Provide sustainability leadership, turn ideas into reality, leave a legacy we can all be proud of.

Fonterra’s Decarbonisation Roadmap
NZ Emission profile

Figure 1: Emissions profile of New Zealand

- Energy:
  - Synthetic greenhouse gases: 2%
  - Carbon dioxide (CO₂): 44%
- IPPU:
  - Transport: 19%
  - Other: 17%
- Electricity:
  - 4%
- Waste:
  - 5%
- Agriculture:
  - 49%

New Zealand emissions in 2016:
- Methane (CH₄): 43%
- Nitrous oxide (N₂O): 12%

OVERVIEW OF FONterra’S NZ OPERATIONS

4.5 million cows
10,000 suppliers

17 billion litres of NZ milk
484 tankers collecting, across 14 depots

26 processing sites
2.5m MT of product

75 Distribution Centres

7 deep sea ports
> 500 voyages
200+ destination ports

Nutrition to hundreds of millions of consumers
in 140 markets across the globe
Fonterra’s Emission Profile

BREAKDOWN:

1% Distribution

10% Manufacturing

89% On-farm

22.2M Total GHG emissions 22.2m tCO₂-e.
Summary of Fonterra’s climate commitments

Set aspirational & intermediate targets

And increase action over time

Take strong action where feasible mitigation

2017-2020:
1) Build awareness & support farmers to implement GMP
2) Deliver 20% energy efficiency
3) Convert coal to gas & biomass hero projects at feasible sites

Increase investment in innovative solutions for viable mitigations

Implement game changing solutions on-farm

Achieve 2030 Intermediate Targets

Climate-neutral growth in on-farm emissions

- 30% reduction in Operations emissions (absolute) by 2030
- No new coal from 2030, and coal only as a last resort until then
- Divestment of Glencoal assets by 2025

2050 Aspiration

1) Net zero emissions (on the way to 100% renewable) & low emission dairy

2) An accepted contribution from dairy to NZ’s Paris Commitment

3) Positive impact on global emissions (e.g. providing global solutions)
ROAD MAP TO TRANSITION TO A LOW EMISSION FUTURE

A Fonterra and Ministry for the Environment initiative, with support from the Ministry of Business, Innovation & Employment, Energy Efficiency & Conservation Authority, and Transparency, to help build the foundations towards meeting Fonterra’s long-term emission reduction targets.

New Zealand’s large industrial users of fossil fuel for thermal energy, such as Fonterra, are able to transition to a low emission, 100% renewable energy future in a cost effective manner. This results in generating value for all New Zealanders and contributes to New Zealand meeting its 2030 climate change target to reduce greenhouse gas emissions by 30 percent below 2005 levels by 2030.

**Identifying actions to reduce emissions**
- Improve energy efficiency and reduce costs.
- Create action that builds the foundation for large energy users, such as Fonterra, to transition off coal and onto renewable sources of energy.
- Show leadership in climate mitigation and sustainability action. Fonterra demonstrates what action could be taken by industrial users to reduce emissions.
- Build resilience against rising energy and carbon costs.
- Create value for all New Zealanders by transitioning to a low emission future.

**Building the Foundation**
- **Now – December 2017**
  - Case Study: Social and good benefits of electrifying process heat
    - To undertake an assessment and produce a report by December 2017 that summarises the social and good benefits associated with electrification of process heat. This will be used to assist the Government with considering wider benefits than GHG abatement when considering regulations & work programs. (Facilitated activity)
  - Roadmaps for energy efficiency and large scale electrification of dairy processing
    - 1. Identify a range of optimised energy efficiency solutions for existing dairy plant processes and capture this in a roadmap to improve energy efficiency.
    - 2. Assess the economic and environmental feasibility of large scale dairy electrification by December 2017. This report is to assess and summarise the major scale electrification of dairy processing that could occur.

**Steps to a lower emission future**
- **2018-2019**
  - Review barriers for the uptake of renewable energy for process heat users
    - Barriers faced by process heat users to increase their use of renewable energy or improve the efficiency of their plant will be identified under the Process Heat in New Zealand (PHNZ) action plan. This will help build the evidence base and identify the role of Government and potential target areas by December 2019.
  - Explore new sources of capital and alternative financing models
    - Explore opportunities for new sources of capital and alternative financing models, to support investment in projects that help accelerate the transition to a low emission economy.

**Driving industry action**
- **Post-2019**
  - Demonstration site for wood biomass co-firing at scale
    - To convert a Fonterra site to enable co-firing of wood biomass with coal. This work stream includes Fonterra developing a co-firing strategy for existing coal boiler assets and a position for future new coal boiler assets.
  - Demonstration site for large scale electrification
    - To undertake electrification of processing improvements at a Fonterra site and to install NZ’s first boiler that operates on electricity to generate thermal energy at a Fonterra site.

Identifying the social good benefits associated with electrifying process heat could prompt Government and industry to consider benefits beyond GHG abatement when considering regulations and investment decisions.

Engaging with large energy users in transitioning to a low emission future may generate wider benefits beyond GHG abatement, including:
- Assist in establishing a market & supply chain for low energy, Demand Tolerant Technology for other users who cannot afford to take a risk, if Fonterra can install a system in a cost-effective manner, it could help convince other large energy users to reduce emissions.

Renewable electricity is a future thermal energy source and possible alternative energy source to existing emissions intensive sources. However, it is an expensive option compared with current alternatives.

It is envisaged that large scale electrification of dairy processing will assist with lowering total energy use (therefore improving energy intensity), as well as reducing emissions from dairy processing due to lower energy use and use of electricity which is predominantly renewable in NZ.

To leverage NZ’s renewable advantage, it is proposed that Government review the barriers faced by process heat users to increase their use of renewable energy or improve the efficiency of their plant. This report would summarise these barriers and form part of an evidence base for any recommendations as part of the Industrial heat plan. Process Heat in New Zealand (PHNZ).

This would provide industry with greater certainty of costs and timelines when considering renewable process heat investments.

The uptake and fuel costs of transitioning from current fossil fuel energy sources to low emission alternatives such as biomass and electricity are a significant barrier to any large-scale transition.

Identifying alternative investment approaches will assist large process heat users transition to low emission energy sources. It will help bridge the gap between fossil fuel energy sources and existing renewable solutions to deliver a low emission energy future in time.

Fonterra, like other industrial users, has a significant installed base of coal boilers that typically have a lifespan of 40-50 years. It is unlikely that all boilers will be replaced in the short-medium term as some have recently been installed.

Therefore it is important for companies to develop a strategy to minimise emissions from these boilers while they remain using coal to ensure those assets do not become stranded and maximise their use while they remain operational.
Energy Intensity

Last season, this saved Fonterra enough energy to power all the households in Hamilton City for over 4 years

19.3% reduction since FY03

Cumulatively, this saved Fonterra enough energy to power all the households in Hamilton City for over 43 years
Gas Reserves
What Carbon Price?

Source: Concept Consulting et al. (2018a).
High Speed MVR $
High Temperature Heatpumps $$
Electrode Boiler $$$$
NEW ZEALAND MILK COLLECTION

VOLUME (M LITRES/DAY)

JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY

2016/17 2015/16 2014/15
Impact of Fonterra on NZ Electricity Load

Note: Fonterra load is approx. 2TWh/yr
AN OPPORTUNITY