Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

Some observations from the Parliamentary Commissioner for the Environment

New Zealand Agricultural Climate Change Conference

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I'd like to use this opportunity to underline the scale of the challenge livestock farming faces if we are to tackle its contribution to climate change seriously.

[Slide 2] New Zealand's agricultural sector only exists because of mass deforestation. Forest clearance released around 18 billion tonnes of carbon dioxide, roughly ten times the amount we have ever emitted from burning fossil fuels. Because of carbon dioxide's very long atmospheric lifetime that forest clearance is still having a significant warming effect today.

Sometime in the middle of the twentieth century, slowing rates of deforestation and increased rates of new forest planting meant our forests switched from being a net source to a net sink of carbon dioxide. Since then, forest planting – much of it commercial pine plantations – has sequestered roughly 1.4 billion tonnes of carbon dioxide. As a result, this source of warming is now gradually declining.

[Slide 3] By comparison, the warming contributions from fossil carbon dioxide, nitrous oxide and livestock methane emissions have been much smaller. Excluding the legacy warming effect from historic deforestation, methane from livestock currently accounts for roughly 55% of New Zealand's contribution to warming; nitrous oxide accounts for 14%, and fossil carbon dioxide accounts for the remaining 31%. These numbers are based on what you get if you put New Zealand's emissions – in tonnes of each gas – into a climate model called MAGIC-C. They are not based on the much-maligned GWP_{100} or any other type of emissions metric.

[Slide 4] Let's take a closer look at methane emissions from livestock. They rose steeply during the 1950s and 1960s on the back of increases in sheep and beef cattle numbers. Since the early 1990s, methane emissions from dairy cattle have risen while emissions from sheep have declined. The overall result is that total livestock methane emissions have been roughly stable over the last two decades.

However, while total livestock emissions have been more or less constant over the past two decades, the warming caused by these emissions is still increasing. This is due to inertia in the transfer of heat between different parts of the Earth system, as well as climate–carbon cycle feedbacks which continue to have a small warming effect even after the methane itself has left the atmosphere.

Parliament has legislated targets to reduce biogenic methane emissions by 10% by 2030 and 24–47% by 2050 relative to the 2017 level; and to reduce all other gases to net zero by 2050. What do these targets mean in terms of warming?

[Slide 5] The solid red area shows the warming from carbon dioxide that is more or less locked in from emissions to date. The hatched red area shows the warming from future carbon dioxide emissions that are yet to occur. The warming from carbon dioxide will continue to rise until emissions reach zero, at which point the warming will plateau. The Climate Change Response Act 2002 does not set any targets for gross carbon dioxide emissions, so here we assume that they track He Pou a Rangi – Climate Change Commission's demonstration path, with further reductions beyond 2050.

[Slide 6] Here is the equivalent warming pathway for nitrous oxide.

[Slide 7] By contrast, most of the warming from methane emissions to date will be gone within a few decades because methane doesn't hang around. This means that we have the option to significantly turn down the warming from methane within our lifetimes by reducing methane emissions – if we choose to. It's important to focus on warming because that's what we're trying to mitigate.

[Slide 8] Reducing methane emissions 12% by 2050 generates a warming track like this.

[Slide 9] Meeting the low end of the legislated target of 24% by 2050 looks like this. It is similar to what a pathway designed to achieve 'no additional warming' above the current level would look like.

[Slide 10] And reaching the upper end of the range – 47% – looks like this.

I am aware that there are those who argue that all we need to do is show that we're not causing any more warming than we already are. That reducing emissions just enough to get a nice flat line will do the trick. It won't.

Under the Paris Agreement, New Zealand has an international obligation to do as much as it can to keep the 1.5 °C global goal within reach. It is not a credible negotiating position to say that our largest contribution to warming is off limits when we have the option to reduce it. Neither, by the way, is it credible to say that global mitigation has failed so we may as well just get on with adapting. A 3–4 °C warmer world won't be a very happy place for agriculture. As a little country we need to argue hard for international action and we have no credibility if we seek a leave pass for our largest contributor.

Neither should we be tempted by the argument that since we're a little country it doesn't make sense for us to develop the technologies needed to solve the world's problems and that we should instead be a fast follower. That might be true of concrete or steel but when it comes to agricultural emissions, who are we waiting to follow? We have more skin in this game than others. We have serious research capacity. We have long congratulated ourselves on our productivity and resourcefulness. The logic all leads to the conclusion that we have to tackle this problem head on.

And there is pure self interest in this. We have an interest in continuing to sell products to high-income markets where consumers are taking an increasing interest in the emissions footprint of their food and drink. Being able to show that New Zealand products are associated with the lowest possible emissions will be essential if we are to continue to be a preferred supplier.

For all these reasons I agree with the Climate Change Commission and the Government that having targets to reduce warming from methane to below the current level is justified. How far below the current level is a matter for the Government to decide, based on advice from the Climate Change Commission. I would simply observe that the current target of a 24–47% reduction by 2050 is so wide a range that the scale of transformation expected from the primary

sector is very unclear. If the 2050 methane target is updated, I would encourage the Government to a choose a narrower target range.

To meet any target we need to build a solid consensus about how best we can make progress. Reductions in emissions from livestock can be achieved through a combination of two strategies:

- Reducing livestock numbers, through lower stocking rates per hectare and land use change.
- Reducing emissions per animal, through changes in management practices and the uptake of new on-farm mitigation technologies as they become available.

Even in the absence of a price on biological emissions, we are seeing land use change driven by an insatiable demand for carbon offsets as the New Zealand Emissions Trading Scheme (NZ ETS) price rises. As many of you know, I have expressed grave doubts about our reliance on forestry offsets as a way of meeting emissions targets for fossil carbon dioxide. We should wean ourselves off this option.

On the other hand, I have suggested that using whatever forestry stock we generate to offset the warming caused by our agricultural emissions might be more justifiable. The number of trees needed to offset the warming from a given herd of animals is set out in a paper I commissioned from Professor Dave Frame and Dr Nathanael Melia.[1] It is not small, and it could only be a part of a solution. I'll come back to that point but for now let me focus on the second approach: reducing emissions per animal.

In the dairy sector, changing management practices can deliver moderate reductions in emissions – perhaps of the order of 10%. Examples include keeping livestock off pasture at sensitive times, once-a-day milking, improved effluent management, low-nitrogen feeds and reducing nitrogen fertiliser use. The practicality and impact on profitability of these practices varies from farm to farm. Fewer options are currently available for changing management practices on sheep and beef farms. Whatever the case – and there are people in this audience much better placed to judge the fine detail of what's possible – the existing possibilities will not get us to a 24% reduction in methane emissions by 2050, let alone a 47% reduction.

Fortunately, promising new mitigation technologies are in the pipeline. These include methane and nitrification inhibitors, breeding low-emission sheep and cattle, low-emission feeds and feed additives, and of course, the Holy Grail, a methane vaccine. These mitigation technologies are all at different stages of development and each has its own particular set of challenges and barriers to overcome before it can be widely implemented in a New Zealand context. I look forward to hearing more about the current status of some of these technologies later today. But it is clear that without accelerated progress on some of these technical fixes, the only way we will meet our 2050 methane target will be through very large reductions in stocking rates. The work being undertaken by our science and research organisations on reducing agricultural emissions is therefore a critical component of New Zealand's climate change policy. We must get this right.

[1] Frame and Melia, 2022. Offsetting livestock methane with trees
See https://pce.parliament.nz/publications/how-much-forestry-would-be-needed-to-offset-warming-from-agricultural-methane/

[Slide 11] In 2003 the Government began to invest money in reducing agricultural emissions through the Pastoral Greenhouse Gas Research Consortium (PGgRc). The consortium invested around $5 million per year from 2003 to 2021, with funding from the Ministry of Business, Innovation and Employment matched by industry.[2]

Then in 2009 the New Zealand Agricultural Greenhouse Gas Research Centre was established. It received around $5 million per year from the Ministry for Primary Industries over the following decade.

Then there was the Global Research Alliance on Agricultural Greenhouse Gases, also established in 2009. It focuses on international collaboration and received funding of around $65 million over the following decade.

Finally, the Ministry for Primary Industries' Sustainable Land Management and Climate Change (SLMACC) programme invested around $2.5 million per year into research on mitigation of biological emissions between 2007 and 2019.

All told, in the decade between 2009 and 2018, the Government spent roughly $20 million per year on research into the emissions of a sector that in 2019 alone generated $24 billion in export earnings – scarcely a level of investment commensurate with the value at risk and the urgency of finding a way forward. In saying that I level no criticisms at those who battled away with the resources they had.

[Slide 12] Budget 2022 saw a step change. The Government announced an additional $340 million over four years to accelerate the development of greenhouse gas mitigations in the agriculture sector, with industry committing to spend at least $35 million per year by 2025. It's worth noting that since this initiative is funded from the Climate Emergency Response Fund, it is effectively being paid for by the fossil fuel emitting sector of the economy.

I'd like to congratulate the minister and those who managed to successfully steer this initiative through the gauntlet of the annual budget process. It is well overdue. What a pity that we didn't take the challenge more seriously two decades ago when the PGgRc was set up. Two decades on we are awaiting a science and mātauranga plan from the Biological Emissions Reduction Science Accelerator – BERSA – which has itself been two years in the making.

The scale of the additional funding creates overnight a new risk. Can the system absorb the resources? And can we sustain that effort long enough to generate results. Research can't be turned on and off overnight, so the governance arrangements really matter. As I understand it, we are going to have a Centre for Climate Action on Agricultural Emissions to oversee the implementation of the BERSA's plan and the work of both a public–private partnership (or Joint Venture) and the New Zealand Agricultural Greenhouse Gas Research Centre with its focus on more fundamental public good research.[3]

International collaboration will also be important. The Global Research Alliance has played a valuable role since it was set up in 2009. An international team of researchers led by Tim Searchinger at Princeton University has identified several specific areas in which international

[2] Since 2021, a subset of PGgRc members have continued to work on methane vaccines and inhibitors under the aegis of the Ruminant Greenhouse Gas Partnership (RGP).

[3] The Joint Venture is a public private partnership between the Government and ANZCO Foods, Fonterra, Rabobank, Ravensdown, Silver Fern Farms and Synlait.

collaboration could usefully be expanded, such as setting up a coordinated multi-year evaluation of promising methane inhibitors in 20 to 30 countries.[4]

However we arrange things, we must avoid a convoluted labyrinth of governance arrangements crippled by risk aversion and the temptation to second guess those most familiar with the field. During his visit to New Zealand last year, Professor Frank Convery from University College Dublin suggested to me that valuable lessons could be learned from the United Kingdom's highly successful programme to develop Covid-19 vaccines. In 2020, the UK Government appointed a venture capitalist called Kate Bingham to head the UK's new Covid-19 vaccine taskforce. Bingham put together a steering group of nine people, mainly from the private sector. She later said that one of the factors behind the success of the programme was that they resisted the temptation to penny-pinch. She also suggested that government ministries are often far too risk averse and can learn from a venture capitalist mindset, where a proportion of failures is acceptable.[5]

Clearly, developing a Covid-19 vaccine is not the same thing as developing a methane vaccine. But I agree with Professor Convery that the UK experience is worth reflecting on as the New Zealand Government decides how it is going to empower its new centre and galvanise sustained focus on its central mission, which is to see management changes and on-farm mitigation technologies deployed at scale within a reasonable time frame.

The Government's commitment to help fund solutions represents a significant subsidy – one that I consider justified. Assuming that these research investments succeed in opening up new mitigation opportunities, the next task is to have them adopted. This brings us to the thorny issue of carrots and sticks. The Government's pricing mechanism proposes both emissions levies and incentive payments. You heard Dr Rod Carr describe it less kindly at this conference yesterday as "a tax-like mechanism to fund a bureaucratic overhead to give some of it back as good behaviour grants".

Putting a price on agricultural emissions should be designed to incentivise the uptake of less emissions-intensive management practices. That's how environmental taxes are supposed to work. In setting the level of any levy, regard has to be had to the availability of mitigation options. There is little point in using economic tools to incentivise behaviour change if there are no ways to change behaviour. Equally, if new mitigation options arise, levies should rise to expedite their uptake. If you don't like levies, then the alternative is regulation – the mandated uptake of technologies and management practices. I know which I would prefer.

There is of course also the option of land use change. In some cases, this will be the best thing for the land and the climate. It may also be a way to meet our targets at lower cost. Let's assume that within a decade we have a suite of tools we can deploy that can get us somewhere in the 24–47% range for livestock methane. We could then add to whatever progress we have made by tree planting. That was the idea I wanted to test in the note I mentioned earlier. To my mind it would be preferable for the pastoral sector to be planting trees where that makes sense rather than witnessing wholesale land use change driven by fossil fuel emitters who have no long term stake in that land. But, and I must emphasise this *but*, tree planting could only ever be a part of

[4] Searchinger et al., 2021. Opportunities to Reduce Methane Emissions from Global Agriculture. See https://searchinger.princeton.edu/document/46 [accessed 23 February 2023].

[5] Cookson, 2021. UK vaccine supremo Kate Bingham: 'The bickering needs to stop'. Financial Times, 3 April 2021. See https://www.ft.com/content/8d9edc58-7922-496a-942f-5360bfe84876 [accessed 26 February 2023].

the solution because offsetting all of the warming from livestock would require an unrealistically large area of forest.

I would like to end with an observation on the coherence of different areas of government policy. Agriculture's exemption from emissions pricing since 2008 is not the only example of the Government, in effect, subsidising activities that emit greenhouse gases.

The Government's overly generous free allocation regime for emissions-intensive, trade-exposed industries in the NZ ETS provides another example. I welcome news that the Government is finally introducing changes to pare back those overly generous allocations.

Less welcome was the Government's decision in March 2022 to cut the fuel excise duty by 25 cents per litre. The excise duty cut was initially triggered when average petrol prices rose to above $3 per litre. But by the time it was extended a third time, in December 2022, average petrol prices outside of Auckland had already fallen to under $2.40 per litre. The cut in the excise will have cost around $1.4 billion by the end of March this year. Not only is this a poor, untargeted policy that flies in the face of New Zealand's stated climate change ambitions. It is one for which we will have nothing to show when it comes to an end.

Having something to show for the money that is spent has to be a bottom line. Getting on top of our climate change response will be difficult and expensive enough without this sort of poorly targeted expenditure. While transitions should be 'just' we can't afford to compensate everybody. Whether it is low-income households or farming enterprises that face a challenge, we need to spend scarce resources wisely.

I think the Government's commitment to working with the private sector to unlock some practical on-farm answers *is* a wise use of resources. It needs to be sustained long enough to know if there are additional solutions out there. Four years is unlikely to be enough. And we need to quantify the benefits in terms of reduced warming. I am planning to monitor this all very closely.