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

Climate change and agriculture:

Understanding the biological greenhouse gases

Frequently Asked Questions

What is this report about?

This report is about the biological greenhouse gases from agriculture – methane and nitrous oxide. Together, these gases form about half of New Zealand's greenhouse gas emissions. This high proportion presents a major challenge in our bid to fight climate change. The Commissioner has examined the complex science of the biological gases.

Why did the Commissioner decide to undertake this investigation?

Climate change is the biggest issue the world faces. The world has committed to reducing emissions and limiting global warming. Here in New Zealand, we need to work out how we will play our part. The Commissioner has produced this report to provide a common understanding of the science of biological greenhouse gases as a basis for moving forward together.

What are the report's main findings?

The science of the biological gases is complex, and reducing them will not be easy. The Commissioner has found that, while there are no silver bullets, there are things we can be doing. Immediate opportunities for reducing New Zealand's emissions lie in forestry and farm management. In the long term the way in which food is grown, and the types of food grown, will have to change if methane and nitrous oxide are to be significantly reduced.

What are the biological gases?

The biological gases from agriculture are methane and nitrous oxide.

- Most of the methane is emitted when sheep and cattle burp.
- Most of the nitrous oxide is emitted when animal urine interacts with microbes in the soil.

Together they make up about half of New Zealand's annual greenhouse gas emissions.

Is there anything farmers can do now?

There are a number of things farmers can be doing now, including changes to feeds, fertiliser application, stocking rates, and the stock mix. Planting trees can also make a big difference.

Are there any promising areas of research?

A methane vaccine would be extremely useful, and could be easily integrated into current farming practice – but it does not yet exist. The Commissioner believes such a vaccine would be so valuable that the research aimed at developing it should be ramped up as much as possible.

So what will all this research deliver in terms of reducing greenhouse gases?

Some mitigation options being studied may eventually be used to reduce greenhouse gases, but others may not. Some may be effective in reducing the gases from an animal in the laboratory, but not fit well into farming systems and make little national impact. Some may have the potential to make a significant national impact, but would take many decades to do so.

For instance, a methane vaccine could reduce methane emissions by 20% or more, but the research is in a very early stage, and there is no guarantee that it will ever be successfully developed. In contrast, requiring that urease inhibitors be added to all nitrogen fertiliser could reduce nitrous oxide emissions by 3%, and could be done very soon.

What role can trees play in reducing emissions?

A million more hectares of trees would make a significant difference to New Zealand's emissions. Establishing forests has the added benefit of reducing erosion, and improving water quality. Planting trees can buy us time, but we must keep looking for other ways to reduce emissions.

Why must NZ take action on biological emissions?

Last year in Paris, global leaders agreed that the world must essentially stop emitting greenhouse gases this century. If we are to succeed, the next few decades will be crucial. The biological gases from agriculture – methane and nitrous oxide – form about half of New Zealand's greenhouse gas emissions. Reducing biological emissions from agriculture will be challenging, but there are things that can, and should be, done.

What action is the Government taking on biological emissions?

Currently, the New Zealand Government invests about $20 million each year and is playing an international role in research to reduce biological methane. Industry groups, including Fonterra, Dairy NZ, Beef and Lamb, Deer Research, and the Fertiliser Association, are also supporting much of this scientific work. The Government has recently established a new reference group to look at what can be done about the biological gases from agriculture, and another reference group to look at the role that forestry can play.

How much does methane matter?

Globally, carbon dioxide is the main driver of climate change, and it is accumulating in the atmosphere at an alarming rate. Methane in the atmosphere is short-lived, in contrast with nitrous oxide and carbon dioxide. Nevertheless, methane emissions are damaging. For instance, while methane molecules disappear relatively rapidly from the atmosphere, they do leave some damage behind. Most of the heat that they trap is absorbed into the ocean,contributing to sea level rise.

Should agriculture be included in the ETS?

The Commissioner has found that the ETS is not the only way forward, and that the important thing is to work together and begin to reduce the biological emissions.

What impact will this have on farmers and the agricultural sector?

Doubtless, farming in the future will be very different to what it is now, and climate change will be an increasingly major influence. But New Zealand farmers have proved themselves to be nothing if not adaptable. Farmers will need research and independent advice so they can reduce emissions, while remaining profitable.

How much does each greenhouse gas contribute to New Zealand's total emissions?

- Carbon dioxide is about 45% of New Zealand's total emissions.
- Methane is about 45% of New Zealand's total emissions.
- Nitrous oxide is about 10% of New Zealand's total emissions.