



Climate Disclosure

2023

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About
the Report

01.

Who we are

Ravensdown is an agricultural co-operative formed in 1977 for the supply of nutrients and other agricultural inputs. Ravensdown has a distribution network of more than 50 sites throughout New Zealand; three manufacturing sites in Napier, Christchurch and Dunedin; a number of lime quarries, an aerial spreading subsidiary and an analytical laboratory. We aim to ensure the sustainable use of land for food production, now and for generations to come, by sourcing and promoting the application of the right amounts of the right nutrients for the right purpose, at the right time.

Report purpose

This report is supplementary to Ravensdown's 2023 Integrated Report. It is loosely designed to reflect the recommendations of the Taskforce on Climate-related Financial Disclosures (TCFD), as we work towards full disclosure. An index on page 35 cross references the requirements of the TCFD across its four topic areas (Fig 1). This is how the report has been structured.

This report has been written to meet the needs of the business regarding timely response to risk; capture of opportunities from the low carbon economy; meeting the expectations of our stakeholders and the commitments made to the Climate Leaders Coalition and Sustainable Business Council. It also introduces the Taskforce on Nature-related Financial Disclosures, as we begin to assess our position against those recommendations.

The report period is 1 January 2022–31 December 2022, with limited assurance from EY of Scope 1, 2 and certain Scope 3 emissions of the GHG emissions inventory against the GHG Protocol Corporate Standard.

We would like to recognise Aotearoa Circle who we worked with on the Agri Adaptation Roadmap, which helped us in the development of climate scenarios.

FIGURE 1:

The taskforce's recommendations are structured around four thematic areas that represent core elements of how organisations operate.

Oversight, assessment and management of climate-related risk and opportunities.

The actual and potential impacts of climate-related risks and opportunities on the business.

How the organisation identifies, assesses and manages climate-related risks.

Metrics used to assess and manage relevant risks and report on performance against targets.



Our why

We use materiality assessment as a way to evaluate what is important to our stakeholders and their expectations of Ravensdown. During the 2022 materiality assessment we heard a lot from stakeholders on the impact of climate change - and change generally - on the primary sector, and the expectations on us to deliver solutions.

Markets are changing

"Climate change is only becoming more prominent for the new generation of decision-makers who decide what they buy and where from based on issues such as this." Insurer

We need to ensure policy will address current challenges and meet future needs

"It is important to connect back to the government and regulators on a just transition for farmers to address concerns about climate change." Regulator

We need to support adaptation in the sector

"NZ needs to be nimble on the world stage, adapting quickly and thinking differently about how land is used and what products are produced." Regulator

We need to be part of the solution

"Agriculture and farming will see fundamental change in the coming years which will call for innovative solutions."

"Develop sustainable products quickly to meet the push for reduced carbon, allowing farmers time to adapt." Supply partners

We must demonstrate measurable action

"It is always easier to 'talk the talk' than 'walk the walk.' Staff member

We need to understand and expect climate change risk

"Responding in a calm, measured way to challenges such as supply chain disruption, redirecting the ships when needed, makes for a strong relationship." Supply partner

Our why

Minimising environmental impact is top of mind for farmers

“We will run with new products that come along if they will reduce our environmental impact.”

“Looking after our wai and whenua is the most important thing.” Customers

With a solid understanding of our own emissions we now need to shift our attention to supply chain

“Understanding Scope 1, 2 and 3 greenhouse gas emissions and how to reduce them is becoming increasingly important for NZ businesses to access capital.” Banking partner

“Ravensdown has clearly taken a systematic approach to climate change, building credibility by addressing their own direct emissions.” Industry group

We need to acknowledge the unique contribution of te ao Māori to Aotearoa and Ravensdown

“Mana whenua are increasingly key stakeholders as our manufacturing sites learn more about where they are located and mana whenua significance.”

Staff member

We need to invest in science and research

“We have what I would call a strategically aligned partnership with Ravensdown. We jointly invest in the people and the science.”

Research partner

Industry collaboration is critical

“The drive for change is coming at farmers from all directions. Ravensdown and others [must] collaborate to support farmers as they try to respond to this change.”

Customer



Governance

02.



From the CEO

Climate change presents a threat to all businesses - not least those in the agriculture sector - and all New Zealanders.

This year, in keeping with our aspiration for climate change leadership, we reset our carbon reduction target to align with a 1.5 degree warming pathway. We have been successful this year in lowering our GHG footprint, and that from our products, but we also saw the devastating impacts of severe weather events on the primary sector and NZ as a whole, reminding us that there is a lot more work to do. We believe that Ravensdown's science, technology and advice can contribute significantly to the solution.

We recognise the need for collaboration and the need to support farmers with responding to, understanding and meeting obligations through improved GHG reporting, nutrient management advice and technological developments.

Garry Diack

From the Chair

The 2022 materiality assessment showed Climate Action to sit soundly in the top three material issues for Ravensdown. Stakeholders expect Ravensdown to "build credibility by addressing its own direct carbon emissions, then help customers transition to reduced carbon, then mobilise the workforce to make their own change as consumers".

This Climate report - Ravensdown's first - is an important milestone and demonstrates commitment to addressing climate change. Ravensdown has made a commitment to significantly reduce its own climate change impact, that of its farmers, its supply chain and even staff; and to show leadership in policy and research to encourage mitigation solutions. This report is for transparency and accountability in relation to those commitments.

Bruce Wills

Ravensdown has an Enterprise Risk Management System within which risks (including climate risks) are assessed and controls applied and managed. Our Board, Audit and Risk Committee (ARC) and Leadership Team are actively engaged in risk management (Fig. 2).

Board oversight

The Board of Directors has ultimate responsibility for oversight of climate-related risks and opportunities. They gain oversight of the climate risk position and activity through the ARC which meets on a regular basis throughout the year. It is the responsibility of the ARC to do deep dives and assess mitigations implemented by management on behalf of the Board. Once a year the ARC undertakes a formal review of our position, including greenhouse gas emissions and targets.

Management's role

Assessment and management of climate-related risks and opportunities is championed by the CEO with the support of the Leadership Team, who review decarbonisation progress on a monthly basis and have a formal process annually for reviewing climate risk through the Risk Management Committee. The Risk Management Committee meets regularly to assess risks and review the suitability and implementation of management activity. The Leadership Team takes ownership of enterprise level risks and drive focused risk management within their individual business areas.

Full Board and Leadership support is required for making and reaching carbon reduction targets. This year a 1.5°C aligned target was agreed by the Leadership team and approved by the Board. Decision-making frameworks such as the capex management system required change in order to better support and facilitate decisions under the conditions of climate change and a low carbon economy. Strong commitment to carbon reduction projects in the near term will be required in order to meet or surpass carbon reduction targets, and to mitigate the worst impacts of climate change.

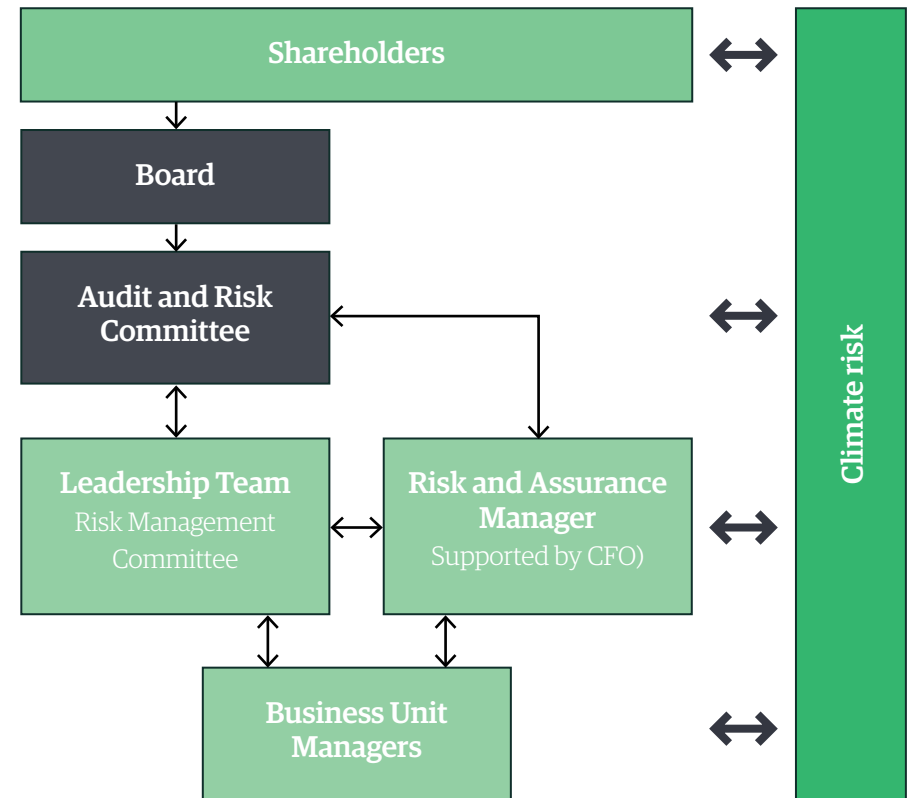


FIGURE 2:
Ravensdown Risk
Governance Structure



Strategy

03.

This section uses three different climate-related scenarios (Fig. 3 and 4), including a 1.5°C and a 3°C scenario to identify (Fig. 5) and assess (Table 1) the climate-related risks and opportunities relevant to Ravensdown and describe controls enacted to improve the resilience of the organisation's strategy (Table 1).

Scenarios Used

Three temperature scenarios were used for modelling and assessing Ravensdown's climate-related risks and opportunities over the short, medium and long term (Fig. 3). The scenarios were loosely based on the sector-level adaptation roadmap developed by Aotearoa Circle (Fig. 4), of which we had a role on the Technical Expert Group. Fig. 5 summarises the risks that we have prioritised as a result of this work. Table 1 describes the impact of these risks and opportunities on the organisation and the resilience measures taken. Brief descriptions of the scenario narratives used are included in Appendix D.

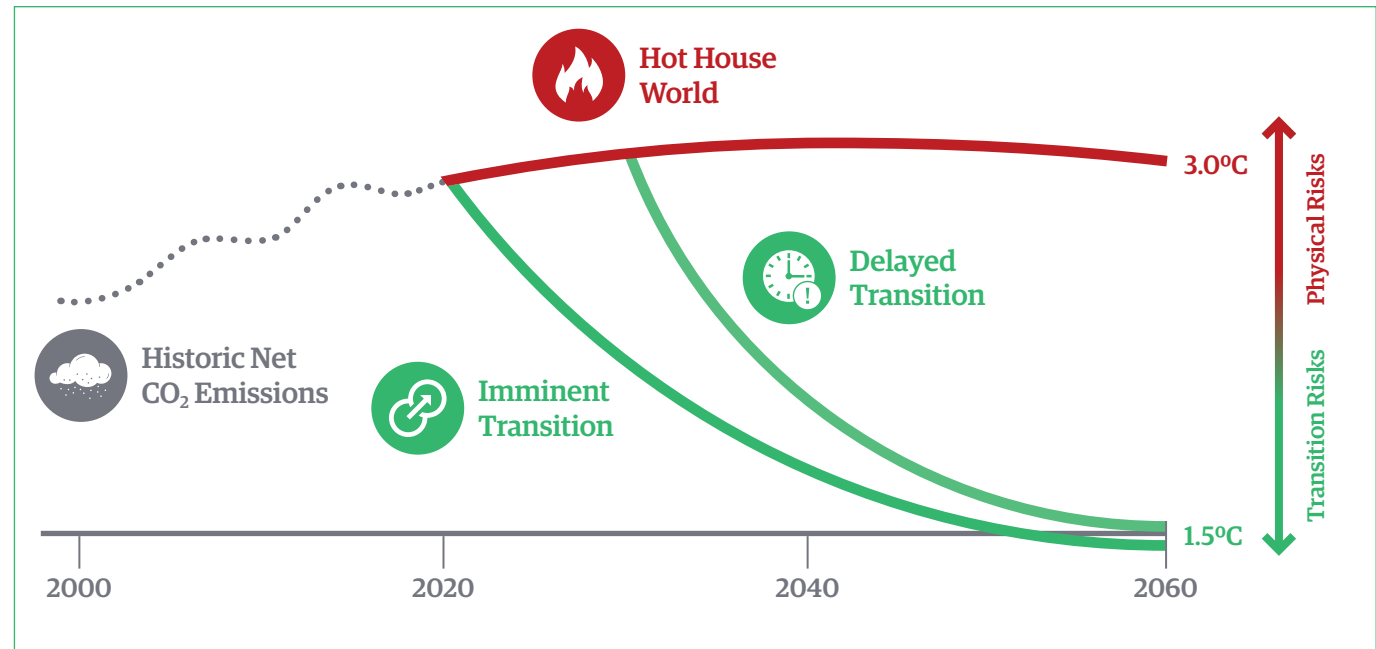


FIGURE 3:
Trajectory of three
climate scenarios used

| | Scenario | Description | Policy Change | Physical Impact | Financial (Transitional) Impact | Technology Change |
|-----|---|--|--|--|---|----------------------------------|
| 01. | Orderly (net zero 2050) | Imminent, smooth transition to net zero | Immediate climate policy action | Warming limited to 1.5C Low-medium risk | Initially high, then gradual and orderly | Fast technology change |
| 02. | Disorderly (delayed transition) | Late but rapid and disruptive transition to net zero | Delayed climate policy action, divergent between sectors | Medium-high risk | Initially low, severe after 2030 | Slow then fast technology change |
| 03. | Hot house (current policies) | No new policies are introduced leading to high warming | No additional climate policy | 3+ degrees of warming Critical risk | Low nationally, economically damaging internationally | Slow technology change |

FIGURE 4:
Characteristics of the three climate scenarios used

Transition Risks and Opportunities (top row)

Risks arising from the process of adjusting to a low carbon economy



Carbon Pricing

Rise in **carbon price** increases fuel/input/logistics costs and adds levy to product sold



Farm Viability

Land use change to forestry or non-productive driven by policy (planning limitations, compliance requirements, ETS mechanisms) leads to loss of market



Low Carbon Solutions (opportunity)

Govt policy support to drive a low carbon transition opens new opportunities



Brand and Reputation (opportunity)

Corporate responsibility for climate change and environmental impact commensurate to increased stakeholder interest and urgency has positive impact on brand



Supply Link Disruption

Increased risk of interruption to supply links and stores from weather or geopolitical causes

Physical Risks

(bottom row)

Risks arising from changes to the climate or extreme weather events



Spreading Window Narrows

Reduced application window because of drier summers and wetter winters leads to high seasonal pressure, high redundancy of assets, lower sales



Land Use Change

Increased frequency of flood + drought leads farmland to be sold, thus changes land use and markets (e.g. increased horticulture, increased tropical cropping, decreased yields, damage to crops, stock reduction)



Damage to Assets

Extreme weather events combined with sea level rise leads to increased repair and maintenance costs, assets outages, high price of insurance

FIGURE 5: Summary of identified climate-related risks and opportunities

Climate Change Impacts & Resilience

The inherent risks and opportunities above were scored 1-5 on severity and likelihood under each scenario using our standard risk matrix. Controls (resilience measures) are identified and the same risks are scored again for residual risk. The most significant risks and opportunities are displayed in Table 1. The risk ratings displayed are under scenario 3 and before resilience measures.

TABLE 1:
Risk ratings and resilience measures introduced

| | |
|---|-------------|
| H | High |
| S | Significant |
| M | Medium |
| L | Low |

| | Cause | Risk | Impact | Rating (S3) | Resilience Measures |
|--------------|---|---|---|-------------|--|
| Transitional | Price of carbon in NZ ETS and global markets increases | Increases fuel costs, input costs and logistics costs | Operating costs rise | 5/4 H | <ul style="list-style-type: none"> Investigate/grow supplementary product offerings Customer segmentation to service customers more effectively Structure the business right for future demand Add/grow additional and specialist skills and advice Investigate/grow supplementary product offerings Lower carbon manufacturing by reducing reliance on fossil fuels |
| | | Requires a levy to be added to product sold, increasing cost to customers | Product prices rise | H | <ul style="list-style-type: none"> Focus on providing tools and advice to ensure precise and efficient nutrient application Align with suppliers with common goals to source low carbon products at a fair price Expand ARL lab capabilities Transition customers to urease-coated urea |
| | | Affects farm viability | Land use change and therefore reduced or different demand | H | <ul style="list-style-type: none"> Engage with larger ('kauri') and proactive customers on emissions performance & mitigation Broaden scope of advice to diversify and future-proof |
| | Climate-related policy and regulation for farms (planning limitations, compliance requirements) | Poor farm viability leads to land use change to forestry or non/less productive land use types | Loss of market and changes to product demand, flow on impact on food production and NZ economic returns | 5/3 H | <ul style="list-style-type: none"> Commercialise & implement technological mitigation solutions on farm Engage with policy process/submit on proposed (climate) policy Invest in staff development to broaden staff skills base |
| | Govt policy support to drive a low carbon transition | Opens new opportunities for development and commercialisation of low carbon solutions | Positive impact on brand/reputation and financial position | 4/3 S | <ul style="list-style-type: none"> Research and develop new emissions reduction solutions for farmers Establishment of Agnition to invest in high-potential opportunities Establishment of and support to AgriZero for co-ordinated approach to agricultural GHG emissions |
| | Increasing geopolitical instability | International shipping supply link disruptions | Inability to supply in line with demand | 4/3 S | <ul style="list-style-type: none"> Diversify supply Strong working relationship with Ravensdown Shipping Services |
| Physical | Extreme weather events (Acute climate change) | Damage to roading network causing supply disruptions | Delayed or inability to supply | 4/3 S | <ul style="list-style-type: none"> Standard pre investment evaluation of risk for any new site location Regular reconsideration of rail distribution options Strategic community urea silo installation |
| | | Damage to assets | Increased cost of repairs, maintenance, insurance, asset outages | 5/3 H | <ul style="list-style-type: none"> Standard pre investment risk evaluation for any new site location Assess climate impact of all major construction projects Assess all site locations for closure, retreat or investment |
| | Drier summers and wetter winters, increased frequency of flood and drought (Chronic climate change) | Reduced spreading window | High seasonal pressure, high redundancy of assets, lower sales | 5/3 H | <ul style="list-style-type: none"> More efficient use of capital assets, including consolidation Size the business right for future demand Undertake early planning with customers |
| | | Frequent decreased yields, damage to crops, loss of stock | Farms sold or abandoned, changes to crop types or land use change leads to changes to the market | 5/5 H | <ul style="list-style-type: none"> Engage with customers on adaptation, risk and diversification Leverage cross-sectoral position to support diversification/adaptation |

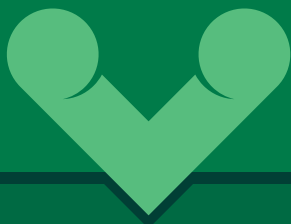


Risk Management

04.

This section describes Ravensdown's process and systems for managing and responding to climate-related (and other) risks.

Identification



- Climate risk has had a specific risk identification process. A number of workshops have been undertaken to identify and better understand Ravensdown's climate-related risks, considering the whole value chain. This year we undertook
 - 1 x workshop to identify transition risk
 - 1 x workshop to identify physical risk
 - 1 x workshop to discuss impact and response to risk

Assessment



- The risks identified have then been described using likelihood and severity ratings and assessed across three time horizons and three temperature scenarios.
- Financial risk is assessed and represented in three categories.
- Time horizons have been set based on the useful life of existing assets and infrastructure, the availability of data and to align with carbon reduction targets.
- Risk ratings are showed in Table 1.

Management & Integration



- Climate-related risk is integrated into Ravensdown's Enterprise Risk Management framework (ERM) where it is prioritised relative to other types of risks.
- This framework is applied via the use of Ravensdown's RavRisk platform, in conjunction with the 'RavSafe' platform for incident management.
- The ERM requires a secondary assessment of risk considering the agreed response. We call this 'residual risk'.
- The full identification and assessment process is reviewed annually and repeated biannually.
- The ERM also defines risk management roles and risk treatment options.
- During the most recent workshop in February 2023, more focus was dedicated to risk management. It was noted that it is increasingly difficult to separate out transition and physical risk and response.

Financial Risk Categories

| | |
|------|--------------|
| Low | <\$2m |
| Mid | \$2m - \$10m |
| High | >\$10m |

Time Horizons

| | |
|-----------|-------------|
| Near term | 2022 - 2030 |
| Mid | 2030 - 2040 |
| Long Time | 2040 - 2050 |

Metrics & Targets

05.

Assurance

EY has provided limited assurance on the Scope 1, Scope 2 and certain Scope 3 GHG emissions, for the calendar year 1 January 2022 to 31 December 2022 in accordance with the GHG Protocol.

GHG Inventory Boundary

The organisational scope takes an operational control approach to include Ravensdown and its subsidiaries while excluding joint venture partnerships, associations and consignments. A screening process is undertaken annually to identify all material emissions across scope 1-3, to define organisational and operational boundaries and to identify any need for recalculation. Therefore note that this year's scope is broader than and not necessarily comparable to footprints published in previous reports. Ravensdown has reported its GHG inventory within its Integrated Report since 2017 and obtained limited assurance annually. Our base year for measuring progress is 2018 as this was the first year for which a robust and complete footprint was available.

Methodology

The carbon footprint is calculated on a calendar year and undertaken in accordance with the GHG Protocol. The primary source of emissions factors is the Ministry for the Environment (MfE, 2022). The cases where MfE emissions factors have not been available are:

- Marine gas oil (Defra (UK) 2020 factor has been used)
- CO₂ from CO₃ in phosphate rock (Ledgard and Falconer, 2019* has been used)
- Sequestration rates (Climate Change (Forestry Sector) Regs 2008 Sch. 6 Table 2 has been used).

Exclusions

Each year we formally review the scope of our GHG inventory and strive to improve the accuracy and scope of year on year. The following emissions sources have been purposefully excluded from the emissions inventory for the reasons given:

- The urea quantities that we sell for industrial uses rather than land application have no emissions associated and are therefore excluded.
- Emissions associated with cloud storage were assessed as for the first time this year suppliers were able to supply robust data for our requirements. This emissions source was deemed immaterial but the evaluation will be repeated in future scoping meetings.

- One-time construction project emissions are assessed separately (via project assessment template) so as to not affect trends.
- We moved to incorporate international mining-related scope 3 emissions of raw materials by including a question on our annual supplier sustainability survey. Transport of these raw materials from source to port is not able to be included on the basis of unavailable accurate data.
- There are small immaterial sources of scope 3 emissions in the area of staff travel which we exclude on the basis of immateriality. They include staff mileage, staff commuting, couriers and taxis. However we did this year engage with staff to better understand and influence commuting emissions and with our courier partner on emissions reduction.
- Refrigerants are excluded on the basis of immateriality.

Recalculations

Situations prompting recalculation of the base year are acquisitions/divestment and changes in reporting boundaries or calculation methodologies, including improvements in the accuracy of emission factors as per the GHG Protocol where they are material (i.e. >1%) of the base year emissions profile.

Emissions sources from an acquisition (company or site) or change to insourcing are included, both with their emissions in the

base year (when the company didn't control these sources yet) and in the current year. Similarly, emission sources from divested facilities/companies or outsourced activities are excluded, both with their emissions in the base year (when they were still controlled by the divesting company) and the current year.

Recalculations in the current year are:

1. The divestment of White Rock Lime Quarry in December 2021, which used coal to dry lime, required recalculation. This source of emissions is excluded from the base year and current year and the target, so as not to falsely suggest an apparent (but not absolute) emissions reduction. Ravensdown does not consider divestment to mitigate climate change emissions and would still like to see this fuel consumption mitigated. Therefore we have openly shared the work we had completed and knowledge gained on mitigation options for lime processing with the new owner of White Rock Quarry.
2. Emissions factors have changed for air travel and waste so the base year is updated to reflect this.
3. The reporting boundary expanded with the addition of process emissions from superphosphate manufacture which has been back-calculated for comparability between years.

*Ledgard, S. and Falconer, S. (2019) Update of the carbon footprint of fertilisers used in New Zealand, Report for Fertiliser Association of New Zealand RE450/2019/059.

Performance

Data Quality

Ravensdown has high confidence in the accuracy of this data. Areas where data quality is deemed to be poor have not been incorporated into the scope of the inventory and will not be until confidence is reached that the data is useful, relevant and comparable. Every year the emissions screening process considers additional scope 3 sources of emissions and the data available to assess whether the scope can be expanded. The data set and analysis are checked internally and by a third party.

Offsets

No offsets were purchased or supplied this year. All reductions are absolute.

As a manufacturer of fertiliser products, Ravensdown exhibits relatively low industrial scope 1 and 2 emissions and very high scope 3 (indirect/supply chain) emissions. The process of superphosphate manufacture generates electricity so scope 1 and 2 emissions are not as high as for other manufacturing processes of similar scale. The most significant direct physical sources of emissions aside from processing losses are two South Island lime quarries which burn coal to dry lime. This year we commenced a project at each site to address this emissions source (page 24). Most of scope 3 is attributable to upstream international shipping of raw materials and downstream use of products on farm.

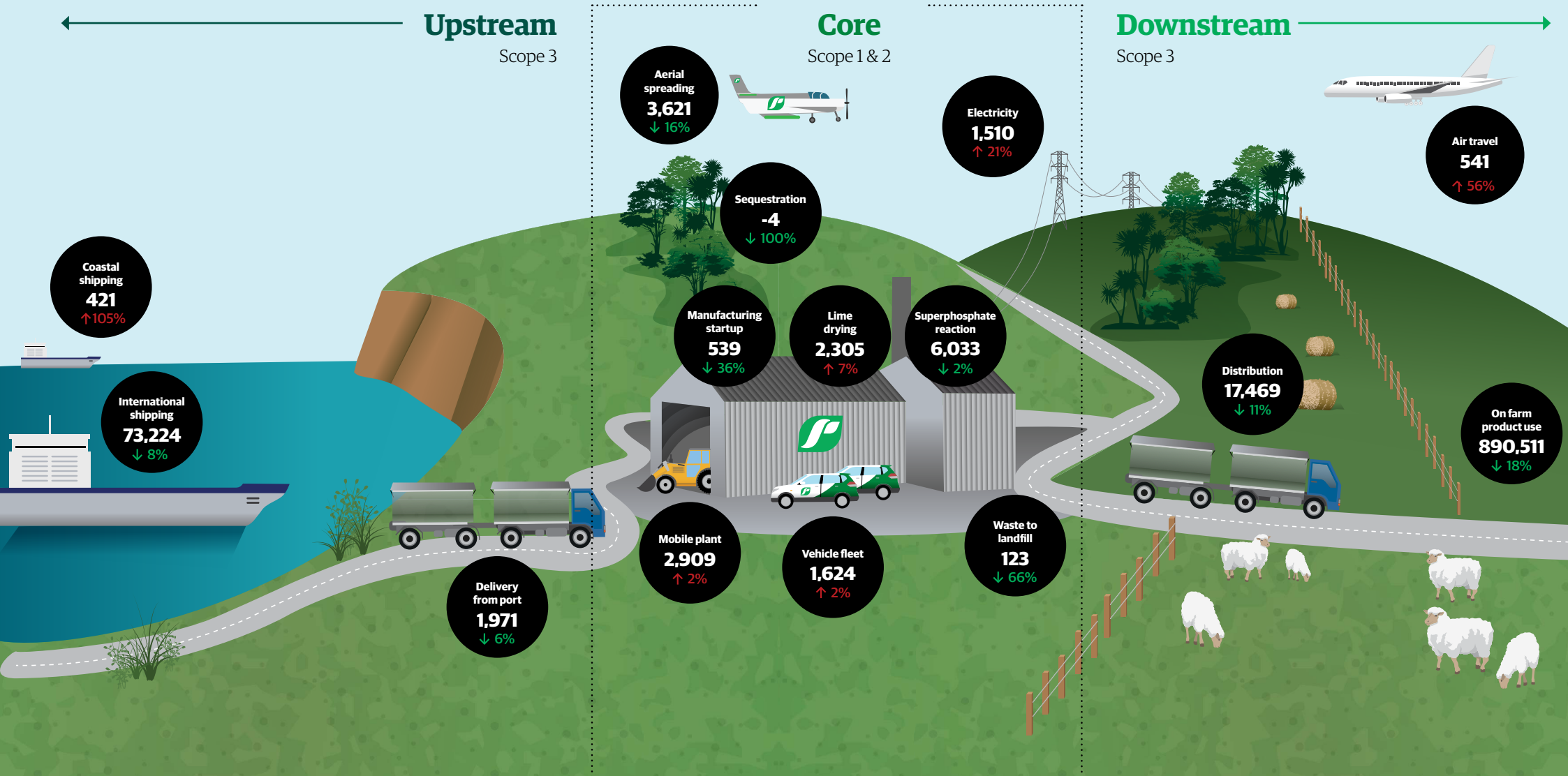
In 2022, Ravensdown's GHG emissions across scope 1, 2 and 3 total 1,002,798 tCO₂^e, reduced from 1,208,803 tCO₂^e in the previous year. Overall, sales were down 12.5% over the 12-month period due to reduced customer demand in response to a range of factors including high fertiliser prices and legislative controls on application of fertiliser. This is a contributing factor to the overall decrease across most emissions sources, however total emissions on an intensity basis (per tonne sold) are also reduced. A further breakdown of emissions by scope, by gas and by lifecycle stage follows.

The graphic overleaf shows 2022 emissions sources against the previous year.

Ravensdown 2022 Greenhouse Gas Inventory

All totals represented as tonnes of carbon dioxide equivalent

Scope 1 total: 17,027
 Scope 2 total: 1,370
 Scope 3 total: 984,401



Upstream Scope 3

Core Scope 1 & 2

Downstream Scope 3

Coastal shipping
421
↑ 105%

International shipping
73,224
↓ 8%

Delivery from port
1,971
↓ 6%

Aerial spreading
3,621
↓ 16%

Sequestration
-4
↓ 100%

Manufacturing startup
539
↓ 36%

Lime drying
2,305
↑ 7%

Superphosphate reaction
6,033
↓ 2%

Mobile plant
2,909
↑ 2%

Vehicle fleet
1,624
↑ 2%

Waste to landfill
123
↓ 66%

Electricity
1,510
↑ 21%

Distribution
17,469
↓ 11%

Air travel
541
↑ 56%

On farm product use
890,511
↓ 18%

TABLE 2:
Summary of greenhouse gas emissions: base year (CY18),
current year (CY22) and previous year (CY21).

| Scope | Emissions source (/activity) | 2018 (base year) | 2021 (prev. year) | 2022 (latest performance) | % change this year | T change this year | % change since 2018 | T change since 2018 |
|-----------------------------|--|---------------------|----------------------|---------------------------------|-----------------------|-----------------------|------------------------|------------------------|
| 1 | Stationary diesel / manufacturing startup | 904 | 847 | 539 | -36 | -308 | -40 | -365 |
| | Transport diesel & petrol / mobile plant and vehicle fleet | 4,919 | 4,446 | 4,534 | 2 | 88 | -8 | -385 |
| | Sub-bituminous coal / lime drying | 3,354 | 2,157 | 2,305 | 7 | 147 | -31 | -1,049.50 |
| | Aircraft fuel / aerial spreading | 4,822 | 4,286 | 3,621 | -16 | -665 | -25 | -1,200 |
| | CO ₂ release / superphosphate reaction (*new) | 7,080 | 6,177 | 6,033 | -2 | -144 | -15 | -1,047 |
| | Sequestration / newly established native forest (*new) | | | -4 | 100 | -4 | 100 | -4 |
| Scope 1 total | | 21,078 | 17,912 | 17,027 | -5 | -885 | -19 | -4,051 |
| 2 | Electricity - exported to grid | -273 | -345 | -359 | 4 | -14 | 32 | -86 |
| | Electricity - purchased | 1,440 | 1,456 | 1,729 | 19 | 273 | 20 | 289 |
| Scope 2 total | | 1,167 | 1,111 | 1,370 | 23 | 259 | 17 | 203 |
| 3. | Delivery from port | 2,450 | 2,104 | 1,970 | -6 | -133 | -20 | -479 |
| | Freight / Distribution by road | 20,586 | 19,704 | 17,469 | -11 | -2,235 | -15 | -3,117 |
| | Coastal shipping / Distribution by sea | 183 | 205 | 421 | 105 | 216 | 131 | 238 |
| | International shipping | 109,675 | 79,251 | 73,224 | -8 | -6,028 | -33 | -36,452 |
| | Waste to landfill | 196 | 359 | 124 | -66 | -235 | -37 | -72 |
| | Electricity - transmission losses | 153 | 139 | 140 | 1 | 1 | -9 | -13 |
| | On farm product use | 1,225,494 | 1,087,937 | 890,511 | -18 | -197,426 | -27 | -334,983 |
| | Air travel | 1,273 | 347 | 541 | 56 | 194 | -57 | -732 |
| Scope 3 total | | 1,360,010 | 1,190,047 | 984,401 | -17 | -205,646 | -28 | -375,610 |
| Annual GHG inventory | | 1,382,255 | 1,209,071 | 1,002,798 | -17 | -206,273 | -27 | -379,457 |

Carbon footprint is calculated on a calendar year and undertaken in accordance with the GHG Protocol. EY has provided limited assurance on the Scope 1, Scope 2 and certain Scope 3 GHG emissions

for the calendar year 1 Jan 22 to 31 Dec 22.*Note that scope is broader than footprints published in previous years, and that recalculations have occurred for comparability, meaning that previous years'

emissions' totals are not as previously. Organisational scope takes an operational control approach to include Ravensdown and subsidiaries and excludes joint venture partnerships.

• Some row totals may not sum due to rounding

Targets

Climate change ambition and urgency has developed since Ravensdown started reporting in 2018, as reflected by increasingly ambitious emissions reduction targets. The latest available Science-Based Targets Initiative (SBTi) guidance is used for calculating targets using the Absolute Contraction approach (in the absence of a Sectoral Decarbonisation Approach for the sector).

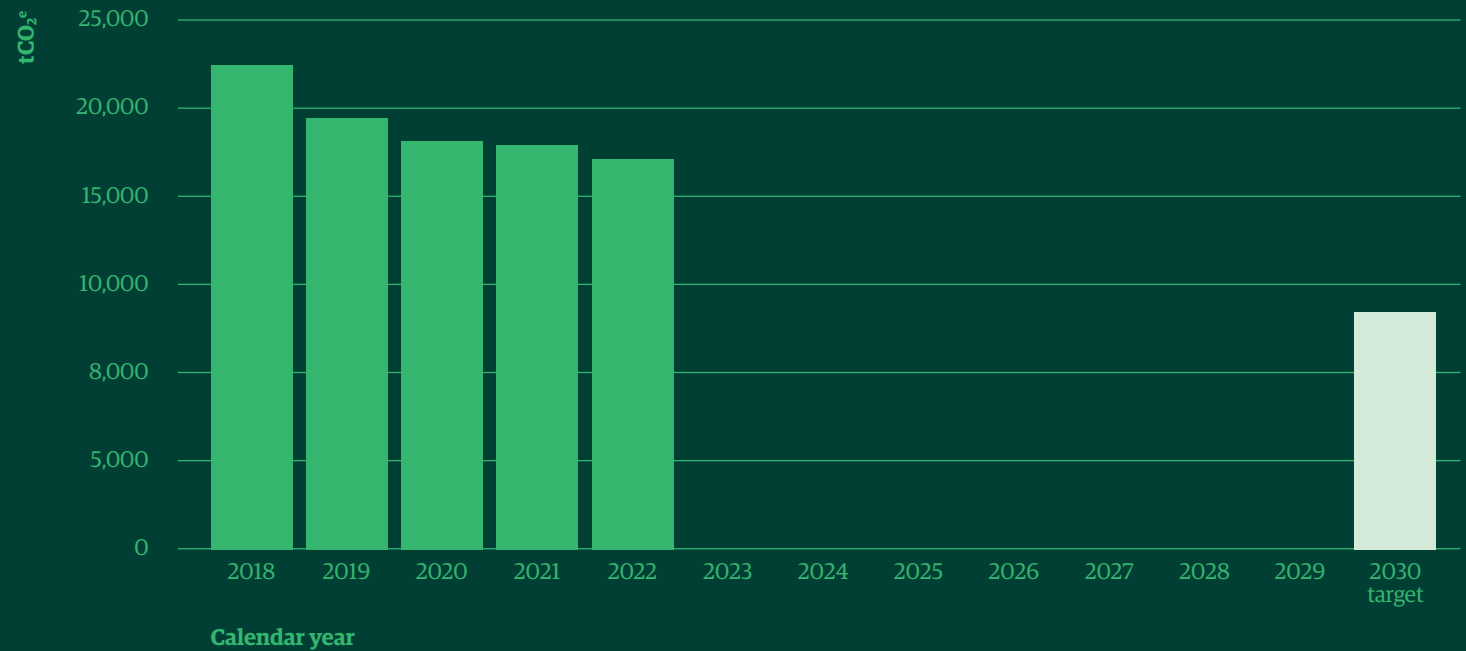
Our first emissions reduction target (2019) was 15% reduction of 2018 emissions by 2030 aligned with a 2°C warming pathway. In 2020 this was upgraded to 30% by 2030, following the well below 2°C of warming (WB2D) pathway. In 2022, as a result of increased urgency, stakeholder interest, better science and availability of solutions, we increased the target to align with a 1.5°C

of warming: 50.4% reduction by 2030; and net zero by 2050. To meet this will require a combination of strong responses addressing every area of operational emissions. The lack of options for emissions reduction from aerial spreading makes this target difficult to meet.

Scope 3 targets are proportionally the same: 30% for a below 2°C pathway; 50% for 1.5°C.

Currently SBTi recommends a WB2D target is acceptable for scope 3, while the Climate Leaders Coalition (CLC) recommendation is 1.5°C, but makes allowances for that target to be met by 2035. We have set a 1.5°C target for scope 3 based on the fact that mitigations will be available to our customers by that time, and will be calculated as reductions to our overall footprint.

FIGURE 6:
Scope 1+2 (operational)
emissions and 2030 target





Climate Action

06.

Case Studies

We are embedding plans within our businesses to accelerate climate mitigation action across scopes 1-3, with consideration to a just transition and te ao Māori and other cultural perspectives. The results on pages 20-21 do not reflect any expected reductions from these projects that are currently being implemented.

01.

Biomass Combustor

- Dipton Lime (scope 1)

A biomass combustor has been constructed and will shortly be operational at Dipton Lime so that lime can be processed without the use of coal. This project was supported by EECA's GIDI fund. Along with energy efficiency measures such as insulation of the driers and automated moisture meters, and the divestment of one coal-fired lime quarry (triggering a base year recalculation), we have significantly reduced our reliance on coal going forward. The CO₂ saving from this project is estimated at 1,205 tCO₂^e per annum.



Completion September 2023



02.

Rock Storage Shed

- Geraldine Lime (scope 1)

A rock shed is under construction at Geraldine Lime for storage of raw feed rock to enable rock to be processed in optimum conditions in summer without using fuel and stored for the winter months, when drying is a daily necessity. In this way, 350t of coal can be saved annually. Savings are conservatively estimated at 706 tCO₂^e annually or 5.7% of Ravensdown's total emissions, plus an additional 7.6 tCO₂^e attributed to reduced electricity consumption.

Completion September 2023

03.

Light Fleet Review

- nationwide (scope 1)

We have undertaken a comprehensive review of our fleet which is being progressively replaced with close to 100% hybrid and electric vehicles. We would like to recognise the help of our lease partner FleetPartners with this work. The current available vehicle options were tested at a trial day to assess for suitability on farm by our team. We extended this work to allow all of our Christchurch staff, not just those with company vehicles, to take home the latest electric vehicles on a trial basis to break down some misconceptions about EVs. The CO₂ saving is approximately 650 tonnes per annum (39% reduction) with the current proposed vehicle mix.



Roll out 2023-25



04.

Electricity

- national (scope 2)

The only significant and absolute area of the business in which emissions increased this year was electricity, therefore this is an area of focus for the coming year. We have photovoltaics on order for rooftop solar installation at selected sites and ran some trials to better understand the suitability of this technology in our environment. We plan to report next year on additional renewable energy capacity.

Investigation 2023-24

05.

Shipping

- international (scope 3)

Internationally, we have partnered with Maersk to fuel our containerised shipping using biofuel. This strategy is expected to have a disproportionately high reduction on shipping emissions (20% reduction) due to container shipping emissions being the most carbon intensive of our import emissions.

Emissions from coastal shipping doubled this year as we made a conscious effort to prioritise moving product by sea in an effort to reduce emissions and congestion from heavy trucks. We estimate that this reduced 2022 emissions by 12-27 tonnes per voyage. This also demonstrated a resilience benefit as coastal shipping transferred nutrients to the regions that needed it during supply shortages.



Commenced 2022/23



06.

Ecopond

- national (scope 3)

Work continued to refine, pilot, educate and implement our methane mitigation technology EcoPond, which removes 99.9% of methane lost from farm dairy effluent ponds. The technology has been developed by Ravensdown in co-operation with farmers, farming organisations and Lincoln University. It also provides benefits of reducing phosphate and E. coli levels in water.

Commenced 2022/23

07.

N-Vision Research Project

- national (scope 3)

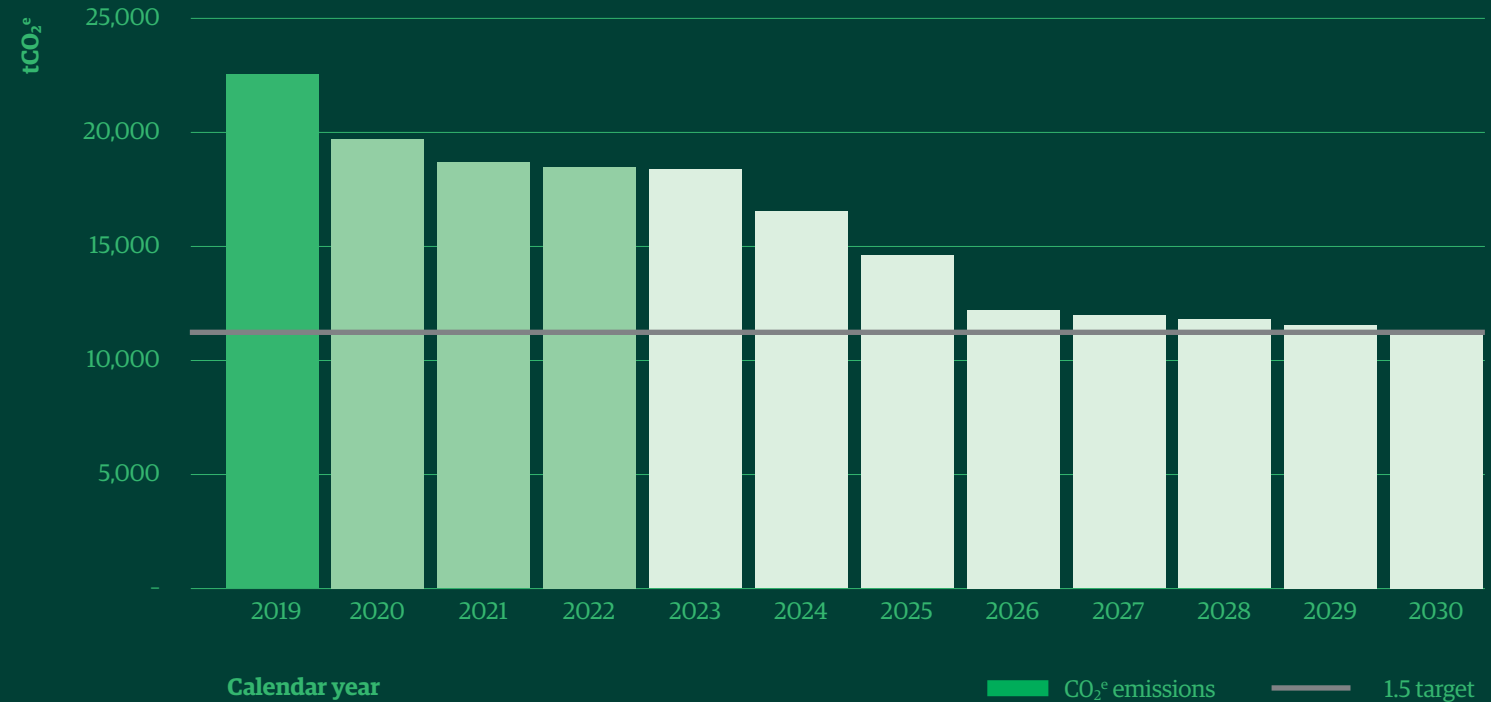
Our largest-ever research and development investment, N-Vision, addresses losses of nitrogen to the air as GHG emissions of nitrous oxide by inhibiting soil microbes and harnessing a naturally occurring soil fungi. It is a partnership with Lincoln University, Plant and Food Research and the Ministry for Primary Industry's Sustainable Food and Fibre Futures Fund.



Commenced 2022/23

Reduction Trajectory

Ravensdown has set out a decarbonisation plan to meet our 2030/2035 targets which rely on the current efforts showcased above, and others that are yet to come. For scope 1 and 2 emissions, the plan follows the trajectory set out in Figure 7. (Note that the emissions sources added in 2022 have been removed for comparability, and that the impact of White Rock quarry coal has been removed from all years to avoid the perception of significant reduction in emissions following its sale.)



Scope three reductions will come from a range of identified actions over a longer time horizon. These include modest fertiliser use as a result of high prices, legislative controls and emissions pricing; uptake of on farm mitigation solutions; investment,

development and rapid commercialisation of new technology; scale up of precision agriculture tools, particularly inhibitors; scale up of low emissions international shipping and lower carbon manufacturing of inputs.

FIGURE 7: Emissions to date, modelled projects against 1.5°C target

Stakeholder Impact

Employees

This year we carried out a survey of select staff to ask how we might help them to reduce their own carbon footprint. It achieved high engagement (45%): 60% of respondents stated that they would appreciate help to better understand their impact on climate change so we shared advice and a calculator and ran

a promotion to measure engagement and uptake. It proved to be a great way to stimulate thinking and conversations about personal impacts and identified additional ways that Ravensdown can help such as financial incentives. Some comments from staff:

“This was really interesting, thank you. It’s the first time I’ve been able to see where most of my emissions come from. Quite thought provoking”

“Imagine how much I can further reduce by using my eBike as my main mode of transport, which would cut out half, if not more, of my travel emissions”

“Mine should come down next year as we put solar panels on our house late 2022 & have ordered an EV due February 2023”

“I thought it might be lower as I mainly cycle, but car and flying far outweigh my efforts! Looks like there’s room for improvement for us!”

Board members

This year Board members were required to travel less as a number of Board meetings were scheduled on Microsoft Teams to minimise travel. We estimate that this saved 10t of GHG emissions from flights alone over the course of the year.

Customers

We recognise the huge impact of scope 3 emissions through on farm use of our products. We have long sought to minimise this through quality advice: precise, efficient application and informed choice of fertiliser products. Going forward, our focus will also be on understanding the embodied carbon of specific products to provide customers improved information on emissions and mitigation options, and to build on staff knowledge to ensure that all customer-facing staff are well equipped to evaluate and advise farmers on climate mitigation options.

Suppliers

This year we continued to build on our work to evaluate suppliers on climate action with great success. We again circulated our sustainability survey to all preferred suppliers and this year added specific questions on our focus areas of human rights and carbon footprints. We received 50 responses from our preferred suppliers with 15 already having available product footprints. We reward leading suppliers with an annual sustainability performance award. We also seek to support the lower performers so that they improve, rather than lose our business.

Iwi

Ravensdown is taking a stronger partnership approach to ensure that our climate response supports Māori stakeholders and that te ao Māori is considered in our business strategy and practices. Our te ao Māori group is developing important pou: matauranga, tikanga, kaitiakitanga and manaakitanga, to guide our work and better incorporate te ao Māori perspectives, for example the value matauranga Māori has for guiding sustainable farming practice.

Stakeholder Impact

Government

This year a major achievement was the establishment of a Joint Venture partnership with other industry partners and the government to work together to advance GHG reduction technologies for the agriculture sector. 'AgriZero' will see a joint investment of **\$172m** over the next four years to develop and commercialise practical tools and technologies for farmers to significantly reduce biogenic methane and nitrous oxide emissions.

We appreciate the support of the Electricity Efficiency and Conservation Authority (EECA) on our decarbonisation journey, having received co-funding for two coal reduction projects.

We continue to shape policy to support pragmatic, effective and meaningful climate action through submissions on government proposals.

Industry Collaboration

Our memberships to Sustainable Business Council, Climate Leaders Coalition and Aotearoa Circle help us to stay connected to climate and sustainability leaders in New Zealand, collaborate on new initiatives and research, ensure we are across the latest standards and methodologies, support and partner with like-minded businesses, share best practice and engage with government on the need for appropriate climate action.





Nature-Related Risk & Opportunity 07.

In preparation for the next frontier of climate action, including the assessment of nature-based risks and net positive targets, Ravensdown this year took the opportunity to also consider nature-related risks and opportunities. We undertook an initial assessment following the framework set

out by the Taskforce on Nature-Related Financial Disclosures, identifying impacts on nature throughout our value chain (Table 3), and then mapping our dependencies, risks, opportunities and outcomes (Fig. 8). This will form the basis for our long-term direction with clear goals and measures related to nature.

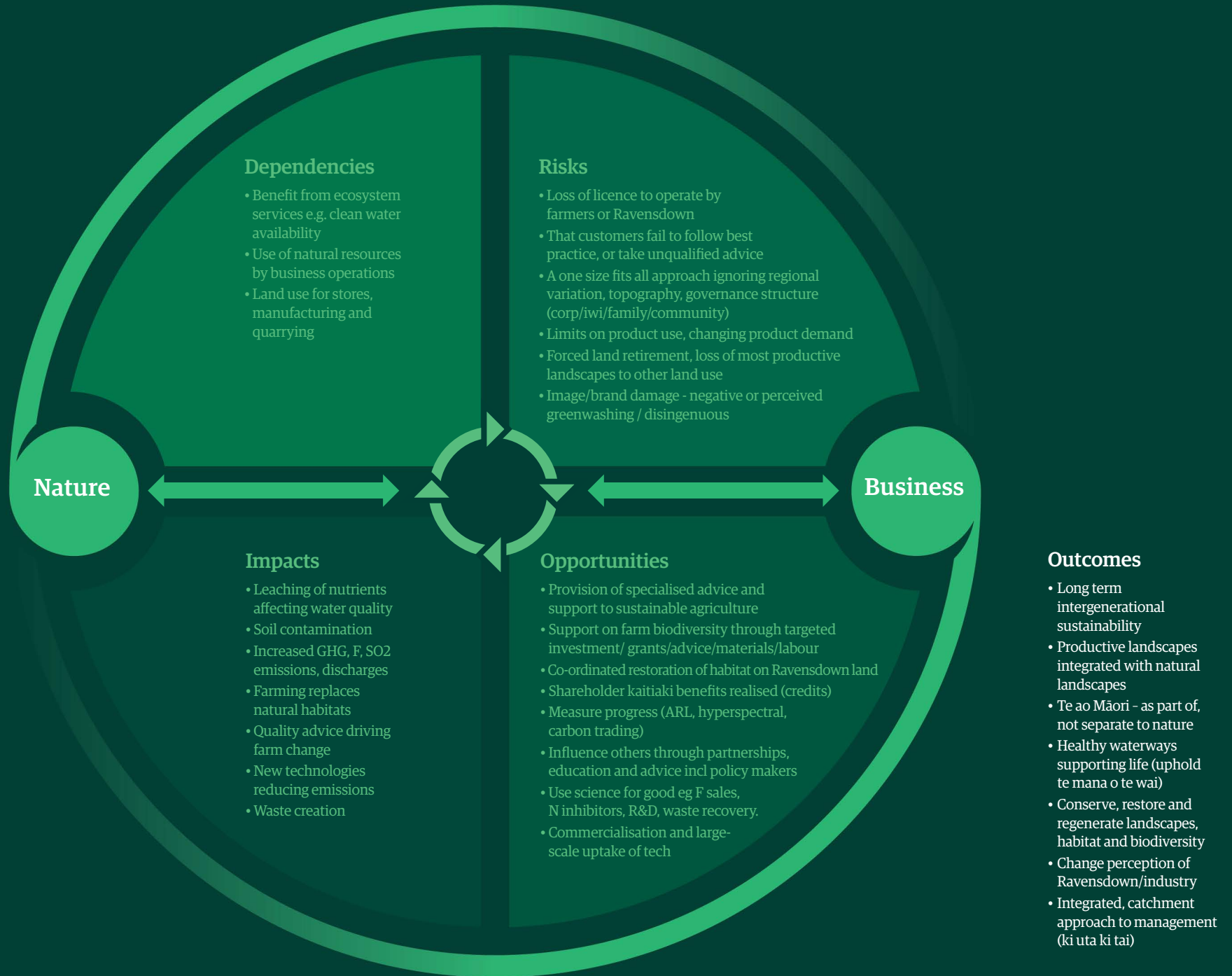
The governance and risk assessment approach described above for climate similarly applies to nature. This year we advanced ongoing biodiversity commitments with several projects at operational sites focused on habitat restoration (page 32).

| |
|-----------------|
| Not material |
| Least material |
| Medium material |
| Most material |

TABLE 3
Value Chain

| | | Value Chain | | |
|---------------|------------|-------------------------|---|---|
| | | Upstream (Supply chain) | Operations | Downstream (Farm) |
| Nature Realms | Freshwater | | Consented manufacturing discharges (NPE, CHC) Operational discharges | Leaching of nutrients Quality advice driving farm change (+) |
| | Ocean | | Consented manufacturing discharges (DUD) | |
| | Land | Mining of raw materials | Historic soil contamination Waste creation, e.g. packaging | Farming replaces natural habitats |
| | Air | | Consented manufacturing emissions | |
| | Atmosphere | GHG emissions | GHG emissions | New technologies reducing emissions (+) GHG emissions |

FIGURE 8:
Ravensdown initial
mapping output for
nature



Recent biodiversity case studies



Te Kuiti

Rejuvenation of two wetlands on Māori Trust land within Supreme quarry footprint.

Awatoto

Habitat restoration to improve biodiversity by creating an area of permanent wetland next to manufacturing site.



Ngarua

Support to community-led native plant propagation area, giant land snail monitoring, native habitat restoration and pest management.



Ōtautahi

Three new stormwater pond areas completed.

Kakahu

Wetland establishment to protect and enhance Māori rock art site.



Dipton

7.2ha of native forest planted to rehabilitate quarry land, restore habitat, draw down carbon (90t/yr) and restore nature.



Summary

08.

Ravensdown has a robust and well-understood GHG inventory that is reducing annually and we have a plan in place to continue this towards the targets that we have set. We are working with others to ensure that GHG emissions are kept within necessary limits and to maximise resilience of the primary sector to the impact of climate change.

Commencing the climate risk adaptation process has enabled us as a business to better understand the risks we are exposed to now

and into the future, and to establish a process to regularly reassess them and to take action to prepare for and manage them.

We understand the intersection of climate change and nature, the critical current position and that the problems that our business causes and is exposed to cannot be addressed in isolation. We are committed to a long-term approach and committed to being transparent about the journey.





Appendicies

Appendix A: Disclosure Requirements

| TCFD Requirement | | Page |
|------------------------------|--|--------|
| Governance | a) Describe the Board's oversight of climate-related risks and opportunities. | 9 |
| | b) Describe management's role in assessing and managing climate-related risks and opportunities. | 9 |
| Strategy | a) Describe the climate-related risks and opportunities the organisation has identified over the short, medium, and long term. | 13 |
| | b) Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning. | 14 |
| | c) Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario. | 11, 14 |
| Risk Management | a) Describe the organisation's processes for identifying and assessing climate-related risks. | 16 |
| | b) Describe the organisation's processes for managing climate-related risks. | 16 |
| | c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organisation's overall risk management. | 16 |
| Metrics & Targets | a) Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process. | 18 |
| | b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks. | 20, 21 |
| | c) Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets. | 22 |

| Climate Leaders' Coalition Requirement | | Page |
|---|--|------------|
| Measuring our emissions, having them independently verified, and reporting them publicly. | | 20, 21, 37 |
| Adopting short-and-long-term gross absolute science aligned targets for scope 1, 2, and 3 emissions to limit future warming to 1.5°C. | | 22 |
| Assessing climate change risks and opportunities (including in the value chain), setting objectives/target(s) to reduce these risks and maximise opportunities, and publicly disclosing them. | | 13, 14 |
| Proactively enabling our employees, board members, customers, and suppliers to reduce their emissions and reduce their climate change risks. | | 27 |
| Embedding plans within our businesses to accelerate climate action across mitigation, adaptation, and transition, and incorporate te ao Māori perspectives. | | 24, 25 |
| Preparing for the next frontier of climate action, including considering the assessment of nature-based risks and long-term climate positive targets. | | 30-32 |

| GHG Protocol Requirement (Bold Only) | Page |
|---|-------------|
| Organisational boundaries chosen, including the chosen consolidation approach | 18 |
| Operational boundaries chosen and list specifying which types of scope 3 activities are covered | 18, 20 |
| The reporting period | 18 |
| Total scope 1 and 2 emissions independent of GHG trades | 21 |
| Emissions data separately for each scope | 21 |
| Emissions data for all six GHGs separately (CO₂, CH₄, N₂O, HFCs, PFCs, SF₆) in metric tonnes and in tonnes of CO₂^e | 38 |
| Year chosen as base year, and an emissions profile over time that is consistent with and clarifies the chosen policy for base year recalculations | 21, 22 |
| Appropriate context for any significant emissions changes that trigger base year emissions recalculation | 18 |
| Emissions data for direct CO₂ emissions from biologically sequestered carbon (e.g. CO₂ from burning biomass/biofuel), reported separately from scopes) | 38 |
| Methodologies used to calculate or measure emissions, providing a reference or link to any calculation tools used | 18 |
| Any specific exclusions of sources, facilities, operations | 18 |
| Optional information: | |
| Emissions data from relevant scope 3 emissions activities for which reliable data can be obtained. | 21 |
| Emissions data further subdivided where this aids transparency, e.g. by business unit/facility, country, source type, and activity type. | 20, 39 |
| Emissions attributable to own generation of electricity, heat, or steam that is sold or transferred to another organisation. | 21 |
| Emissions attributable to the generation of electricity, heat or steam that is purchased for re-sale to non-end users. | N/A |
| A description of performance measured against internal and external benchmarks. | 10 |
| Emissions from GHGs not covered by the Kyoto Protocol (eg NOx), reported separately from scopes. | N/A |
| Relevant ratio performance indicators (e.g. emissions per tonne of production or sales). | 38 |
| Outline of GHG management/reduction programs or strategies. | 24, 25 |
| Information on any contractual provisions addressing GHG-related risks and obligations. | N/A |
| External assurance provided and a copy of any verification statement of the reported emissions data. | 37 |

Appendix B: Assurance Statement



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Independent Limited Assurance Report to the Directors and Management of Ravensdown Limited ('Ravensdown')

Assurance Conclusion

Based on our limited assurance procedures described below, nothing has come to our attention that causes us to believe that Ravensdown Limited's greenhouse gas ('GHG') emissions inventory ('GHG Inventory') (including Scope 1, Scope 2 and Scope 3 emissions for the year ended 31 December 2022 has not been prepared and presented fairly, in all material respects, in accordance with the Criteria defined below.

Other Matters

We note that Calendar Year 2018 GHG emissions have been recalculated and restated in the current year and GHG emissions reductions have been measured from this baseline year. EY has not assured the restated 2018 emissions figures. Our opinion is not modified within respect to this matter.

Scope

Ernst & Young Limited ('EY') has performed a limited assurance engagement in relation to Ravensdown's GHG Inventory disclosures for the year ended 31 December 2022, in order to conclude that nothing has come to our attention that the GHG Inventory does not meet, in all material respects, the requirements of the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard ('The GHG Protocol').

Subject Matter and Criteria

The subject matter for this limited assurance engagement includes Ravensdown's GHG emissions (including Scope 1, Scope 2 and Scope 3 emissions) for the year ended 31 December 2022.

The criteria for our assurance engagement was the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard ('The GHG Protocol'). Emissions factor sources include:

- ▶ New Zealand Ministry for the Environment, *Measuring Emissions: A Guide for Organisations (2020)*.
- ▶ UK Department of Business Energy & Industrial Strategy, *Greenhouse gas reporting: conversion factors (2020)*.
- ▶ Fertiliser Association (Ledgard & Falconer), *Update of the carbon footprint of fertilisers used in New Zealand (2019)*.
- ▶ Climate Change (Forestry Sector) Regulations 2008, *Schedule 6, Table 2*.

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Page 2

The procedures we performed were based on our professional judgement and included, but were not limited to, the following:

- ▶ Conducting interviews with personnel to understand the business and reporting process.
- ▶ Confirming sources of GHG emissions and the measurement methodology
- ▶ Confirming the sources of data used in calculating the GHG emissions
- ▶ Identifying and testing assumptions supporting the calculations.
- ▶ Tests of calculation and aggregation.
- ▶ Comparing year on year activity-based GHG emissions and energy data where possible.
- ▶ Checking organisational and operational boundaries to test completeness of GHG emissions sources.
- ▶ Checking that GHG emissions factors and methodologies have been correctly applied as per the criteria.
- ▶ Checking the reasonableness of the methodologies where site specific methods have been selected by management.
- ▶ Reviewing the appropriateness of the presentation of disclosures.

Limitations on scope

There are inherent limitations in performing assurance - for example, assurance engagements are based on selective testing of the information being examined - and it is possible that fraud, error, or non-compliance may occur and not be detected. There are additional inherent risks associated with assurance over non-financial information including reporting against standards which require information to be assured against source data compiled using definitions and estimation methods that are developed by the reporting entity. Finally, adherence to ISAE 3000 (NZ), ISAE 3410 (NZ), and the GHG Protocol is subjective and will be interpreted differently by different stakeholder groups.

Our assurance was limited to the Subject Matter and did not include statutory financial statements. While we considered the effectiveness of management's internal controls when determining the nature and extent of our procedures, our assurance engagement was not designed to provide assurance on internal controls. Our procedures did not include testing controls or performing procedures relating to checking aggregation or calculation of data within IT systems. Our assurance is limited to policies, and procedures in place as of 28 August 2023, ahead of the publication of Ravensdown's GHG Inventory.

Independence

We confirm that EY has complied with all professional regulations relating to independence in relation to this engagement. EY has stringent policies and procedures in place to ensure independence requirements are addressed and monitored on a timely basis.

Ernst & Young applies Professional and Ethical Standard 3 which requires the firm to design, implement and operate a system of quality management including policies or procedures regarding compliance with ethical requirements, professional standards, and applicable legal and regulatory requirements.

Use of Report

Our responsibility in performing our assurance activities is to the Directors and Management of Ravensdown only, and in accordance with the terms of reference for this engagement, as agreed with Ravensdown. We do not therefore accept or assume any responsibility for any other purpose or to any other person or organisation. Any reliance any such third party may place on the Subject Matter is entirely at its own risk. No statement is made as to whether the Criteria are appropriate for any third-party purpose.

28 August 2023
Ernst & Young Limited
Auckland

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Appendix C: GHG Emissions Breakdowns

TABLE 4: Emission intensity - tCO₂^e per tonne sold (fertiliser, rolling 3-year avg)

| Year | CY 2019 | CY 2020 | CY 2021 | CY 2022 |
|--|---------|---------|---------|---------|
| Scope 1, 2, 3A | | | | |
| Intensity/t | 0.1169 | 0.1166 | 0.1103 | 0.1062 |
| Scope 1, 2, 3A and 3B - including on farm | | | | |
| Intensity/t | 1.0839 | 1.0907 | 1.0642 | 1.0296 |

An important part of the analysis is to calculate emissions on an intensity basis as well as absolute to establish whether the cause of a reduction is due to efficiency or changed activity levels, particularly in years such as this with considerably lower sales.

On an emissions intensity basis i.e. per tonne of fertiliser sold, GHG emissions have decreased from 0.08 tCO₂^e/t to 0.03 tCO₂^e/t.

TABLE 5: Total emissions by gas 2022 calendar year

| | TOTAL | CO ₂ | CH ₄ | N ₂ O | | HFCS | PFCS | SF ₆ |
|------------------------------|-------------------------------|------------------|-----------------|-------------------------------|------------|-------------------------------|------|-----------------|
| | tCO ₂ ^e | tCO ₂ | t | tCO ₂ ^e | t | tCO ₂ ^e | | |
| Scope 1 (excl. seq) | 17,031.58 | 10,769.54 | 1.16 | 41.30 | 49.71 | 188.59 | N/A | N/A |
| Scope 2 | 1,370.24 | 1,335.87 | 0.89 | 31.73 | 0.70 | 2.64 | | |
| Scope 3 (excl. biof.) | 984,399.92 | 415,846 | 8.05 | 301.18 | 150,676.43 | 568,624.29 | | |
| Sequestration | (4.34) | (4.34) | - | - | - | - | | |
| Biofuel | 0.60 | 0.59 | 0.00 | 0.00 | 0.00 | 0.00 | | |

The Greenhouse Gas Protocol's corporate standard requires a breakdown of emissions by gas; this is provided in Table 5.

The most significant sources of emissions by facility are listed in Table 6.

*NB in accordance with MfE detailed guidance on GHG inventory development - fertiliser use numbers may not add due to rounding

*Biofuel values are less than 1.0 (but not zero)

Appendix C: GHG Emissions Breakdowns 2023 calendar year

Table 6: Emissions disaggregated by facility >100t (tCO₂e)

| Facility | Stationary Combustion | Total Emissions |
|---------------------|-----------------------|-----------------|
| Aerowork | 0 | 3,946 |
| Geraldine Lime | 1,206 | 1,624 |
| Dipton Lime | 1,098 | 1,323 |
| Napier Works | 468 | 1,314 |
| Christchurch Office | 0 | 1,272 |
| Christchurch Works | 307 | 594 |
| Dunedin Works | 244 | 579 |
| Supreme Lime | 0 | 321 |
| Greenleaf Lime | 0 | 130 |
| Seadown Store | 0 | 141 |
| New Plymouth Store | 0 | 127 |
| Ngarua Lime | 0 | 110 |
| Nelson Store | 0 | 101 |

Appendix D: Scenario Narratives

Characteristics of 'Orderly' (scenario 1-1.5°)

Short (2023-2030)

- Strong policy and high prices throughout 2020's
- 2030 methane target met (10% reduction)
- Carbon price \$140
- Diesel price \$3.50/L

Medium (2030-2040)

- Technological developments e.g. Vaccine/methane and nitrification inhibitor
- Land use change dairy to horticulture, sheep + beef to forestry
- Nitrogen sales down 20%: 100% of urea sales inhibited, super, lime down 10%
- Four sites at high flood risk

Long (2040-2050)

- Carbon price - NZ\$250/t in 2050
- Lesser physical climate impacts
- High end of methane target met (45%) through technology and land use change
- Significant land use change:
 - 5% dairy converted to horticulture
 - 0.50 million ha sheep + beef converted to forestry
 - Dairy cows - 2.28m (current 4.95m - 31.7% reduction on 2020)
 - Sheep and beef stock units - 36.2m (current 47.6m - 24% reduction on 2020)

16% NZ population increase



1.5°C increase in global temperature



.25m sea level rise



+15 extreme heat days



-10 snowfall days



+15% extreme rainfall



Characteristics of 'Disorderly' (scenario 2)

Short (2023-2030)

- Little impact, current trends continue
- Weak policy and pricing action
- Carbon price ~\$90
- Diesel price \$3.50/L
- National target(s) not met

Medium (2030-2040)

- Delayed and severe policy response
- Severe climate risks eventuate

Long (2040-2050)

- Emissions stabilise
- Carbon price ~NS\$250/t in 2050
- Significant land use change

Characteristics of Hot House (scenario 3-3°)

Short (2023-2030)

- Weak policy and pricing action in 2020's
- Carbon price ~\$90
- Diesel price \$3.50/L
- Methane target(s) not met

Medium (2030-2040)

- Strong physical climate impacts (drought, flood) affecting farm viability, some farms abandoned, govt support offered for adaptation and retreat
- Inequality and global insecurity intensify
- 15 store sites at high flood risk

Long (2040-2050)

- Carbon price ~NZ\$186/t
- 14% reduction in dairy herd compared to 2019
- Significant land use change:
 - Dairy cows - 4.16m (current 4.95m)
 - S+B stock units - 40.2m (current 47.6m)

32% NZ population increase



3°C increase in global temperature



.35m sea level rise



+30 extreme heat days



-20 snowfall days



+22% extreme rainfall



Key resources:

- NIWA climate projections for New Zealand under different emissions pathways (RCPs) (Ministry for the Environment, 2018)
- SSPs showing a range of different socioeconomic scenarios (Riahi et al., 2016)
- IEA World Energy Model scenarios (IEA, 2021)
- Shared policy assumptions for NZ (SPANZ) exploring how domestic policy and land use could evolve (Frame et al., 2018)
- Agri Adaptation Roadmap (Aotearoa Circle, 2023)
- Climate Change Commission's (CCC) pathways for New Zealand's energy, land use and agriculture systems (CCC, 2021)



Climate Disclosure

2023