ economy. We cannot export sunshine and wind.

Economic Impact

The economic analysis completed by the Commission looks only at the tangible costs of a transition to a zero-carbon economy – electric vehicles, renewable generation, a lighter agricultural footprint etc, and concludes this can be achieved for 1% of GDP. While this seems highly optimistic given the experience of countries that have attempted this transition, the message remains the same – a decarbonisation strategy will have no noticeable impact on climate, will in fact create numerous problems, and will weaken the NZ economy. Kauri Oil & Gas has spent the last ten years reviewing the Petroleum Systems of Taranaki and has strong evidence that the oil and gas potential of the basin (and other New Zealand Basins) has been grossly underestimated due to a combination of geological factors and the drilling technologies applied. The economic opportunity associated with this resource is comparable to Norway where oil & gas has added $2.5 trillion to GDP; their Sovereign Fund (built on oil & gas revenues) is now worth $1 trillion dollars. This enables Norway to have one of the highest standards of living in the world.

This is the true cost to New Zealand - the loss of a high-value industry that could fund all the social programmes that are currently only aspirational objectives.

Norway has to date discovered 80 Billion Boe (Barrels of oil equivalent) of oil and gas. Kauri Oil & Gas strongly believes New Zealand has comparable or larger reserves. These present an opportunity not only to accelerate the post-covid economic recovery, but to transform New Zealand's economy and delliver all the subsequent benefits.

An expanded oil & gas sector in New Zealand would result in:

- The elimination of child poverty
- Minimal unemployment
- World class health care, with adequate funding to provide critical services such as dental, mental health
- World class education facilities and opportunities;
- Provision of housing for all New Zealanders;
- Funding for DoC's programmes, such as the $100 m project to make the Auckland Islands predator-free:
- No material change to climate

Specifically, Kauri Oil and Gas has identified low-risk opportunities in both Canterbury and Taranaki Basins that would provide more than enough reserves to kickstart LNG exports from both basins.

The following metrics are based on Wheatstone Project in Australia:

LNG export industry in Taranaki and one in Canterbury, each of which would deliver:

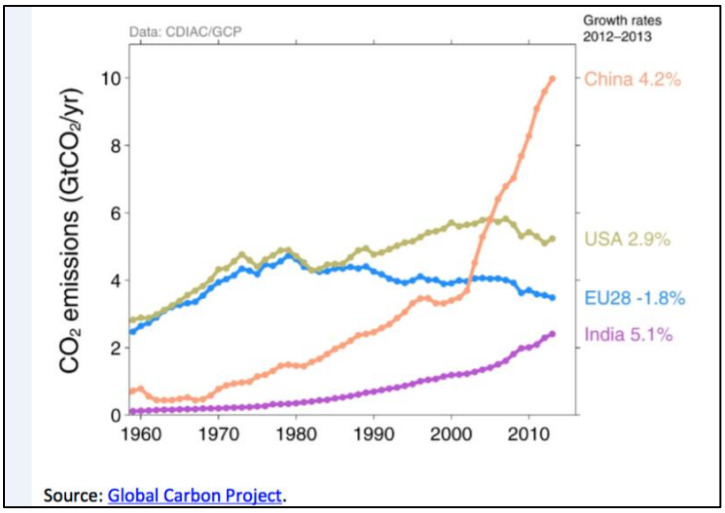
- 7,000 jobs during construction, 30,000 jobs over project lifetime;
- $100 Billion in Crown revenues (royalties, taxes) over 30 years
- Increase in GDPof $360 Billion over 30 years
- $40 Billion added to regional economies

This is the choice confronting the Commission and the government – pursuing a virtue-signalling path that will have no effect on climate change but will handicap future generations in terms of wealth, health, education and opportunities for employment and home ownership, or actually following the science and delivering prosperity.

Conclusions

The Greenhouse model was proposed in the 1850s and has been retained, virtually unchanged, despite a growing body of direct evidence showing it to be unrealistic. The Montreal Protocol was adopted in 1987, and the IPCC was established in 1988, with Greenhouse gases already (mistakenly) identified as the problem. Huge volumes of data have been acquired since the IPCC was established. The IPCC has completed 5 Assessment reports, the last of which was completed in 2013-2014 and provided the scientific input for the Paris Accord in 2018. The key data are the direct measurements of Feldman et al 2015, which confirm emissions from carbon dioxide are inconsequential and proportional to the volume in the atmosphere. Even these could be minimised simply by chilling exhausts.

Decarbonisation will not fix the problem. This seems self-evident but apparently not. If you accept climate change, if you accept temperatures are increasing and think we should slow or reverse this trend, then we need to identify the problem correctly. There is no evidence that increased concentrations of carbon dioxide in the atmosphere causes harm, but direct evidence that it is beneficial. Decarbonisation will have no effect on climate but the cost is crippling. Recently the Minister for Climate Change stated New Zealand should emulate China in setting aggressive goals to reduce emissions. As the chart below shows, despite the rhetoric China has no intent to reach net zero emissions and is on a path of industrial expansion. There is no reason to expect they will not ignore the Paris Accord as they have the Montreal Protocol.



CO2 emissions by country showing China's industrial expansion

The future is not bleak and children need to be reassured. We have allowed climate scientists to travel around the country fearmongering in schools and bullying councils (and now our government) into declaring emergencies. Climate change resources provided to schools include statements such as '*there is no alternative explanation that does not involve rising* CO_2*"*. This is simply false. It is not science, it is propaganda.

The proposed solution is likely to have unintended consequences that are worse than the perceived problem. China plans to build a weather modification system by 2025 to actually try and control weather – where and when rain falls, restricting the extent of snow etc. The west has its own wealthy elite prepared to start geo-engineering projects to interfere with the atmosphere when we demonstrably do not yet understand how the system works.

The costs of decarbonisation are huge and are not transparent. On top of the costs of achieving 100% renewable electricity generation, replacing the vehicle fleet, additional taxes on individuals and businesses based on supposed climate impact, there are huge international commitments being made. The gap between New Zealand emissions and commitments is likely to be around 20 million tonnes/year and will be closed by purchasing carbon credits. These are expected to be around $170/tonne, so over the next 10 years New Zealand will be liable for in excess of $34 billion. On top of COVID-19 debt this is building a debt that will cripple the next two generations at least. If it is difficult for first home buyers to get a house now, it will be simply impossible in future.

New Zealand is a trading nation. We need to sell goods or services that people beyond our borders want – natural gas, tourism (including movies), agricultural products, IT (games, software etc). Spending vast amounts of money rebuilding our domestic energy supply systems and infrastructure may create jobs and allow us some pious posturing, but it is diverting funds from real problems – housing, health, education, child poverty. Current policies are preventing us from deriving the economic benefit associated with hydrocarbons. There is an emerging market for LNG on the east coast of Australia and a discovery offshore Taranaki or Canterbury will take several years to develop.

Recommendations / Actions

My position can be easily checked but I do not have access to all the data. I expect NIWA and GNS can access these datasets , so suggest you request the following data, either for a New Zealand location (Lauder) and/or global average:

1. Downgoing surface shortwave radiation over the last 30 years (1990-2020)

2. Downgoing surface longwave radiation over the last 30 years

3. Outgoing shortwave radiation for the last 30 years;

4. Radiative forcing by CO_2 2000 – 2020 (extension of Feldman 2015)

If these data confirm incoming shortwave radiation is exceeding downward long wave radiation over the CO_2 absorption frequency range, then there is no debate to be had and the decarbonisation strategy must be revisited.

MBIE is currently managing the abandonment of the Tui Field, which includes plugging and abandoning wells. Estimated budget for this exercise is $155 million, to be paid by the taxpayer. In Kauri's evaluation, these wells could be recompleted over different zones and perform as appraisal wells for the larger Tui field. To test the concept prior to the abandonment programme would incur minimal costs – the equipment is being mobilised for abandonment operations and the costs could be recovered in the successful scenario. If successful, the field could either be sold in competitive tender, or a state oil company could be re-established to develop and produce the field.

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