A Market Survey to Ascertain Offsetting Demand

Prepared by the Climate and Energy Finance Group

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Prepared for: The Forestry Ministerial Advisory Group (FMAG)

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Disclaimer

This report was commissioned by the Forestry Ministerial Advisory Group to survey New Zealand Businesses and review the literature on carbon offset demand, mitigation deterrence and abatement approaches of firms. The report is only for the use by the entity that commissioned it and solely for the purpose stated above. The Climate and Energy Finance Group shall have no liability to any other person or entity in respect of this report, or for its use other than for the stated purpose.

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Executive Summary

The Forestry Ministerial Advisory Group (FMAG) provides independent advice to the Minister of Forestry on a range of topics across the forestry system. One such topic is that of carbon offsetting through plantation and native forests in voluntary markets and the New Zealand Emission Trading Scheme (ETS).

FMAG commissioned this research to understand the demand for carbon offsetting, its drivers, and the extent to which this affects the forestry sector in New Zealand. The Climate and Energy Finance Group was contracted to execute this research, which involved undertaking a systematic literature review (provided in a standalone report), and a survey that would help gauge the demand for carbon offsetting and its drivers in New Zealand.

The survey was targeted at decision makers from a range of entities including some respondents from local councils and Iwi organisations. The survey was administered between December 2022 and February 2023 resulting in 70 respondent (93% completed the survey and 80% completed the follow-on discrete choice experiment). Most respondents (82%) were part of a sustainability or climate related network, which could signal either a response bias, as we asked some of these networks to distribute the survey, or a general trend of New Zealand Businesses toward joining such networks, which are not particularly onerous. However, the sample exhibits a wide demographic spread across private and listed companies, climate reporting and non-reporting entities, ETS participants and non-participants etc (see Tables 1, 2 and 3).

FMAG specifically required insights into the following questions, which we present along with the relevant survey findings below.

1. What position do NZ firms hold on offsets? Is it consistent with the Science Based Target Initiative (SBTi) position? [1]
    a. High level of agreement (47% and 21% highly agree and agree, respectively) across the sample with the SBTi position on offsets that companies should focus on emissions reduction and only consider offsetting for reductions beyond their science-based or net-zero targets.

2. In addition to the carbon price, what factors do firms consider in their decisions over whether to offset or decarbonise?
    a. When asked directly, capacity to implement, cost of emission reduction, and customer, shareholder and board preferences were the most important factors driving the decision to offset, abate or inset emissions by respondents.
    b. From the Discrete Choice Experiment (DCE), where respondents are asked to make decisions between hypothetical emission reduction solutions, the most important attributes (based on the mean weight indirectly assigned to them by respondents) were the effect on biodiversity (26.1%), credibility (19.7%), and brand value (17.7%) considerations and these were unexpectedly far more important than the cost (8.4%). This shows that when choosing how to reduce emissions, the respondents consider and value these aspects much more than just the cost.

3. To what extent do firms understand their own abatement cost curves?
    a. Respondents had limited understanding of abatement costs, as abatement plans were un-costed and when projects were costed respondents relied heavily on the payback period rather than more sophisticated decision-making metrics[3]. Further, respondents predominantly did not know how much it would cost to reduce their emissions by 25%, 50% or 100%.

[1] The SBTi position limits the role of setting to additional net emission reductions, beyond the climate targets of the entity, which in turn should not be met through offsetting, but rather adaptation (see page 13).

4. At what price is a firm likely to shift from purchasing emissions reductions outside of its own value chain (i.e., offsetting) to reducing emissions in its own activities?
    a. The exact price that would shift the decision making is hard to ascertain as respondents did not have a sophisticated understanding of their abatement costs, however they did express high abatement intentions and actions currently, while also expecting future (2030) carbon prices to be much higher. Therefore, there may be some risk to these abatement plans if the carbon price expectations are not met.

5. Are firms adopting insetting to support capex decisions on emissions reduction technology?
    a. Not many respondents are engaged in insetting and insetting intentions are also relatively low.
    b. When insetting is being undertaken, credibility and cost-effectiveness are the key drivers of that decision.

6. What premium are firms willing to pay for nature-based carbon for offsetting? (i.e., NZUs sourced from a native forest, or a forest managed for native succession.)
    a. Of the respondents that have purchased carbon offset credits in the last year, most (79%) are willing to pay a premium, with 4 respondents willing to pay 20% or more above the NZU price, to purchase credits sourced from native or transition forests.

7. Would a public reporting regimen that distinguished between offsetting and decarbonising, impact firm decision making?
    a. The sample was split evenly between Climate Reporting Entities (CREs), which have to report under the new mandatory Climate Disclosure Standards, and non-CREs. There is effectively no difference in their emission reduction intentions or actions in terms of abatement, offsetting or insetting pathways.

Beyond the insights to the specific questions above, the survey produced some further important insights around abatement intention.

- Respondents in the sample are prioritizing abatement (74% of future emission reductions) over offsetting (12%) and insetting (14%) in their emissions reduction plans and most have started to implement (67%) or identified (14%) specific abatement projects.
- Future (2030) carbon credit (NZU) price expectations are high and those respondents expecting a higher or much higher future price have higher abatement intentions and actions.

[3] The payback rule is an investment decision making tool which requires an investment to return the initial investment within a certain time period. This rule ignores the time value of money (compound interest) and risk aspects of the investment decisions, which is incorporated by other tools such as the net present value (NPV) or internal rate of return (IRR).

Policy recommendations

These recommendations are made by the authors focusing on the insights from the survey study, but also considering the broader context of the current New Zealand Climate Change Policy settings.

- The ETS is the Government's principal policy lever to incentivize emissions reductions in the New Zealand economy. In this study the expectation for a higher future carbon price relates to high abatement intention and action, which supports the conclusion that the ETS does influence firms' decisions to abate emissions.
    - Policy interventions which decrease future NZU price expectations (i.e. overallocation, oversupply from forestry etc) may lead to mitigation deterrence, i.e. more offsetting as opposed to high abatement intentions by respondents.
    - There is a strong need for transparent and consistent mechanisms for ETS policies and managing unit volume[4] under the New Zealand emissions budget to avoid the waterbed effect[5] and encourage investment into abatement projects, especially over longer investment horizons.
    - The main issue for policy makers is to decide whether the ETS should drive gross emission reduction, through abatement, or net emission reduction in large part through forestry.
- The potential for an oversupply of carbon credits sourced from monocrop exotic forests, excessive industrial allocation, and large NZU stockpiles creates potential risks to New Zealand's journey to net-zero.
    - Overall, policies which affect the quantity of NZUs available in the market need to align with New Zealand's carbon budgets, regardless of the source.
    - Further investment into exotic monocrop 'carbon farms' (see figure 1 for recent jump in exotic forest registrations into the ETS) may lead to large increases in the supply of low cost NZUs, which will decrease the price and could shift some emitters from abatement to offsetting and further decreases the relative feasibility of carbon farming through native forest regeneration projects, which come with substantially higher costs.
    - Respondents that had purchased carbon offsets in the last year stated that they are willing to pay a premium for credits sourced from native and transition to native forests.
- Our survey of emitting entities shows high intentions for abatement of emissions rather than offsetting and most agreed with the SBTi position on offsets. This supports a recommendation that offsetting should be reserved for hard-to-abate emissions or emissions reductions beyond net-zero targets.
- The issue for policy makers, beyond allowing the price to meet the expectations required for abatement action, is not whether firms are avoiding the difficult choice of investing in emissions reductions within their value chains, but how they can be supported in their plans to abate their emissions. Examples of this could be in the form of
    - Subsidies or payment for outcomes for abatement projects, particularly for scope 3 emissions (emission up and down the supply chain).
    - Capability building in emission measurement and abatement project planning and execution.
    - Co-investment or guarantees to support project financial feasibility.

[4] An example of this are 'automated' or 'rules based' solutions, like the EU's Market Stability Reserve which adjusts unit volume by applying a pre-established formula.

[5] Many companies intend to abate, and this may run ahead of the cap in reducing emissions, which potentially frees up extra units that other companies may use to emit, thereby neutralising the gains made, if the total net emissions are not managed.

Introduction and Background

For New Zealand to achieve net zero by 2050, businesses need to invest in long-term, transformative decarbonization—switching to renewable energy, electrifying transport, cutting energy use, and swiftly scaling up the innovations in heavy industry by 2030. Alongside taking these critical steps to decarbonize, businesses are recognizing the challenges they face to do so and understand they must also invest in immediate action. Thus, in addition to decarbonizing where possible, businesses are turning to tools such as carbon offsetting, through voluntary and mandated carbon markets.

The growth in voluntary carbon markets[6] has been accompanied by increased global scrutiny around the role of offsetting in net-zero pathways. In the short term, offsetting is criticised for enabling 'mitigation deterrence' – that is, deterring firms from investing in emissions reductions within their own value chains by adopting new technologies, substituting high-emissions sources for alternatives, and increasing efficiency, as they can instead purchase and potentially stockpile offset credits to meet their surrender obligations (SBTi,2021; Markusson et al.,2018; McLaren,2020).

Mitigation deterrence poses challenges for Aotearoa New Zealand where forestry and other offsets play an uncommonly prominent role in the net-zero pathway. Furthermore, at the national level, the New Zealand Government's emissions reductions strategy depends substantially on its net position, largely achieved this decade by the supply of domestic and international units generated by sequestration (Ministry for the Environment,2021). As indicated in Figure 1, exotic trees are dominating as a source of domestic sequestration carbon credits (NZUs) in the ETS, with 87% of all registered forests being exotic as of January 2023.

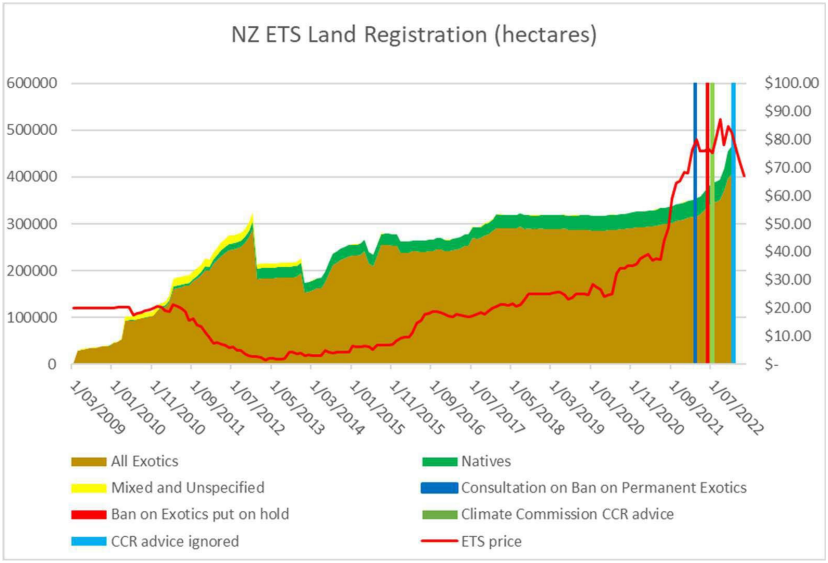


Figure 1 ETS land registrations and price. This chart shows the increased registration of exotic forests in the ETS and related regulatory announcements.

[6] Voluntary carbon offsetting, while it can use units from the NZ ETS, is not specifically regulated by the New Zealand Government. Offsetting done outside of the ETS occurs in voluntary carbon markets (Ministry for the Environment, 2021).

To provide independent, data driven advice on offsetting demand and its interaction with the forestry sector, the Forestry Ministerial Advisory Group (FMAG) commissioned a research project to understanding whether forestry settings in the New Zealand Emissions Trading Scheme (NZ ETS) have created a risk of mitigation deterrence (and the associated risk of perceived deterrence) among New Zealand firms.

The aim of this research project is to help FMAG understand and balance the policy priorities of disincentivizing mitigation deterrence while continuing to encourage the protection, management and creation of beneficial forests[7].The project was devised as a survey of a cross section of organisations in New Zealand supported by insights from a literature review. The Climate and Energy Finance Group (CEFGroup) based at the Otago Business School was contracted to execute a survey to answer the following questions:

1. What position do NZ firms hold on offsets? Is it consistent with the Science Based Target Initiative (SBTi) position?
2. In addition to the carbon price, what factors do firms consider in their decisions over whether to offset or decarbonise?
3. To what extent do firms understand their own abatement cost curves?
4. At what price is a firm likely to shift from purchasing emissions reductions outside of its own value chain (i.e., offsetting) to reducing emissions in its own activities?
5. Are firms adopting insetting to support capex decisions on emissions reduction technology?
6. What premium are firms willing to pay for nature-based carbon for offsetting? (i.e., NZUs sourced from a native forest, or a forest managed for native succession.)
7. Would a public reporting regimen that distinguished between offsetting and decarbonising, impact firm decision making?

[7]For example, transition or native forests which are grown, restored or protected can have many co-benefits beyond carbon sequestration such as positive impacts on biodiversity, erosion control, soil health etc. These forests require substantial up-front and ongoing capital for proper planning, execution and management, which can attained by earning NZUs in the ETS.

Survey Design and Distribution

Method, Distribution and Response

A survey questionnaire and a discrete choice experiment were utilised to gather evidence on the demand for offsetting and its related drivers. The survey questionnaire was designed and distributed through the Qualtrics platform while the discrete choice experiment was executed in the 1000minds platform. Upon completing the questionnaire in Qualtrics, respondents were directed to 1000minds.

A targeted sample of 150 organisations drawn from the membership directory of the Sustainable Business Council, the NZ ETS registry, and the New Zealand Stock Exchange (NZX) were surveyed through direct email invitation being sent to either the sustainability manager or officer, the chief executive officer or another member of the management team involved in sustainability or climate issues. The survey was further distributed through several industry groups including the Sustainable Business Network, the Centre for Sustainable Finance and the Institute of Finance Professionals New Zealand and was also shared on LinkedIn and other social networking platforms.

Seventy organisations responded to the survey, of these 65 completed the survey questionnaire in Qualtrics and of this sample of 65 organisations, 52 went on to complete the discrete choice experiment in 1000minds which represents a completion rate of 93% for the survey questionnaire and 80% for the discrete choice experiment.

Survey Design

The survey was developed to directly address the questions posed by the FMAG. It was then further revised through the findings from the systematic literature review and interviews with key informants, namely carbon offset brokers and carbon management experts.

The survey consisted of a survey questionnaire and a discrete choice experiment[8]. The survey questionnaire, which is available in the appendix, included four main sections: organisation demographics, organisation climate strategy, organisation demand for offsetting and organisation abatement decisions.

The organisation demographics section asked respondents 7 questions about their firm characteristics including whether the organisation is a climate reporting entity, a New Zealand Emissions Trading Scheme (NZ ETS) participant or a member of sustainability related industry network. 11 questions on the organisation's position on climate measurement and reporting are included in the organisation climate strategy section; this section includes a question on organisation's level of agreement with the Science Based Target Initiative (SBTi) position on offsets. The company demand for offsetting section of the survey asks respondents four questions about their organisation's use of offsets, the reason for purchasing offsets and average price paid for offsets. The final section of the survey questionnaire on organisation abatement decisions included 7 questions on abatement and insetting project implementation and associated costs.

[8] A discrete choice experiment (DCE) or choice modelling, is a survey-based methodology for revealing respondents feelings about the attributes or characteristics of a service, product or policy. Through the choices made between two or more discrete alternatives, a DCE elicit preferences from participants without directly asking them to state their preferred options.

Demographic summary statistics

Table 1 shows the industry breakdown of the respondents, the sample has representation from most industries and the hard-to-abate industries are most represented, namely primary industries (16%), manufacturing (12%) or the utilities sector (11%).

Table 2, below, presents further demographic breakdowns of the respondent sample. Panel A shows that most of the organisations were either private (43%) or listed (35%) with crown entities, local councils and social enterprises occupying an equal share of the responses (5% each) and we had two Māori Entities respond. Panel B and C show that a majority are large firms (62%) and that the sample is split almost evenly between organisations which are climate reporting entities (51%) and those that are not (49%).

Table 1 Industry Demographics. This table shows the industries in which respondent organisations operate. Respondents were allowed to select more than one industry.

Industry	Number of responses per industry	Percentage of responses
Agriculture, Forestry and Fisheries	18	16%
Manufacturing	13	12%
Electricity, Gas, Water and Waste Services	12	11%
Construction	9	8%
Professional, Scientific and Technical Services	8	7%
Wholesale Trade	7	6%
Retail Trade	7	6%
Information Media and Telecommunication	6	5%
Financial and Insurance Service	5	5%
Other Services	4	4%
Public Administration	4	4%
Accommodation and Food Services	3	3%
Transport, Postal and Warehousing	3	3%
Rental, Hiring and Real Estate Services	3	3%
Administrative and Support Services	2	2%
Education and Training	2	2%
Health Care and Social Assistance	2	2%
Mining	1	1%
Arts and Recreation Services	1	1%
Total	**110**[2]	

[2] Note: respondents could select more than one sector for their organisation.

Table 2 Organisation type, size and climate reporting status. This table shows the types of organisations that responded to the survey in Panel A, the size of the organisations based on annual income in Panel B and the climate reporting status of the organisations in Panel C.

Panel A		
Organisation Type	**Number of respondents**	**Percentage of responses**
Private	28	43%
Listed	23	35%
Crown Entity	3	5%
Not-for-profit/social enterprise	3	5%
Local Council	3	5%
Māori Trust or iwi Entity	2	3%
State Owned Enterprise	3	5%
Panel B		
Organisation Size		
Large	40	62%
Medium	18	28%
Small	7	11%
Total	**65**	
Panel C		
Climate Reporting Entity (CRE) Status		
CRE	33	51%
Non-CRE	32	49%
Total	**65**	

Table 3, below, provides some further demographic information. Of the respondents, 32% of the organisations in the sample are mandatory participants in the NZ ETS, 12% are voluntary participants[9] and the majority (55%) do not participate in the ETS. Providing a good spread of ETS participants and non-participants for further analysis. The sustainable or climate related industry network membership of the sample is also reported in Table 3. Panel B shows that the most popular memberships are in either the Sustainable Business Council (26%), the Climate Change Leaders Coalition (22%) or the Sustainable Business Network (17%), while a large portion (18%) are not part of any of the networks.

Potential response bias

As the survey was sent to a wide range of target respondents, distributed via climate and sustainability networks, shared on social media and passed on by respondents the population it is drawing from is hard to pin-point. However, investigating tables 1,2 and 3, we can see that there is a good distribution of respondents in terms of sector, size, CRE status, private/listed companies, ETS participation, which should alleviate some concern. When looking at the membership to climate or sustainability networks 82% of respondents hold at least one membership, which may show a bias in those engaged in these issues being more likely to respond to our survey, or that there is general trend of New Zealand Businesses toward joining such networks, which are not particularly onerous. Future research could widen the respondent sample .

[9] These are ETS participants that do not have surrender obligations, but choose to participate in the ETS market.

Table 3 NZ ETS participation and sustainable or climate related industry network membership. This table shows in Panel A the NZ ETS participation status of the organisations in the sample and sustainable or climate related industry network membership in Panel B.

Panel A		
NZ ETS Participation	**Number of responses**	**Percentage of responses**
Non-Participants	36	55%
Mandatory Participants	21	32%
Voluntary Participants	8	12%
Total	**65**	
Panel B		
Sustainable or Climate Related Industry Network Membership	**Number of responses per industry network**	**Percentage of responses**
Sustainable Business Council	28	26%
Climate Change Leaders Coalition	24	22%
No Membership	20	18%
Sustainable Business Network	19	17%
The Aotearoa Circle	9	8%
Other	4	4%
Centre for Sustainable Finance	2	2%
Primary Sector Climate Action Partnership	2	2%
Environmental and Sustainability Network	1	1%
Total	**109***	

Opinions on the SBTi position on Offsetting

Offsetting emissions with carbon credits from forestry raises some concerns: first, emitters may not be sufficiently incentivized to reduce their gross emissions (mitigation deterrence); second, increased carbon prices could precipitate large scale land use change from food production into forestry; third, fast growing exotic species such as *Pinus radiata* will be planted preferentially to slower growing, more expensive to establish natives species; and, fourth, the analysis shows that the majority of emitters (in the sample) are focused on emission reduction rather than offsetting, therefore those investing in carbon farming (especially *Pinus radiata* monocrop forests) today can earn significant mid- and short-term financial returns, but may be creating intergenerational risks and liabilities. In line with such concerns the Science Based Targets initiative (SBTi) made the below statement about offsetting:

> *"The Science Based Targets initiative (SBTi) requires that companies set targets based on emission reductions through direct action within their own boundaries or their value chains. Offsets are only considered to be an option for companies wanting to finance additional emission reductions beyond their science-based target (SBT) or net-zero target."*

The survey questionnaire solicited the opinions of respondents on the Science Based Target initiative (SBTi) position on offsetting by presenting the above statement and asking respondents to indicate their agreement within a Likert scale ranging from 'strongly disagree' to 'strongly agree'.

As shown in Table 4 there was a high level of agreement across the sample with the above SBTi statement on offsets as 47% and 21% of respondents expressed a 'strongly agree' or 'somewhat agree', respectively, while only 12% and 11% disagreed 'somewhat' or 'strongly', respectively. The highest levels of agreement was in the Professional, Scientific and Technical Services and Information, Media and Telecommunication

industries, while the lowest levels of agreement were registered in the primary and utilities industries, which may be expected as these are industries are often described as having a high proportion of 'hard-to-abate' emissions.

Table 4 Level of agreement with SBTi position on offsetting. This table shows the percentage of respondents expressing levels of agreement and disagreement with the SBTi statement on offsetting.

	Level of Agreement				
Industry	*strongly agree*	*somewhat agree*	*neutral*	*somewhat disagree*	*strongly disagree*
Professional, Scientific and Technical Services	86%	14%			
Information, Media and Telecommunications	83%	17%			
Financial and Insurance Service	67%	33%			
Retail Trade	57%	29%		14%	
Electricity, Gas, Water and Waste Services	50%	10%		20%	20%
Construction	50%	33%		17%	
Public Administration	50%		50%		
Other Services	50%	25%		25%	
Manufacturing	45%	18%	18%	18%	
Agriculture, Forestry and Fisheries	38%	25%		12%	25%
Accommodation and Food Services	33%	33%		34%	
Wholesale Trade	14%	43%	29%	14%	
Transport, Portal and Warehousing		33%	33%	34%	
Education and Training		50%		50%	
Full Sample	**47%**	**21%**	**9%**	**12%**	**11%**

Decarbonization plans, actions, and decision drivers

Emission Reduction Plans

The majority (73%) of organisations in the sample indicated that they had an emissions reduction plan, indicating a high level of corporate responsibility around climate issues within our sample of New Zealand entities. The organisations, however, do not seem to be very advanced in understanding the costs associated with decarbonization as 76% of the organisations with an emissions reduction plan indicated that the plan was not costed. Further, most respondents did not seem to have a deep understanding of the cost of their abatement intentions, as presented in table 5 below. This demonstrates that the organisations in the sample have a limited understanding of their abatement cost curve.

Table 5 Percentage of respondents who did not know abatement costs. This table shows the percentage of respondents that did not know the cost of reducing gross emissions of their organisation by 25%, 50% and 100%.

Cost to reduce emissions by	Average costs indicated by respondents	Percentage of respondents that respond 'Don't Know'
25%	$18.6 M	78%
50%	$91.9M	75%
100%	$3.1M	87%

Further, as predicted by the literature (Blanco et al., 2020), most respondents (27%) indicated that their organisation use the payback period as the decision-making tool for abatement projects rather than more sophisticated approaches such as the net present value (19%), internal rate of return (20%) or the marginal abatement cost curve (22%), which is problematic as the payback rule ignores longer term payoffs, implications of the time value of money and risk considerations.

Results from the survey indicate that respondents in the sample are prioritizing abatement over offsetting and insetting in their emissions reduction plans. Intentions for abatement, as represented by the percentage that respondents allocate to abatement in their emissions reduction plan, were high with the average allocation across the full sample being 74%, while allocation to offsetting and insetting was only 12% and 14%, respectively (Table 6 below). Surprisingly the highest average abatement allocation, when broken down by industry, was 87% for the manufacturing industry. There was generally higher abatement intention in hard-to-abate industries (primary industries, manufacturing, utilities and construction), regulated ETS participants and larger companies.

Abatement Intentions

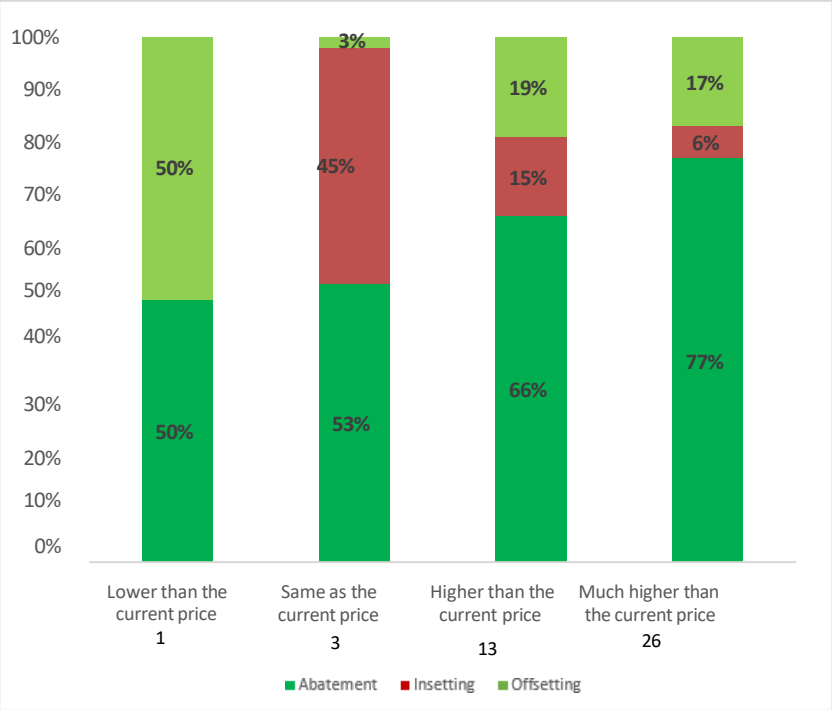
A driving factor of the high level of abatement intension in emissions reduction plans among the sample appears to be expectations for a higher future carbon price (in 2030). The relationship between expectations for a higher future carbon price and the average allocation to abatement in emissions reduction plans is illustrated in Figure 2, which shows that as expectations for the future carbon price increase, abatement occupies a greater share of the average allocations in the emissions reduction plans of respondent organisations[3].

Respondent organisations that indicated that they expect 'a much higher' future price of carbon have a greater percentage (77%) of their emissions reduction plans allocated to abatement when compared to those that expect a 'lower' future carbon price (50%)[2].

This points to a potential issue for policymakers as a large part of price expectations in the ETS are impacted by policy decisions, as can be anecdotally observed in figure 1 above. If that is truly the case then implementing policies which decrease price expectations, may also decrease the level of abatement intentions and lead to mitigation deterrence.

[3] Please note that the number of respondents that expect the future price to be lower or the same as the current price is extremely low.

Figure 2 Average allocations in emissions reductions grouped by expectations for future carbon price. This chart shows the relationship between expectations for the future carbon price and average allocations made to abatement, insetting and offsetting in the emissions reduction plans of respondent organisations.



Impact of carbon reporting regime on offsetting and abatement

Almost half (48%) of the respondents indicated that their organisation is a climate reporting entity under the recently released climate disclosure standards, which came into effect in January 2023. The climate disclosure standards do distinguish between offsetting and decarbonising. These respondents, on average, indicated that 70% of their emissions reduction plan was allocated to abatement which is the same average allocation made by non-climate reporting entities in the sample as shown in Panel F of Table 6. The reporting regime does not appear to impact abatement intentions at the time of our survey.

- When respondents were asked if a reporting regime which distinguished between offsetting and decarbonising would impact their decision to abate, a majority (63%) indicated that it would.
- Additionally, when asked which factors influence their organisation's decision to offset, inset or abate emissions, 5% of respondents indicated that the introduction of disclosure regulations was a factor (see table 8 below).

Table 6 Average percentage of emissions reduction plans allocated to abatement, insetting and offsetting. This table shows the average percentage of respondent's emissions reduction plans allocated to abatement, insetting and offsetting.

	Abatement	Offsetting	Insetting
Panel A: Full Sample	**74%**	**12%**	**14%**
Panel B: Industry			
Agriculture, Forestry and Fisheries	76%	16%	8%
Manufacturing	87%	10%	3%
Electricity, Gas, Water and Waste Services	66%	14%	21%
Retail Trade	82%	5%	13%
Construction	82%	15%	3%
Wholesale Trade	82%	14%	4%
Information Media and Telecommunications	82%	14%	4%
Professional, Scientific and Technical Services	52%	23%	25%
Education and Training	54%	25%	21%
Health Care and Social Assistance	75%	25%	0%
Panel C: Organisation Type			
Listed	73%	24%	4%
Crown Entity	72%	13%	16%
Local Council	98%	0%	2%
Private	70%	19%	11%
Māori Trust or iwi Entity	3%	28%	70%
State Owned Enterprise	75%	10%	15%
Not-for-profit	80%	20%	0%
Panel D: NZ ETS Participation			
Mandatory ETS Participants	76%	14%	10%
Voluntary ETS Participants	53%	36%	11%
Non-ETS Participants	71%	17%	12%
Panel E: Size			
Large	77%	17%	6%
Medium	58%	22%	20%
Small	5%	5%	90%
Panel F: Climate Reporting Entity (CRE) Status			
CRE	70%	23%	7%
Non-CRE	70%	11%	19%

Abatement Action

A high level of abatement action is also being reported by survey respondents, as 67% of respondents indicated that their organisation has implemented some or all abatement projects identified, while 14% had identified, but not implemented abatement projects. Abatement action among respondents in our sample is highest in hard to abate sectors; these results are reported in Table 7.

The high level of abatement intention and action will be driven by a confluence of factors, however we believe the future expectations for the price of carbon may be an important driver. As presented in figure 3 below, a majority of respondent organisations which think that the future price of carbon will be higher or much higher than the current price have identified abatement projects and started implementing some or all of them as indicated in Figure 3.

Figure 3 Abatement action of respondents based on expectations for future carbon price. This chart shows the relationship between expectations for the future carbon price and abatement action of respondent organisations.

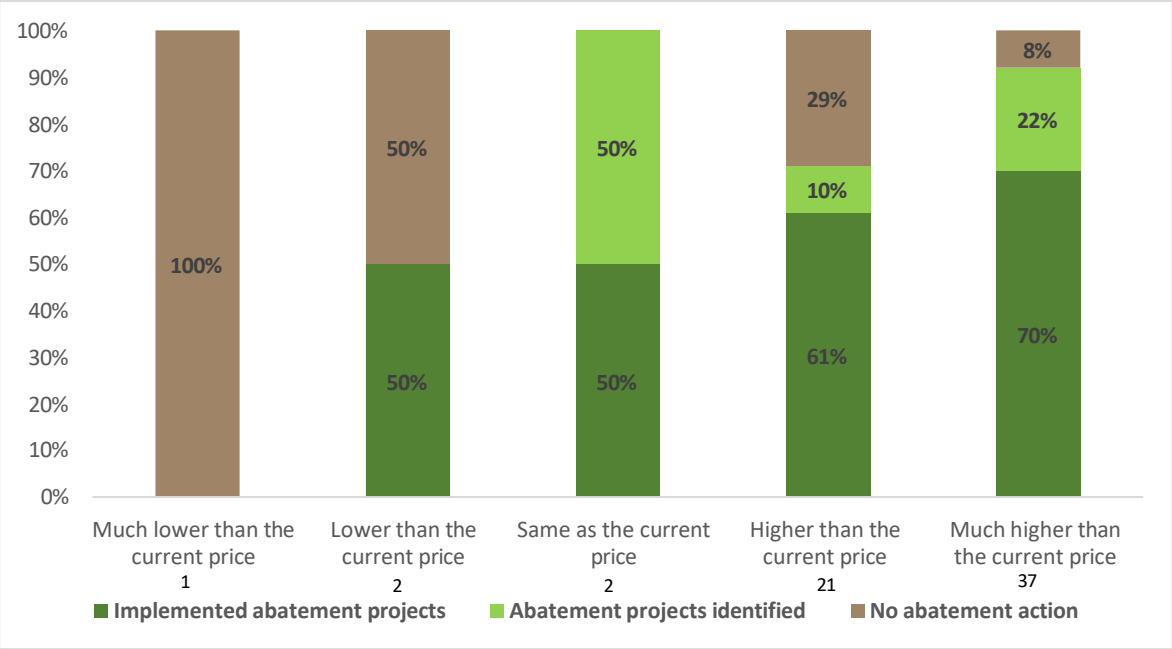


Table 7 Abatement action by full sample, industry, organisation type, size, CRE status and NZ ETS Participation. This table shows the percentage of respondents in the sample that indicated that their organisation has either implemented or identified abatement projects. The results for the full sample are reported in Panel A, the results broken down by industry and organisation type are reported in Panel B and C respectively while the results by organisation size, climate reporting status and NZ ETS participation are reported in Panel D, E and F respectively.

	Implemented Abatement Projects	**Abatement Projects Identified**	**No Abatement Action**
Panel A: Full Sample	67%	14%	19%
Panel B: Industry			
Agriculture, Forestry and Fisheries	53%	24%	24%
Manufacturing	100%	0%	0%
Electricity, Gas, Water and Waste Services	82%	9%	9%
Retail Trade	100%	0%	0%
Construction	86%	14%	0%
Wholesale Trade	86%	0%	14%
Professional, Scientific and Technical Services	86%	14%	0%
Information Media and Telecommunication	83%	0%	17%
Transport, Postal and Warehousing	67%	0%	33%
Accommodation and Food Services	67%	33%	0%
Financial and Insurance Service	67%	0%	33%
Education and Training	50%	0%	50%
Panel C: Organisation Type			
Listed	77%	18%	5%
Crown Entity	75%	0%	25%
Local Council	75%	0%	25%
Private	62%	12%	27%
Māori Trust or iwi Entity	33%	67%	0%
State Owned Enterprise	50%	50%	0%
Not-for-profit	0%	0%	100%
Panel D: Organisation Size			
Large	86%	8%	5%
Medium	44%	25%	31%
Small	14%	29%	57%
Panel E: Climate Reporting Entity (CRE) Status			
CRE	81%	16%	3%
Non-CRE	54%	15%	31%
Panel F: NZ ETS Participation			
Mandatory Participants	90%	5%	5%
Voluntary Participants	83%	17%	0%
Non-Participants	48%	22%	30%

Drivers of plans and actions

Most of the respondents choose the option *'about right'* to the question regarding their perception of the current carbon price (the average price over the survey period was of $73 per NZU), however 59% and 33% believe that the future carbon price will be 'much higher' and 'higher', respectively. Those respondents that expect the price to increase also had more abatement intentions in their emission reduction plans and far higher execution and identification of abatement projects, as previously discussed. This indicates that the price of carbon credits, particularly expectations of future prices, can affect entities decision making on emission reduction or offsetting, which has important implications for policy makers around settings which affect the supply, demand and consequently the price of NZUs.

In addition to the carbon price, the survey explored additional drivers of decisions around emissions reductions being made by respondent organisations. When asked about the factors considered when making the decision whether to abate, inset or offset, most respondents highlighted capacity to implement projects (12%), project cost (12%) and board opinions (11%) as the most common decision drivers, although many other factors also come into the decision, highlighting the complex nature of these decisions. For a full breakdown of these responses, see Table 8 below.

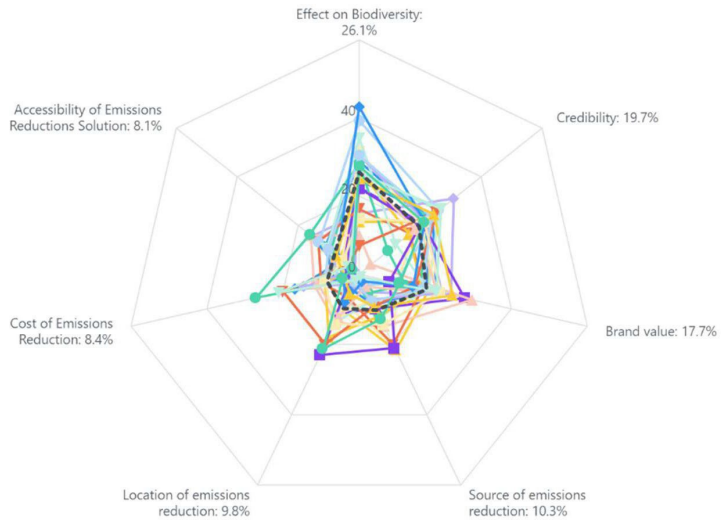
Table 8 Factors considered when making emissions reductions decisions. This table shows the number and percentage of respondents that selected factors considered in the decision of their organisation to abate, offset or inset emissions. *Respondents were allowed to select more than one response.

Factors	Number of Respondents	Percentage of Respondents
Our capacity to implement abatement and in setting projects	43	12%
The cost of abatement and insetting projects	41	12%
The opinions of the board on our carbon emissions	37	11%
The opinions of our customers/clients	32	9%
International best practices for emissions reductions	32	9%
The opinions of our shareholders on our carbon emissions	31	9%
The price of NZU credits	28	8%
We look at what the rest of the industry and our competitors are doing	28	8%
Regulatory changes in the emissions trading scheme	28	8%
The opinions of our employees on our carbon Emissions	22	6%
The introduction of regulations on disclosure of Emissions	19	5%
Other	10	3%
	351*	

Asking respondents to make complex trade-offs by asking them directly about decision driving factors, as in Table 8 above, or between multifaceted emission reduction approaches, can make it difficult to tease out true priorities. Therefore, the discreet choice experiment in 1000minds was also used to explore the attributes considered by respondent organisations when making decisions between various emission reduction pathways. In the discrete choice experiment, respondents were asked to make a series of hypothetical trade- offs between emission reduction pathways, which each only presented a combination of two attributes.

As indicated in Figure 4, on average the first, second and third most important attributes were effect on biodiversity (26.1% mean weight), credibility (19.7%) and impact on brand value (17.7%) respectively, while the cost (8.4%) and accessibility (8.1%) were the least important. This was quite surprising and shows that the respondents are thinking beyond just the cost of emission reductions and their emission reduction decisions are more influenced by these broader effects.

Figure 4 Discrete Choice experiment results. This figure shows the relative mean weights assigned to the emissions reductions attributes in black and the weighting for each individual respondent in the coloured lines. Each axis represents an attribute, with the mean weight reported beside each attribute.



Demand for Offsetting and Insetting

There is generally a low level of demand for offsetting, relative to abatement of emissions, among the sample, and most respondents have not purchased carbon credits. The percentage of respondents who indicated that their organisation had purchased carbon offset credits within the last year was surprisingly low (31%), indicating low demand for offsets. This also points to a high level of consistency in the position that these firms hold on offsets and their limited use of offsets for emissions reduction.

The overall conclusion from the abatement and offsetting actions, of organisations in our sample, is that expectations for an increase in the price of carbon has not enabled mitigation deterrence, as expected in the literature (Markusson et al.,2018; Aronold and Toledano,2021) via increased purchases of offset credits, but instead has spurred firms into abatement actions. The low demand for offsetting is consistent with the high level of agreement (47%), across the sample, with the Science Based Target Initiative (SBTi) position on offsets.

Despite the low demand for offsetting among the sample, of the 14 respondents that had purchased offsets in the last year, 11 indicated willingness of their organisation to pay a premium for native forest offsets, with 3 indicating willingness to pay a 2% premium, 3 a 10% premium and 3 a premium greater than 20% as shown in Table 9.

Table 9 Willingness to pay premium for native forest offsets.

Premium	Number	Percentage respondents
2%	3	27%
5%	1	9%
10%	3	27%
20%	1	9%
>20%	3	27%
Total	**11**	

Insetting was not a popular emissions reduction tool used by organisations that responded to the survey with only 24% of respondent organisations indicating that they have identified and started implementing insetting projects. The main reason respondent organisations, that indicated they had started implementing insetting, was its credibility relative to offsetting.

While there was not a significant uptake of insetting projects among organisations that responded to the survey there was a high preference for attributes we would ascribe to insetting with native forests, in the discrete choice experiment. Of the organisations adopting insetting, none selected that this was to support capex decisions on emissions reduction technologies.

Conclusion

The headline conclusion of this research is that offsetting is not the predominant tool for emission reductions by firms in our sample.

Offsetting, available through the New Zealand ETS and voluntary carbon markets, does not seem to have enabled mitigation deterrence among the firms surveyed as their demand for offsetting is low, relative to abatement. Further, respondents with an expectation for a higher future carbon price had higher proportion of abatement, that is investing in emissions reductions within their own value chains, in their emission reduction plans. This speaks to the effectiveness of the New Zealand Emissions Trading Scheme as sending a price signal influencing firms to abate emissions when this is more cost effective. As higher future price expectations seem to relate to abatement plans and actions, if the intent of the ETS is to motivate emission reductions, future policies need to allow NZU prices to increase over time to motivate and meet expectations of our respondents, who are already focusing on abating rather than offsetting their emissions.

The organisations surveyed have a high level of intention, action and preference for abatement and are willing to pay a premium for offsets sourced from indigenous forest restoration when they do use offsets. Further, the discrete choice experiment revealed that the most important attributes for emissions reduction pathways are biodiversity impacts, credibility and the effect on the entity's brand value. Taken together this shows the preference by businesses to use indigenous forest credits, when credits are used to offset emissions.

Firms in our sample have a strong desire for abatement, what is now needed is the enabling environment and support infrastructure to allow them to deepen and entrench their abatement action. The green transition seems to be a priority within New Zealand firms, but steps need to be taken by policy makers to ensure it is sustained. The issue for policy makers is not whether firms are avoiding the difficult choice of investing in emissions reductions within their value chains, but how they can be supported in their plans to abate their emissions.

First, the expectation of an increasing carbon price, as is planned in the Government's latest Emissions Reduction Plan (ERP), needs to be maintained through clear policy direction and a decreasing unit supply in line with the New Zealand's Nationally Determined Contributions under the Paris Agreement. Beyond this we suggest a combination of subsidies or payment for outcomes for abatement projects, Capability building in emission measurement and abatement project planning and execution and lastly Co-investment or guarantees to support project financial feasibility, when these projects lead to abatement or for projects which sequester carbon and produce co-benefits.

Glossary

Insetting: Carbon insetting is reducing the entities net emissions by planting forests for sequestration or employing CCS technologies, within the companies own value chain, i.e. by planting a forest on some purchased land, as opposed to offsetting, which is done by purchasing credits from external projects/companies.

Abatement: Carbon Abatement is reducing the entities net emissions by reducing gross emissions within the companies own value chain, i.e. by replacing a internal combustion engine vehicle with an electric vehicle.

Offsetting: Carbon offsetting is reducing the entities net emissions by the practice of purchasing carbon offset units from other entities/projects which reduce carbon emissions (through reduction in their GHG emissions, planting forests for sequestration or employing Carbon Capture and Storage (CCS) technologies) outside the offsetting entities own value chain.

Credible carbon offsetting means reducing entities net emission footprint by the retirement or cancellation of units (also known as carbon credits) that meet the requirements of the respective voluntary or compliance carbon market/registry. When the unit is retired or cancelled, it is removed from circulation in that registry and cannot be used again by another buyer. (Ministry for the Environment,2020).

Compliance Carbon Markets: Compliance markets are created, managed and regulated by mandatory national, regional, or international agencies. These markets have set rules around how carbon credits are created, distributed and returned. In New Zealand, the Emissions Trading Scheme is a compliance market that requires mandatory participants to surrender a regulated amount of credits (NZUs), which they receive through industrial allocation, forest based carbon sequestration or by purchasing them from other entities. Non-mandatory participants may also generate, purchase and sell NZUs in the market.

Voluntary Carbon Markets: Voluntary markets operate outside of compliance markets and enable companies and individuals to purchase carbon offsets on a voluntary basis with no intended use for compliance purposes.

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Appendix

Section 1: Company Demographics

This section of the survey will ask general questions about your company

1. In which Industry does your company/organisation operate? Select all that apply

□ Agriculture, Forestry and Fisheries

□ Mining

□ Manufacturing

□ Electricity, Gas, Water and Waste Services

□ Construction

□ Wholesale Trade

□ Retail Trade

□ Accommodation and Food Services

□ Transport, Postal and Warehousing

□ Information Media and Telecommunications

□ Financial and Insurance Service

□ Rental, Hiring and Real Estate Services

□ Professional, Scientific and Technical Services

□ Administrative and Support Services

□ Education and Training

□ Health Care and Social Assistance

□ Arts and Recreation Services

□ Other Services

2. Is your company/organisation listed on the stock market, private or Māori Owned?
□ Listed

□ Private

□ Private- Māori owned business

3. Will your company/organisation be a climate reporting entity when the New Zealand Climate-related Disclosures Reporting Standards come into force in 2023?
□ Yes

□ No

□ I am not aware of the New Zealand Climate Standards

4. What is the annual revenue of your company/organisation?
□ <$1million

□ $1 million - $30 million

□ >$30 million

5. Is your company a member of any sustainable or climate related business or industry networks? Select all that apply
□ Sustainable Business Network

□ Climate Change Leaders Coalition

□ Environmental and Sustainability Network

□ The Aotearoa Circle

□ Sustainable Business Council

□ Net-Zero Banking Alliance

□ Centre for Sustainable Finance

□ NZ Climate and Health Council

□ Primary Sector Climate Action Partnership

□ Pastoral Greenhouse Gas Research Consortium

□ Climate Action Engineers
□ New Zealand Wind Energy Association

□ Other _____

6. Is your company a mandatory participant in the New Zealand Emissions Trading Scheme?

Mandatory participant: A person who carries out an activity listed in Schedule 3 of the Climate Change Response Act 2002
□ Yes, we carry out activities listed in Schedule 3 of the Climate Change Response Act 2002

□ No, we are voluntary participants

□ No, we are not participants

7. What is your job title/role in your company/organisation?

□ Chief Executive Officer

□ Chief Financial Officer

□ Executive

□ Director

□ Sustainability Officer

□ Sustainability Manager

□ Environmental Officer

□ Other (please explain) _____

Section 2: Company Climate Strategy and Metrics

This section of the survey will ask questions about your company's position on climate related issues

8.Does your company have a climate strategy or policy?

□ Yes, the strategy/policy is documented in our annual report

□ Yes, the strategy/policy is documented in a standalone public document

□ Yes, the strategy/policy is documented in our climate-related disclosures

□ No

□ Not sure/don't know

Skip Logic: If no or not sure/don't know is selected skip Q9 and go to Q10

9. How much of your company's climate strategy depends on abatement, offsetting or insetting of future emissions? Indicate using percentages, these may be estimates.

Definitions:

- *Carbon offsets are investments in environmental projects that reduce carbon emissions elsewhere to compensate for your company's carbon emissions.*
- *Carbon insetting projects are sequestration projects which are owned and operated within your company, as opposed to offsetting, which is done by purchasing credits from external projects/companies.*
- *Abatement is the reduction of the Greenhouse Gases (GHGs) within your company's operations or value chain.*

a. Abatement, _____%

b. Insetting, _____%

c. Offsetting, _____%

10. Has your company made a net zero pledge?
□ Yes, we have pledged to become Net Zero by _____

□ No

11. Does your company agree with the following statement by the Science Based Targets initiative (SBTi)?

Strongly disagree → Strongly agree

	1	2	3	4	5
"Companies should set targets based on emission reductions through direct action within their own boundaries or their value chains. Offsets should only be considered to be an option for companies wanting to finance additional emission reductions beyond their science-based target (SBT) or net-zero target"	Δ	Δ	Δ	Δ	Δ

12. Indicate your company's agreement with the following statements. *Mark only one box for each row.*

Strongly disagree → Strongly agree

	1	2	3	4	5
a) Any company should be able to offset their emissions	Δ	Δ	Δ	Δ	Δ
b) Only companies in hard to abate sectors should be able to offset their emissions	Δ	Δ	Δ	Δ	Δ
c) Offsetting distracts from the need for firms to cut their gross emissions	Δ	Δ	Δ	Δ	Δ
d) Forest offsets are the best type of offsets	Δ	Δ	Δ	Δ	Δ
e) Only native forests should be allowed for offsetting	Δ	Δ	Δ	Δ	Δ
f) Forest offsets will not be viable in the long run	Δ	Δ	Δ	Δ	Δ
g) If you had to report on gross, rather than net. Emissions firms are more likely to abate rather than offset their emissions	Δ	Δ	Δ	Δ	Δ

h) Forests that will be harvested should not be used for offsetting	Δ	Δ	Δ	Δ	Δ

13. Does your company measure and manage its carbon emissions?

□ Yes, we measure and manage our Scope 1 and 2 emissions only

□ Yes, we measure and manage our Scope 1, 2 and 3 emissions

□ No

Skip Logic: If no was selected skip Q14, Q15 and Q16 and go to Q17

Display Logic: If yes, we measure and manage our Scope 1 and 2 emissions only display Q14 and Q16

Display Logic: If yes, we measure and manage our Scope 1, 2 and 3 emissions was selected display Q14, Q15 and Q16

14. What was your company's gross carbon emissions (scope 1 and scope 2) for the year in tonnes of carbon dioxide equivalent (CO2e)?

State the estimated amount _____

15. What was your company's estimated gross scope 3 emissions for the last year in tons of CO2e?

State the estimated amount. _____

16. Has your company's gross (scope 1 and scope 2) carbon emissions increased or decreased the last year?

□ Our emissions increased by _____%

□ Our emissions decreased by _____%

□ Our emissions neither increased nor decreased

17. Indicate your company's view on the current price of carbon by using the scale to complete the follow statement:

We think the current price of carbon ($88.20NZU as at November 15,2022) is…

□ Very low

□ Low

□ About right

□ High

□ Very high

18. Indicate your company's expectation for the price of carbon in 2030 by using the scale to complete the following statement:

We think the price of carbon in 2030 will be…
□ Much lower than the current price

□ Lower than the current price

□ Same as the current price

□ Higher than the current price

□ Much higher than the current price

Section 3: Company Demand for Offsetting

This section of the survey will ask questions about your company's offsetting practices

19. Has your company purchased carbon offset credits within the last five years?

NZUs- New Zealand Units

VCUs- Voluntary Carbon Units

□ Yes, we purchased NZUs for use in meeting our obligations under the NZ ETS

□ Yes, we purchased NZUs for voluntary offsetting

□ Yes, we purchased VCUs from a domestic offset project

□ Yes, we purchased VCUs from an international offset project

□ No

Skip Logic: If no was selected skip all questions in this section and go to section 4

20. What is the total volume of carbon dioxide equivalent (CO2e) emissions your company has offset within the last five years?

_____

21. What is the average price per tonne of CO2e your company has paid for carbon offset credits:

_____

22. What is the reason(s) your company has purchased carbon offset credits? Select all that apply
□ To meet our net zero target

□ Carbon offset credits are cheap compared to our abatement and insetting options

□ The price of carbon is increasing so we wanted to purchase the carbon credits before they get too expensive

□ To reduce our overall cost of carbon compliance

□ Other _____

23. Would your company be willing to pay a premium for NZUs sourced from a native forest, or a forest managed for native succession?
□ Yes

□ No

24. At what price per tonne of CO2e is your company likely to shift from purchasing emissions reductions outside of its own value chain (i.e., offsetting) to reducing emissions in its operations and supply chain?

_____

Section 4: Company Decisions on Abatement and Insetting

This section of the survey will ask questions about your company's abatement and in setting practices

Definition: Abatement is the reduction of the Greenhouse Gases (GHGs) within your company's operations or value chain.

25. Has your company identified abatement projects?
□ Yes, we have identified abatement projects and have implemented some or all

□ Yes, we have identified potential abatement projects but have not started implementation

□ No

Skip Logic: If no was selected skip Q26 and Q27 and go to Q28

Skip Logic: If yes, we have identified abatement projects and have started to implement them was selected skip Q26 and go to Q28

Display Logic: If yes, we have identified abatement projects but have not started to implement them was selected display Q26

26. Why has your company not implemented any abatement projects identified?
□ They are too costly to implement

□ We were not able to secure financing from our bank or the greater capital market

□ We are awaiting co-funding support from the government

□ The carbon reduction we will see from the project is not sufficient to justify the investment, at the current carbon price

□ Other _____

27. Which investment decision tool/metric does your company use to assess abatement projects?
□ Payback period technique, what is your cut-off (in years)? _____

□ Net present value technique, what is the required rate of return (%)? _____

□ Internal rate of return method, what is the required rate of return (%)? _____

□ Marginal Abatement Cost Curve

□ Other _____

28. Is your company aware of the following schemes to support companies to source funding for, plan and implement abatement projects?

Scheme	**No, my company is aware of this scheme**	**Yes, my company is not aware of this scheme**	**My company has received support from this scheme**
Government Investment in Decarbonising Industry (GIDI) Fund	□	□	□
New Zealand Green Investment Finance (NZGIF)	□	□	□
Sustainable Agriculture Finance Initiative (SAFI)	□	□	□
Ara Ake- New Zealand Future Energy Centre	□	□	□

29. Indicate in the table below, the cost for your company to decrease gross emissions by the amount indicated

Percentage Reduction	Cost
10%	
20%	
30%	
40%	
50%	
Net-Zero	

30. Has your company identified in setting projects?

Definition: Carbon insetting projects are sequestration projects which are owned and operated within your organisation, as opposed to offsetting, which is done by purchasing credits from external projects/companies.

□ Yes, we have identified insetting projects and have started to implement them

□ Yes, we have identified potential insetting projects but have not started to implement them

□ No, we do not have the expertise to do insetting, so we prefer to offset our emissions

Skip Logic: If no was selected skip Q31 and go to Q32

Skip Logic: If yes, we have identified potential insetting projects but have note started to implement them was selected skip Q31 and go to Q32

Display Logic: If yes, we have identified insetting projects and have started to implement them was selected display Q31

31. Why has your company decided to implement insetting projects? Select all that apply

□ It is more cost efficient than offsetting

□ It is more cost efficient than abatement

□ It is a more credible way to reduce our emissions than offsetting

□ The carbon reduction we will see from the projects will allow us to meet our emissions reductions goals more quickly

□ Other _____

32. What factors does your company consider when making decisions over whether to offset, inset or abate your emissions? Select all that apply

□ The price of carbon

□ Our capacity to implement abatement and in setting projects

□ The cost of abatement and in setting projects

□ The opinions of the board on our carbon emissions

□ The opinions of our shareholders on our carbon emissions

□ The opinions of our shareholders on our carbon emissions

□ We look at what the rest of the industry and our competitors are doing

□ International best practices for emissions reductions

□ Regulatory changes in the emissions trading scheme

□ The introduction of regulations on disclosure of emissions

□ Other _____

Section 5: Preferences for Emissions Reduction Solutions

Discreet Choice Experiment (DCE)/Conjoint Analysis:

Which attributes are important to your company when choosing between emissions reduction solutions?

Emissions reduction solutions are hypothetical products, services, techniques or approaches which deliver a net reduction of carbon emissions.

This section of the survey will use the **1000minds software** to ask you to select between two hypothetical emissions reductions solutions.

For the purpose of this exercise, it may be useful to think of emissions reduction solutions as either offsetting, insetting or abatement and to assume that each solution delivers the same amount of net emissions reduction.

An output of this exercise will be a ranking of the attributes which are most important to your company when choosing emissions reduction solutions. The ranking will be displayed immediately after you have selected between the hypothetical emissions reductions solutions.

By clicking the arrow below you will be redirected to the **1000minds software**.

1000minds software link to be embedded at end of Qualtrics survey:
https://survey.1000minds.com/15722/r8ppek5xat/test