



Natural Capital fact sheet 4

Getting to know and manage on-farm Greenhouse Gas (GHG) Emissions

At BNZ, we understand that natural resources such as water, soil, climate, biodiversity, and ecology, are the fundamentals of food production. We also know that New Zealand agribusinesses are highly attuned to harnessing and managing these natural resources. To help you manage and grow your farm's natural resources to the next level of efficiency and health, we've set up the BNZ agribusiness Natural Capital team, dedicated to supporting farmers on this journey.

To better understand the effects of environmental regulations on New Zealand agribusinesses, we've partnered with AgFirst Consulting to help answer some of the key questions about the current environmental topics and on-farm management. Together, we've developed a series of Natural Capital fact sheets to help support our customers as they navigate change.

Please use this resource as a quick fact check as to why these topics are important to the future of your agribusiness, and what practical steps you could take on your farm to help you stay ahead of the curve.

This fact sheet looks at managing on-farm Greenhouse Gas (GHG) emissions and offers practical steps to putting together an emissions reduction plan. It follows on from Natural Capital fact sheets 1 and 2, which outlined some of the general factors behind GHG emissions and carbon sequestration.

Why is it important for your agribusiness to take action now?

Under the Paris Agreement, New Zealand agreed to reduce its Greenhouse Gas (GHG) emissions by 30% by 2030 (based on 2005 emissions). To this end, the Zero Carbon Act was enacted in 2019. This stipulated a 10% reduction, below 2017 emissions, of biogenic methane by 2030 and a longer-term target of 24-47% reduction by 2050. The big target is a net zero emissions level of all GHGs other than biogenic methane by 2050.

Currently, the Primary Sector Climate Action Partnership (Government, Industry, and Iwi) called He Waka Eke Noa¹, is considering how agriculture will set a price for on-farm GHG emissions from January 2025 onwards. A key aspect of He Waka Eke Noa's work is to develop an on-farm accounting system, which would allow the 'point of obligation' for on-farm emissions to sit at the farmer level.

What is the point of obligation?

This refers to the point at which any GHG emissions will be accounted for. There are two key options:

1. At the processor level: this means that the processors (e.g. dairy/meat companies) would pay the tax to the Government, and recoup this from farmers via reduced pay-outs and schedules. Administratively this would be more efficient but masks the cost to farmers.
2. At the farmer level: this would involve a direct cost for each farm, relative to their net GHG emissions. Administratively, this would be more complex but offers the individual farmer a direct cost of their emissions, and therefore an incentive to mitigate these. This option is widely considered favourable to the Primary sector.

What targets will the Primary sector need to meet, and by when?

As part of the work underway through He Waka Eke Noa, they are identifying ways to ensure the Primary sector can meet the following targets:

- By 31 December 2021, 25% of farmers need to know their on-farm GHG emissions numbers and have a written plan to manage emissions.
- By 31 December 2022, 100% of farmers need to know their on-farm GHG emissions numbers.
- By 31 December 2024, 100% of farmers need to have a written plan to manage GHG emissions.

So, what options are available to manage and reduce on-farm GHG emissions?

Firstly, it's essential to understand what the key drivers of two of the key on-farm GHG emissions (methane and nitrous oxide) are and what the reduction steps could be:

- The amount of dry matter eaten by livestock. There is a direct correlation between this and methane emissions.
 - This is the biggest driver of on-farm GHG reductions. In most circumstances, a reduction in stocking rates would reduce dry matter eaten significantly and reduce GHG emissions². AgFirst modelling highlights that if stocking rates are reduced, per-animal performance must be improved in order to maintain the financial viability of the business.
- The amount of protein in the diet – excess protein is excreted via urine, some of which is converted to nitrous oxide by soil organisms.
 - One option is to explore reducing the amount of protein in your animals' diet coming from imported supplements. For example, switching from Palm Kernel (moderate protein) to maize silage (low protein) will reduce nitrous oxide emissions by a few percent.
- The amount of nitrogen fertiliser used. On pastoral farms this is largely used to grow more dry matter. Nitrogen fertiliser also has direct nitrous oxide and carbon dioxide emissions.
 - Some potential actions include: lower application rates at any one time, only applying when necessary and not applying when soil mineralisation rates are high³.

¹<https://hewakaekenoa.nz>

²<https://www.agfirst.co.nz/wp-content/uploads/2020/09/Achieving-Zero-Carbon-Act-Reduction-Targets-on-Farm-AGF.pdf>

³<https://www.dairynz.co.nz/environment/on-farm-actions/strategies-to-reduce-n-fertiliser-use>

It's also important to note the variety of research and development currently underway to support on-farm GHG emissions reductions through innovative new solutions:

- Genetics:
 - Low-methane rams should be available within 2-3 years (as of November 2021).
 - There is significant research underway within the dairy industry, with the first low-methane bulls, able to reduce methane emissions by about 10%, anticipated to be available in the next 5 years.
- A methane vaccine:
 - May reduce methane emissions by about 30%. It is hoped to be available by 2031.
- Methane inhibitor:
 - An additive which when fed directly to ruminants could reduce methane emissions by about 30%. The key challenge, given New Zealand's pasture based feed system, is in developing either long-term inhibitors and/or slow-release mechanisms.
- Nitrification inhibitor:
 - A compound, which when applied to soil can reduce nitrous oxide emissions. While some compounds have been identified, commercial availability is still some years off.

There's also the ability to offset emissions via Forestry, as a short-term solution.

It's possible for an agribusiness to use carbon sequestered from forestry to offset their on-farm emissions. It's important to familiarise yourself with what is eligible to be used as an official offset.

You can read about the current definitions and details of what counts as a Forest under the ETS, in Natural Capital fact sheet 2⁴.

He Waka Eke Noa are currently considering an expansion on what farmers could claim for sequestration. Forestry for either carbon farming or offsetting is a complex area, and expert advice on this is recommended.

How to get started within your Agribusiness: know your number, build a plan.

Know your number:

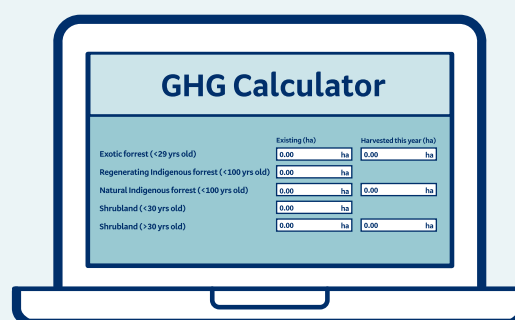
Above, we outlined that by the end of 2022, 100% of NZ farmers will need to know their on-farm GHG number. For calculating farm-level emissions, a GHG calculator is essential.

Several tools are available to calculate on-farm GHG emissions. A review of these can be found here:

- <https://hewakaekenoa.nz/wp-content/uploads/2021/05/Review-of-Models-Calculating-Farm-Level-GHG-Emissions-2-June-2021.pdf>

Of the available calculators, possibly the two best known are Overseer and Farmax. There are various other calculators also available, including:

- Within the dairy industry, many milk processing companies have opted to use Overseer to calculate their suppliers on-farm GHG emissions.
- Fonterra use their Agricultural Inventory Model (AIM) as another alternative to calculate the on-farm emissions of their supplier base.
- In addition, Beef+Lamb NZ have recently released their GHG calculator⁵.



⁴ <https://www.bnz.co.nz/business-banking/agribusiness>

⁵ <https://beeflambnz.com/ghg-calculator-info>

Build a plan:

1. The first step to building an on-farm emissions plan is to know your GHG emissions number and benchmark this against wider industry emission figures. A 2017 Dairy NZ study showed an average emission of 9.6 Tonne CO₂e/ha, with a range of 3.1 – 18.8 T CO₂e/ha, and a 2020 study by AgResearch showed an average emission of 3.6 T CO₂e/ha, range 0.16 – 7.1 T CO₂e/ha for sheep and beef farms.
2. The second step is to understand the drivers of on-farm GHG emissions, and what options are available to either mitigate and/or offset emissions. This may involve farm system change, lower stocking rates, improved productivity, reduced supplement inputs, and so forth.
3. Land use change may be a viable option in some cases. For example, land use change may average emissions down (via horticulture), or provide offsetting via forestry. Consider thoroughly the implications on GHG emissions, and also its financial viability. Seek help from an industry professional or consultant.
4. Ensure that your GHG management plan is integrated into your Farm Environment Plan (FEP). Actions to improve water quality will also likely reduce GHG emissions and vice-versa, so it's imperative that both are included in the same FEP.
5. If you're considering significant change, it may be advisable to wait until He Waka Eke Noa has completed its work (expected March 2022). Three of the key aspects here are the price farmers will face, any changes to the forestry sequestration regime, and how the on-farm accounting system works. Until these are known, any implementation needs to be done cautiously. A possible exception here may be if forestry is a part of your plan; this will take time to implement, so planning and implementation should proceed.

Within your agribusiness, here are the most important actions to start doing right now:

- Ask your farm consultant or industry professional for advice.
- Understand the options you have to reduce GHG emissions; either altering your farming system, and/or land use change .
- Start thinking how you'll incorporate this into your Farm Environment Plan, alongside actions on water quality.
- If you're contemplating using forestry as a carbon offset, then (a) get good advice, and (b) start organising your planting.

Along with our Natural Capital team, BNZ have dedicated Agribusiness Partners throughout New Zealand. Your local Agribusiness Partner can help you to think about where to start with the planning and budgeting of costs when it comes to enhancing your natural resources. If you need any further information on any of the topics discussed above, your local BNZ Agribusiness Partner can put you in touch with their trusted advisors.

If you would like to read more about He Waka Eke Noa, the Zero Carbon Act and current GHG emissions research, here are some great resources that can help:

1. agmatters.nz
2. hewakaekenoa.nz
3. environment.govt.nz/acts-and-regulations/acts/climate-change-response-amendment-act-2019
4. environment.govt.nz/guides/agriculture-emissions-climate-change

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