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

A note on New Zealand's methane emissions from livestock

What is this report about?

This note explains the contribution that continued emissions of methane from New Zealand's ruminant livestock (mostly cows and sheep) at their current rate would make to global warming.

The note is based on modelling work carried out by Dr Andy Reisinger of the New Zealand Agricultural Greenhouse Gas Research Centre. The work was reviewed by international experts.

Why did the Commissioner undertake this work?

The aim of this work is to inform discussions over how methane should be treated under the Zero Carbon Bill. The modelling informs discussions by grounding them in the underlying science.

What were the main findings of the modelling?

Although methane is a short-lived greenhouse gas, once emitted into the atmosphere it causes a lingering warming effect long after the methane itself has gone.

If emissions from New Zealand's livestock were held at current levels, warming caused by those emissions would increase for centuries (although at a gradually declining rate). While methane emissions from New Zealand's livestock may be short-lived in the atmosphere, they are by no means benign.

If the country's desired climate change goal for livestock methane emissions was no additional contribution to warming, then these would need to reduce by some 20% by 2050.

Modelling alone cannot determine how methane should be treated when setting the country's climate change targets. That is a policy matter. The objective of no additional contribution to warming beyond current levels is only one possibility.

Is the Commissioner endorsing a specific target for methane emissions from livestock?

The Commissioner is not endorsing a specific target level for methane from livestock. The note instead examines methane from livestock and its contribution to warming, so that the wider policy discussions are grounded in the underlying science.

This note does not look at whether there should be separate targets for methane and other greenhouse gas emissions. Instead it looks at what science tells us about the impact of methane on further warming. The Commissioner will issue a more detailed report on biological emissions and forest sinks later this year.

What are the differences between the different greenhouse gases?

The three main greenhouse gases are carbon dioxide, methane and nitrous oxide. Carbon dioxide and nitrous oxide are considered long-lived gases because when emitted, significant amounts remain in the atmosphere for centuries. Methane is a relatively short-lived gas and most breaks down within a few decades.

Most of the warming caused by methane emissions occurs during the first few decades, though some warming lingers for centuries after the emissions themselves have disappeared. One tonne of biological methane traps approximately 33 times more heat than a tonne of carbon dioxide over a 100-year period. However, carbon dioxide causes sustained warming for thousands of years.

Does the modelling provide policy guidance for the trajectory that methane emissions from livestock should take between now and 2050?

No. Modelling results cannot answer policy questions about the treatment of methane in target setting or policy implementation.

The intention of the second question modelled was to estimate a trajectory for livestock methane that would generate no additional contribution to warming at any point from here on.

The 'more global action' trajectory (based on RCP 2.6) is particularly stringent, and may not be a realistic one because it would require deep reductions in the immediate future. A more gradual trajectory would lead to some additional warming in the near term requiring deeper emissions reductions later.

Would continued historical efficiency gains be enough to achieve no additional contribution to warming from livestock methane?

Through breeding more efficient animals and improvements in farm management, the emissions intensity of New Zealand agricultural production has improved about one per cent per year over the last few decades.

If production were held constant, and efficiency gains of one per cent per year continued, total emissions of methane from livestock would reduce. We did not model this scenario but the impact would be likely to cause additional warming for many years to come. This is, in part, the legacy of past emissions.