Spotlight on climate change

Closing the gap between rhetoric and action

FORSYTH BARR

The slow burning threat of climate change is moving fast.

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2021 was a year of headline news not only in terms of updated research and the release of clearly defined low carbon transition pathways but also in terms of increasing major weather events and policy signals. Frustrations from society at the slow pace of action spilled over into the streets and the topic of climate change made its way into boardrooms, courtrooms and parliamentary sittings. Net Zero targets for investors and corporates began to evolve from a committed few to the expectation of many.

Apart from a blip caused by COVID -19, global emissions continue to rise. 2020 was the seventh warmest year on record for NZ. Six of the warmest years on record have occurred in the past eight years. Meanwhile, funds have continued to flow into Sustainable Investment products over the last two years at unprecedented speed. Investors that have been able to accurately identify risks and opportunities in the journey towards a low carbon economy have so far been rewarded.

This report takes a look at some of the key developments of 2021 both globally and in New Zealand. We look at how some NZ companies are positioning themselves for a low carbon future and reflect on the enormous gap between what has been achieved and what needs to be done to realise objectives on climate change.

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Executive **summary**

At the end of 2021 the world came together for COP26 in Glasgow; it was the first formal review of countries' climate policies since the Paris Accord was agreed in 2015. 2021 was also a year when activism against climate change moved into the courts and boardrooms. We end this eventful year with a view that correctly identifying the risks and opportunities that companies and countries face in the journey towards net zero is becoming harder and more complex. This applies globally as well as to New Zealand.

Global developments — the year that was...

2021 was a year of headline news not only in terms of updated research and the release of clearly defined low carbon transition pathways but also in terms of increasing major weather events and policy signals. Frustrations from society at the slow pace of action spilled over into the streets and the topic of climate change made its way into boardrooms, courtrooms and parliamentary sittings. The year came to an end with high hopes that world leaders would agree an ambitious plan of action at COP26. To some commentators, the final muted tone of the main communique was disappointing. However, there is no doubt that states, companies and investors are quickly making net zero promises the norm. Meanwhile, funds have continued to flow into Sustainable Investment products over the last two years at unprecedented speed.

NZ developments — the gulf between rhetoric and accomplishments

The NZ Government continued to strongly signal its intentions for a net zero economy and on the eve of the start of COP26 Climate Change Minister, James Shaw, announced a more ambitious target to reduce net emissions by -50% below 2005 levels by 2030, compared to a -30% reduction previously. Notably, two-thirds of this reduction is expected to come from international carbon offsets. In June 2021, the Climate Change Commission released its first advice to government on a low emissions future for New Zealand and auctioning of New Zealand Units (NZUs) for the Emissions Trading Scheme began, with spot prices up over 80% YTD. The External Reporting Board (XRB) began its journey to develop standards for mandatory climate related financial disclosures. But on the ground little is changing. Aside from some obvious COVID-19 related reduced travel — our third annual summary of carbon emissions suggests no meaningful change for the vast majority of companies.

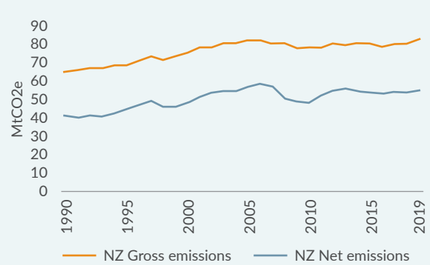
NZ equities

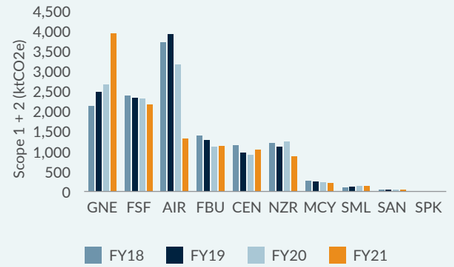
We take a look at four sectors, which include some of NZ's largest emitters, that are feeling the impacts of climate change. We assess how they are progressing towards a net-zero economy. Energy had a dramatic year with many renewable electricity project announcements. Agriculture has so far been relatively insulated but is critical to achieving NZ's climate ambitions. Dairy NZ has labelled the task of reducing methane by 10% as "incredibly challenging" for farmers, and this is just the first step. Construction is responsible for 13–20% emissions and many tenants now require buildings to be of a certain environmental standard before agreeing to leases. Material efficiency will play a large part in reducing construction emissions. Within Transport & Tourism rising sea levels impact on ports and low lying airports, as well as potential reduced consumer demand for air travel could have meaningfully negative long term impacts.

Driving the change

- Unequivocal research
- Weather events intensifying
- Defined pathways to net zero
- Policy signals across the world
- Activism by investors
- Litigation on the rise
- Boardroom focus
- Balance sheets hit

All rhetoric and no action





The gap is closing but a gulf remains

MEL: Has been carbon neutral for some time through buying and retiring carbon credits, growing forests to increase carbon offset alongside reducing it's own gross emissions.

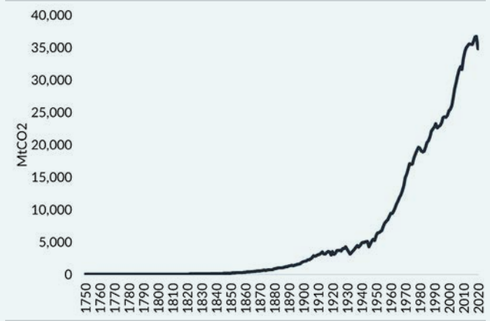
ARG: is using green bonds to help with the conversion of over 50% of its portfolio to green assets by 2031.

FSF: continues to advance well on its coal reduction plans and during 2020 it converted the boiler at its Te Awamutu site from coal to wood pellets. This helped reduce its carbon emissions from coal use by more than 11%.

Market-wide: Rising carbon prices mean the cost of building new wind and solar is now lower than the cost of carbon from running coal-fired units.

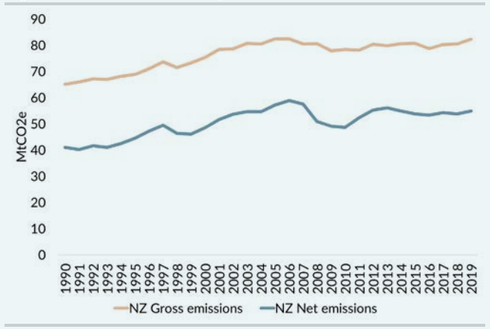
Our thesis in charts -
the gap between rhetoric and action

Figure 1. World annual emissions continue to rise...



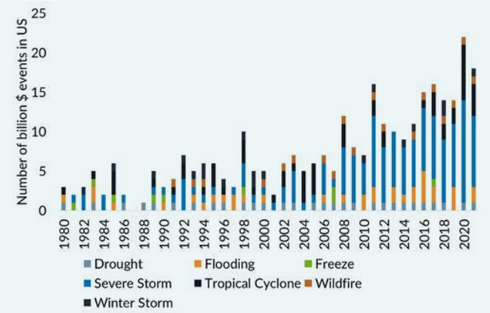
Source: Forsyth Barr analysis, Our World in Data, CO2 emissions only.

Figure 2. ... and NZ is no exception



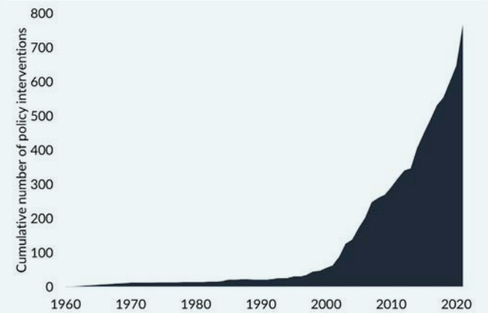
Source: Forsyth Barr analysis, Stats NZ. 2019 Greenhouse Gas Inventory.

Figure 3. ... even though balance sheets are being hit



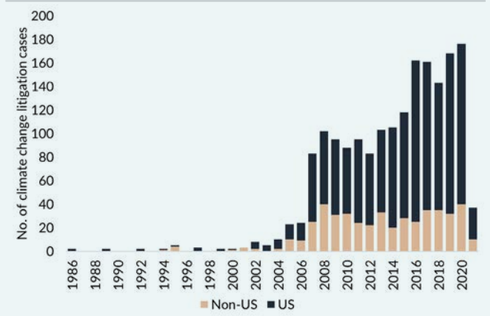
Source: Forsyth Barr analysis, National Centers for Environmental Information. CPI-adjusted.

Figure 4. Regulatory signals for action are strong...



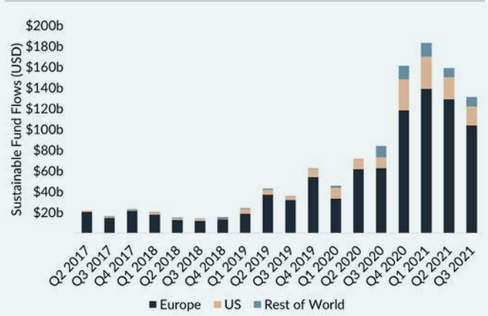
Source: Forsyth Barr analysis, UNPRI database. Sustainable finance policy interventions only.

Figure 5. ...and climate change related legal cases are growing...

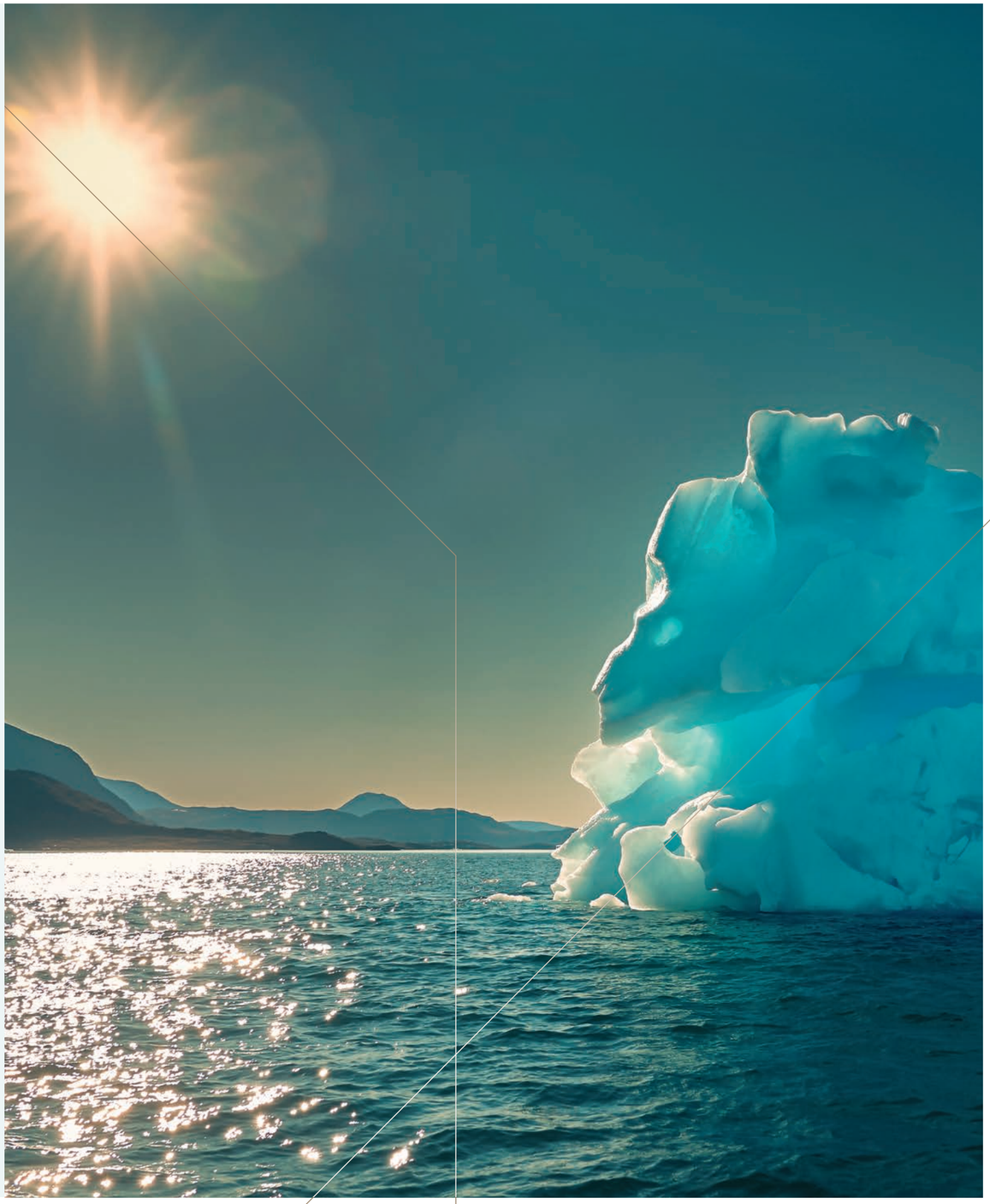


Source: Forsyth Barr analysis, Setzer and Higham (2021), London School of Economics. To May 2021.

Figure 6. ...as are Sustainability funds



Source: Forsyth Barr analysis, Morningstar



Global developments

COP26 finished off an eventful year for action on climate change which remains a core focus for society despite the pandemic. We saw activity on the streets across the globe via protests, a growing focus in courtrooms and boardrooms. The PRI's global database of existing and emerging sustainable finance policies and regulation has, so far in 2021, increased by 159 — more than any previous year. A notable trend that has escalated over the year is commitments by governments, companies and investors to a net zero emissions economy by 2050.

Code red for humanity
a call for immediate and rapid change

The IPCC released its 6th assessment report highlighting the need for rapid, immediate and large scale reductions in greenhouse gas emissions, calling our current situation a code red for humanity. The International Energy Agency provided a transformational pathway for us to get there. The facts and figures were in our hands and the world came together in Glasgow in November. Hopes were high that world leaders would agree an ambitious plan of action.

IPCC's Assessment Report 6 — a sobering reminder of the current trajectory...

August 2021 saw the release of the IPCC's Assessment Report 6. The Secretary-General of the UN, António Guterres, called the report a "code red for humanity". It provided new estimates of the chances of crossing the global warming level of 1.5°C in the coming decades and found that unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to 1.5°C or even 2°C will be beyond reach.

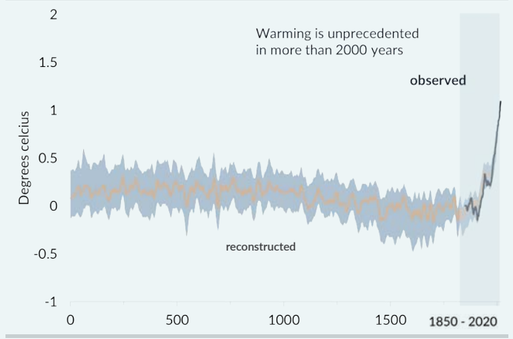
Explaining net zero

Net zero refers to a state in which the greenhouse gases going into the atmosphere are balanced by gases being removed. The term net zero is important because — for CO2 at least — this is the state at which global warming stops. The Paris Agreement underlines the need for net zero, requiring states to 'achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century'. The IPCC has concluded the need for net zero CO2 by 2050 to remain consistent with 1.5C. To ensure we are on track to meet the goals of the 2015 Paris Agreement, greenhouse gas emissions (GHG) must halve over the next decade, falling 7% every year through 2030. Last year the world met this, largely because much of the global economy was shut down as we managed a global pandemic. This demonstrates just how drastic the action is needed to do this year in and year out until 2030 and beyond. Country pledges to date cover around 70% of global GDP and CO2 emissions. However, fewer than a quarter of announced net zero pledges are fixed in domestic legislation and fewer yet are underpinned by specific measures or policies to deliver them in full and on time.

The magnitude of what needs to be done to bend the curve

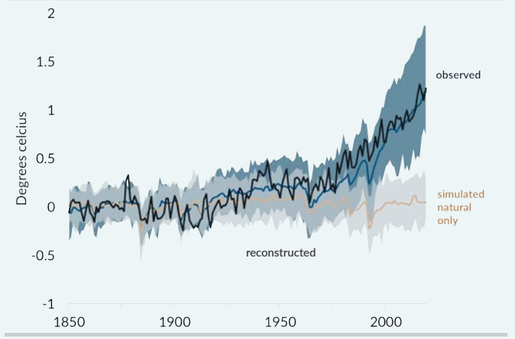
In May, the International Energy Agency (IEA) published a special report titled Net Zero by 2050: A Roadmap for the Global Energy Sector. The 227-page report, also known as Scenario 1.5C, details a pathway to achieve net-zero carbon emissions by 2050. The IEA makes it clear that to achieve this scenario, "nothing less than a complete transformation of how we produce, transport and consume energy" is needed. The report sets out clear milestones — more than 400 in total, spanning all sectors and technologies — for what needs to happen and when, to transform the global economy from one dominated by fossil fuels into one powered predominantly by renewable energy. The pathway requires vast amounts of investment, innovation, skilful policy design and implementation, technology deployment, infrastructure building, international co-operation and efforts across many other areas. One of the more notable milestones: "Beyond projects already committed as of 2021, there are no new oil and gas fields approved for development in our pathway, and no new coal mines or mine extensions are required". This action would lead to a sharp decline in fossil fuel demand, with coal demand declining 90% by 2050, gas 55%, and oil 75% by 2050. By 2050 almost 90% of global electricity would come from carbon-free sources, with 70% coming from solar and wind, and the rest mostly coming from nuclear.

Figure 7. Changes in global surface temperature, observed and reconstructed



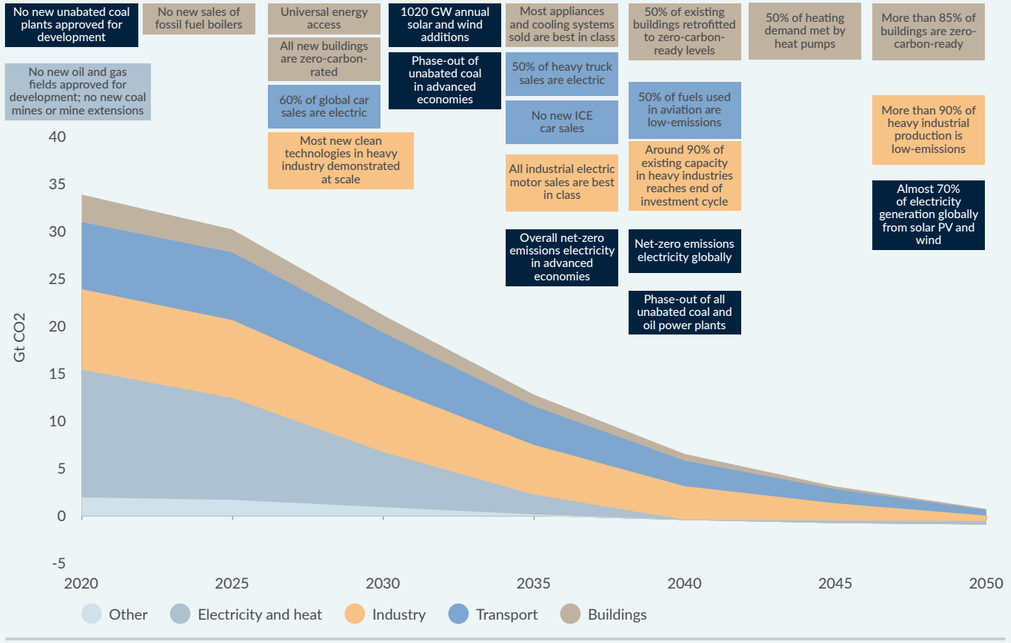
Source: IPCC AR6 Summary for Policy Makers. Temperature is decadal average.

Figure 8. Changes in global surface temperature, observed and and simulated using human & natural and only natural factors



Source: IPCC AR6 Summary for Policy Makers

Figure 9. Key milestones in the journey to Net-Zero



Source: International Energy Agency (2021), Net Zero by 2050, IEA, Paris

The effects of climate change
and society's response

2021 was a year of headline news on climate change, not only in terms of updated research and major weather events but also in terms of frustrations from society at the slow pace of action, and healthy scepticism that net zero commitments are empty promises. Climate change made its way into boardrooms, courtrooms, parliamentary sittings and onto the streets. Some notable examples include:

It's heating up in Canada, Greenland, USA, Australia...

After decades of steadily rising, global carbon dioxide emissions fell by -6.4% in 2020 or the equivalent of 2.3 billion tonnes due to the COVID-19 global pandemic. However, 2021 saw the continuation of increasing major weather events across the world. It rained rather than snowed for the first time on record at the peak of the Greenland ice sheet. A heatwave in Canada and parts of the US pushed temperatures to nearly 50C in a village in British Columbia. Months' worth of rainfall fell in the space of hours in China, and parts of Europe saw severe flooding, leading to casualties and major economic losses. A second year of drought in sub-tropical South America reduced the flow of mighty river basins and hit agriculture, transport and energy production.

...and on the streets across the globe

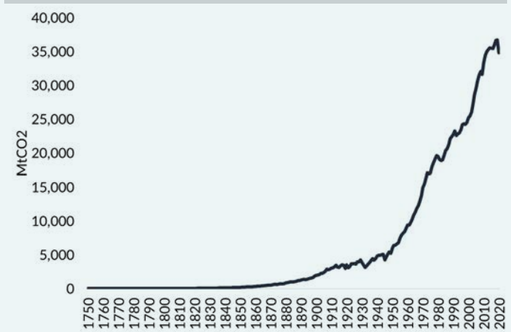
Online campaigns and street protests continued across the globe demanding more decisive action to tackle climate change. Amid the COP26 talks, more than 200 events worldwide were part of a coordinated mobilisation against a lack of urgency to address climate change, with kids often leading the charge.

Activist investors are becoming insiders and entering boardrooms...

Institutional Shareholders Service (ISS) reported that the 2021 U.S. proxy voting season marked an escalation of shareholder engagement on climate-related issues, as well as an expansion of tactics. Many investors are moving beyond requests for disclosure to voting against directors for perceived failures of climate risk mitigation. Two notable examples were:

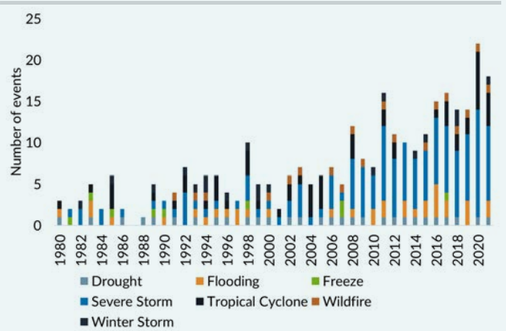
- In May, activist investor Engine No. 1 won three board seats at Exxon Mobil Corp, installing new directors committed to driving the company towards a clean energy transition. The hedge fund held less than 0.02% of Exxon Mobil's shares but campaigned to investors, arguing Exxon's refusal to accept that fossil fuel demand may decline in decades to come has led to a failure to take even initial steps towards evolution. Exxon's management wanted to expand its fossil fuel extraction, despite its recent losses. Engine No. 1 won control of a quarter of the board. BlackRock, Vanguard and State Street voted against Exxon's leadership and gave Engine No. 1 powerful support.
- On the same day at Chevron's AGM, shareholders supported a proposal for the company to substantially reduce the greenhouse gas emissions of its energy products (i.e. scope 3 emissions) in the medium and long-term.

Figure 10. World annual emissions



Source: Forsyth Barr analysis, World in Data

Figure 11. US >US$1bn disaster events (1980–2021)



Source: Forsyth Barr analysis, National Centers for Environmental Information. CPI-adjusted.

Figure 12. Map of global climate protests, Friday for Futures

Source: Friday for Futures.

....and the courts

Climate change related litigation continued its upward trend.

- In May, a Dutch Court ordered Shell to reduce its absolute levels of carbon emissions by 45% by 2030 versus 2019 levels. Earlier in the year Shell had set out one of the sector's most ambitious climate strategies with a target to cut the carbon intensity of its products (i.e. not absolute levels) at least 6% by 2023, 20% by 2030, 45% by 2035 and 100% by 2050, from 2016 levels. The court ruled that Shell's climate policy was "not concrete and is full of conditions… that's not enough".
- This year in Australia, eight teenagers (with the aid of an 86-year-old nun) sued the federal environment minister for negligence. They argued that the minister owed a duty of care to protect them from climate harm when approving new coal mines. The court didn't award the injunction the teens were after (to stop minister Sussan Ley from approving a particular coal mine expansion), but it did find that the minister owed a duty of care when making it.

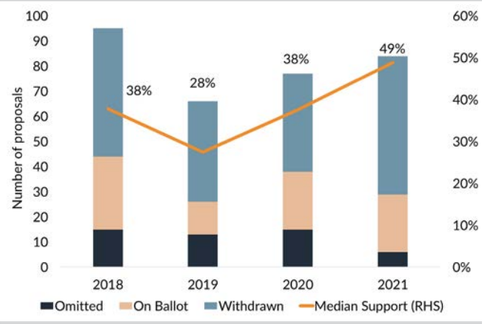
We anticipate a continued rise in litigation against governments and major emitters that fail to adopt serious long-term strategies that are underpinned by concrete plans and short-term emissions reduction targets. If an entity acts inconsistently with commitments and targets, or misleads the public and interested parties about their products and actions, they are also at increasing risk of litigation.

Green tape? The cumulative number of sustainable finance regulatory and policy signals is approaching triple digits...

The growth in sustainable finance related policies and regulations around the world continues to accelerate. The PRI keeps a regulation database which documents existing and in progress sustainable finance policies from around the world. It covers 750 policy tools and guidance, and more than 300 policy revisions. The database includes policies from 86 countries.

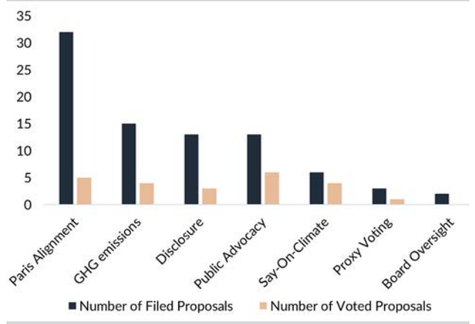
Of the policies identified, 96% have been developed since the year 2000. The pace continues to increase — the PRI has identified 159 new or revised policy instruments so far in 2021, more than the whole of 2020.

Figure 13. US climate-related shareholder proposals



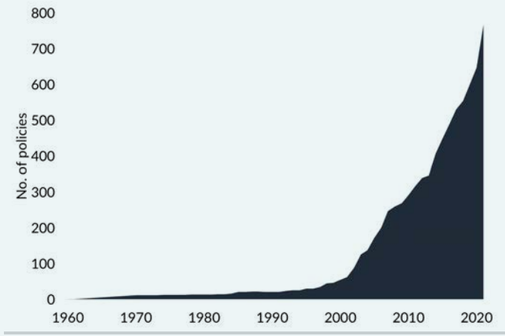
Source: Forsyth Barr analysis, Harvard Law School Forum on Corporate Governance

Figure 14. 2021 US climate shareholder proposal themes



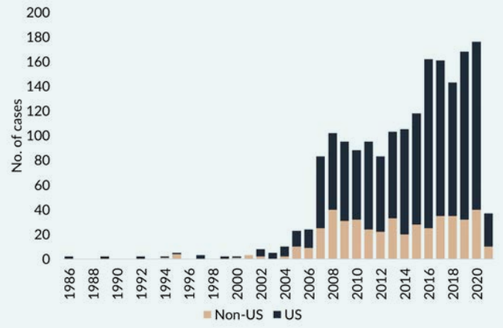
Source: Forsyth Barr analysis, Harvard Law School Forum on Corporate Governance

Figure 15. Cumulative number of sustainable finance policy interventions



Source: Forsyth Barr analysis, PRI Regulation Database

Figure 16. Climate change related litigation cases over time



Source: Setzer and Higham (2021), London School of Economics. To May 2021.

Figure 17. COP26 outcomes summarised

Issue	Description	NZ sign up?
Commitments by all		
Emissions reduction targets	Countries to come back next year to submit stronger 2030 emissions reduction targets with the aim of closing the gap to limiting global warming to 1.5 degrees C.	✓
Developing country financing	Countries agreed that developed countries should urgently deliver more resources to help climate-vulnerable countries adapt to the consequences of climate change.	✓
Coal phase-down	The Glasgow Climate Pact committed countries to "accelerate efforts toward phasing down of unabated coal power". The Pact also calls for all parties to accelerate their development, deployment and dissemination of climate change innovation technologies and clean energy power generation. In addition, the Pact specifically references the reduction of coal and fossil fuel subsidies in the energy mix.	✓
Carbon markets	Countries reached agreement on the rules that govern the international trade of emissions reduction units and established a framework to exchange carbon credits. This progress is expected to pave the way for an international trading mechanism and could lead a global price on carbon.	✓
Other collective commitments		
Deforestation	130 countries possessing 90% of the world's forests pledged to collectively provide US$12billion of public funding to halt and reverse forest loss and degradation by 2030. In addition, more than 30 financial institutions managing almost $9 trillion in assets committed to helping eliminate agricultural commodity driven deforestation from investment and lending portfolios by 2025.	✓
Electric vehicles	Several governments, states and cities, and automotive companies declared their intent at the conference to guarantee all new cars and vans sold will be zero-emission by 2035 in leading markets and 2040 globally. The countries that have signed represent ~20% of the global car market whilst the corporate signatories, including Mercedes-Benz and Ford, produce ~30% of cars sold worldwide. This progress was, however, overshadowed by the countries and companies, including Russia and China, Volkswagen and Toyota, who failed to join the pledge.	✓
Financial sector net zero	Align the finance sector with net-zero by 2050. Via the Glasgow Financial Alliance for Net Zero (GFANZ), more than 450 financial institutions, controlling assets of over US$130 trillion, or approximately 40% of global financial assets, formed an alliance committed to aligning their activities and delivering the investment needed to achieve net zero.	N/A
Fossil fuel financing	A number of countries signed the 'Statement on International Public Support for the Clean Energy Transition' which pledges to end "new direct public support" for unabated fossil fuel energy by the end of 2022	✓
Methane	More than 100 countries committed to The Global Methane Pledge to reduce global methane emissions by at least 30% from 2020 levels by 2030.	✓

Source: Forsyth Barr analysis

Examples of policy interventions include:

- On 21 April 2021, the European Commission published its Sustainable Finance Package containing three important legislative developments: the EU Taxonomy Climate Delegated Act, the proposal for a new Corporate Sustainability Reporting Directive (CSRD), and six amending delegated acts on fiduciary duties, investment and insurance advice will ensure that financial firms include sustainability in their procedures and their investment advice to clients.

  In May, President Biden issued an executive order that directs agencies government-wide, including the SEC, to launch or expand efforts to analyse and lessen economic risks stemming from climate change.
- In November, the Australian Prudential Regulation Authority (APRA) released its final prudential practice guide on climate change financial risks. The guide is designed to assist banks, insurers and superannuation trustees to manage the financial risks of climate change. The guide imposes no new regulatory requirements or obligations but will instead assist APRA-regulated entities to manage climate-related risks and opportunities within their existing risk management and governance practices.
- 61 Stock exchanges now have written ESG Guidance.

...and accounting standards are following suit

At COP26, accounting standard-setter, the International Financial Reporting Standards (IFRS) Foundation, announced the creation of the International Sustainability Standards Board (ISSB) to oversee the development of a new reporting framework covering ESG issues. The new body will start work on climate disclosure standards which will aim to meet investor demands for transparent and comparable information on firms' climate risks and opportunities. It will also act to prevent greenwashing.

A prototype climate disclosure standard was published alongside the launch. It sets out draft rules for how companies could report their climate governance, strategy, risk management, and metrics and targets.

The ISSB will absorb two bodies dedicated to climate and sustainability related disclosures to advance its efforts: the Climate Disclosure Standards Board (CDSB), and the Value Reporting Framework (VRF). Each currently presides over its own voluntary sustainability reporting framework, though they both pledged last year to consolidate their work. The VRF is the result of a merger of the International Integrated Reporting Council and Sustainability Accounting Standards Board.

To have teeth, the agreed-on ISSB standards would have to be incorporated in countries' regulatory frameworks so that businesses are required to use them. The ISSB's draft climate standards are scheduled to be put out for public consultation in 2022.

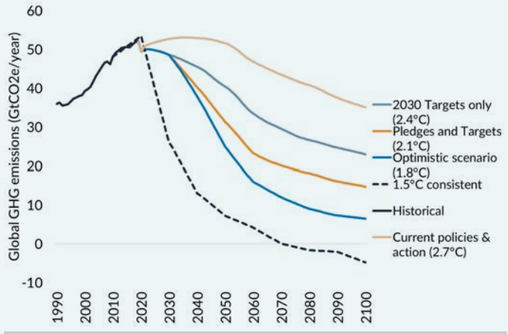
The world responds: COP26 takeaways

The 26th edition of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) —known as COP26 — took place in Glasgow, Scotland from 1–12 November. Attended by leaders from all over the world, it was the first formal review of countries' climate policies since the Paris Agreement of 2015. Figure 17 summarises the outcomes from COP26 on key topics.

Where are we at?

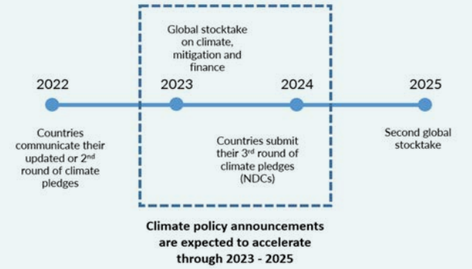
Commitments leading into the 2015 Paris Agreement put the world on track for a 3–4°C rise in temperature, an amount that would be near-catastrophic and was almost universally considered an unacceptable outcome. The commitments made at Paris put the world on track for 2.7°C, a significant improvement but still short of the 'well below' 2°C desired at Paris. Fast-forward to after the Glasgow conference, we now sit somewhere between 2.1–2.7 degrees, depending on the extent that pledges and commitments are followed through. Further strengthening of country commitments is expected over the next few years.

Figure 18. Warming projections to 2100 including COP26 commitments



Source: Forsvth Barr analvsis. Climate Action Tracker Barr analvsis

Figure 19. Paris Agreement ratchet mechanism



Source: Principles for Responsible Investment

Figure 20. Summary of the Net Zero Asset Managers Commitment

Commitments	**• Support the goal of net zero GHG emissions by 2050, in line with global efforts to limit warming to 1.5°C.** **• Support investing aligned with net zero emissions by 2050 or sooner.** **• Set out positions relating to the phase out of thermal coal, in line with the Intergovernmental Panel on Climate Change (IPCC) 1.5 °C scenarios.**
Interim	Set interim targets for 2030, consistent with a fair share of the 50% global reduction in CO2 identified as a requirement in the IPCC
Commitment	Special report on global warming of 1.5°C.
Scope 1, 2 3	Take account of portfolio Scope 1 & 2 emissions and, to the extent possible, material portfolio Scope 3 emissions.
Focus on outcomes	Prioritise the achievement of real economy emissions reductions within the sectors and companies in which we invest.
Offsets	If using offsets, invest in long-term carbon removal, where there are no technologically and/or financially viable alternatives to eliminate emissions.
Investing in solutions	As required, create investment products aligned with net zero emissions by 2050 and facilitate increased investment in climate solutions.
Data and analytics	Provide asset owner clients with information and analytics on net zero investing and climate risk and opportunity.
Engagement and voting	Implement a stewardship and engagement strategy, with a clear escalation and voting policy, that is consistent with our ambition for all assets under management to achieve net zero emissions by 2050 or sooner.
Collaboration	Engage with actors key to the investment system including credit rating agencies, auditors, stock exchanges, proxy advisers, investment consultants, and data and service providers to ensure that products and services available to investors are consistent with the aim of achieving global net zero emissions by 2050 or sooner.
Policy advocacy	Ensure any relevant direct and indirect policy advocacy we undertake is supportive of achieving global net zero emissions by 2050 or sooner.
Accountability and disclosure	Publish TCFD disclosures, including a climate action plan, annually and submit them for review to ensure the approach applied is based on a robust methodology, consistent with the UN Race to Zero criteria, and action is being taken in line with the commitments made.

Source: Forsyth Barr analysis

Net zero frameworks for investors

Best practice for implementing net zero in investment portfolios is still emerging. However, the Net Zero Asset Managers Commitment is gaining traction quickly. After launching in 2020, it already has 220 signatories with combined assets under management of US$57 trillion.

To offset or not to offset?

A carbon offset broadly refers to a reduction in GHG emissions — or an increase in carbon storage (e.g., through land restoration or the planting of trees) — that is used to compensate for emissions that occur elsewhere. While there is disagreement about the widespread use of offsetting there is strong international agreement across the climate community that any offsetting requires:

- Robust standards (e.g. additionality, permanence, verifiability, etc.).
- Specification of offsetting approach, avoided emissions, reductions, or removals.

The main criticism of net zero commitments is that they don't adequately address the climate crisis and in many instances are used to allow industries to carry on with business as usual on the promise of future offsets or technology that doesn't yet exist. To truly work towards preventing global temperatures rising above 2 degrees C, net-zero must be achieved but through a focus on the elimination of emissions. And action must start today, not in 2045.

Investors are reliant on the companies in their portfolio to action their net zero commitments and this is why engagement is such an important part of investor action on climate change.

Measuring the carbon footprint of portfolios

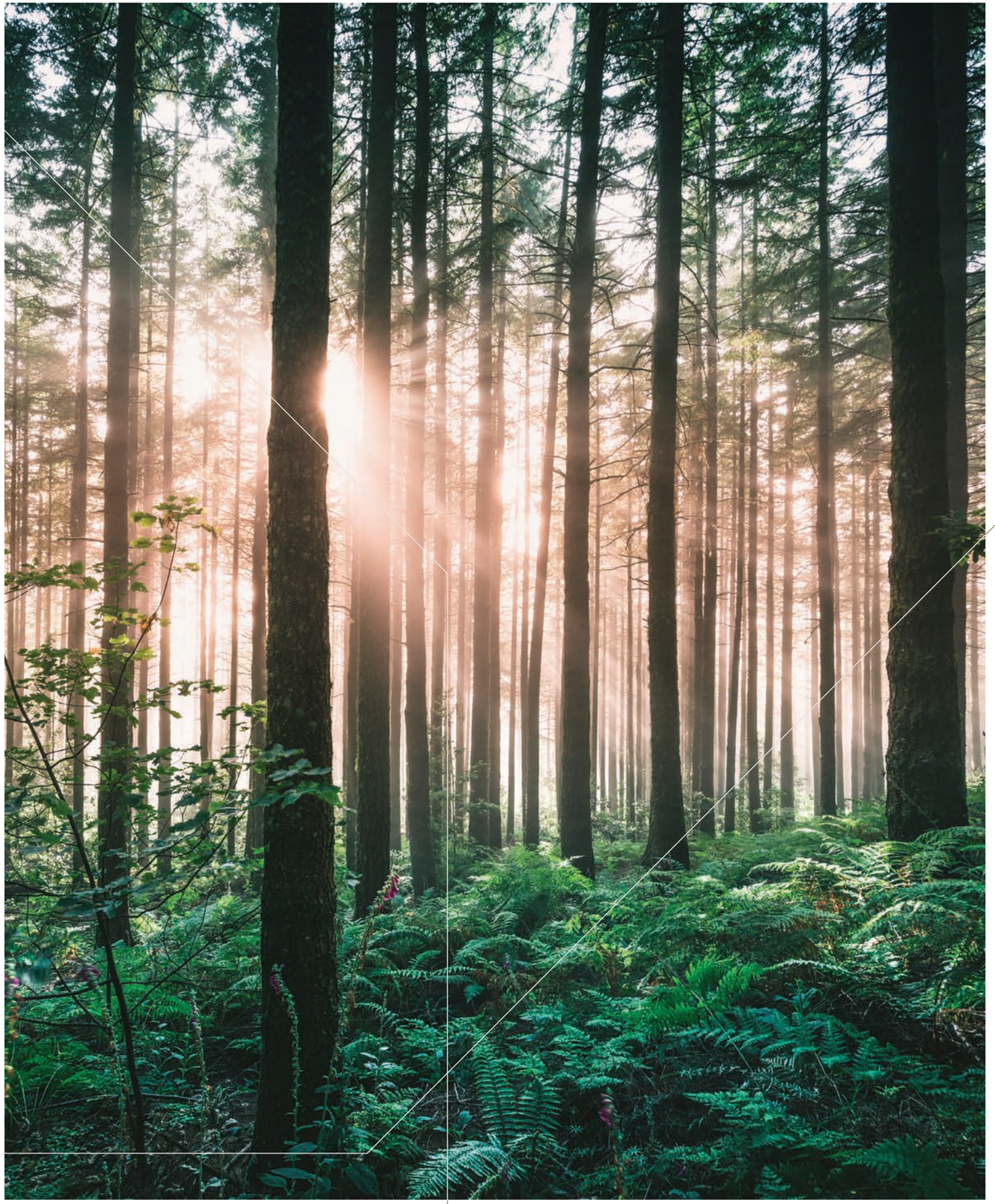
Net zero commitments are driving decarbonisation of investment portfolios and increasing investment in climate solutions, in a way that is consistent with a limiting temperature rise to 1.5°C or 2°C. A portfolio carbon footprint can help investors understand exposure to climate change risks and opportunities in their portfolio. It can also help assess whether a portfolio is on track to meet the ambition of the Paris Accord, or, in other words, to achieve net zero emissions by 2050 at the latest. Once established, a portfolio carbon footprint can act as a baseline on which you can set net zero and interim targets (usually five yearly) to track progress.

What about other parts of the financial system?

It's not only asset managers taking action. The first net zero initiative in the finance sector launched in 2019. It was the UN-convened Net-Zero Asset Owner Alliance (NZAOA), which at that time consisted of 30 members controlling US$5 trillion in assets. At the start of 2021, the Net Zero Asset Managers Initiative (NZAM) and the Paris Aligned Investment Initiative (PAII) were launched. This was followed by the Net-Zero Banking Alliance (NZBA) in April 2021, and the Glasgow Financial Alliance for Net Zero (GFANZ) which provided a vehicle for banks to make net zero commitments. Momentum continued and in September the Net-Zero Insurance Alliance (NZIA), the Net Zero Financial Service Providers Alliance (NZFSPA) and the Net Zero Investment Consultants Initiative (NZICI) all launched.

- Whilst all the initiatives are nuanced, the underlying broad criteria are similar and cover:
- Use of science-based guidelines to reach net-zero emissions across all emissions scopes by 2050.
- The setting of a 2030 interim target that represents a fair share of the 50% decarbonisation required by the end of the decade.
- The setting and publishing of a net-zero transition strategy.
- Commitments to transparent reporting and accounting on progress against those targets.
- Adherence to strict restrictions on use of offsets.

While the pace of emissions cuts may still be too slow for some commentators, it is clear that investors, companies and countries are quickly making net zero promises the norm.



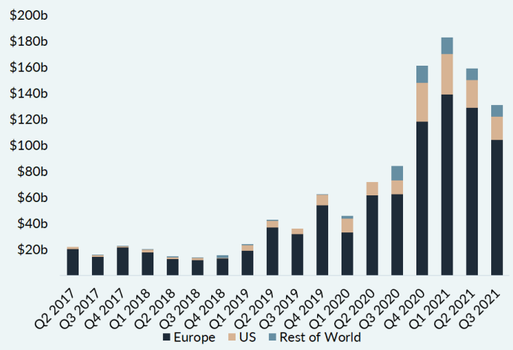
Fund flows

Meanwhile, what started in 2020 has only continued into 2021. Funds have flowed into Sustainable investment products over the last two years at unprecedented speed, with ~US$360 billion of inflows in 2020 and ~US$473 billion in 2021, according to Morningstar (Figure 21).

It's not only equities that are seeing ESG flows; the global sustainable bond market flourishes

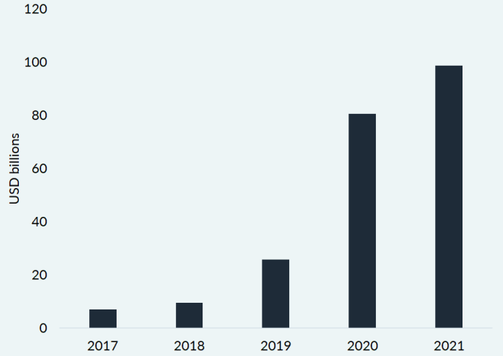
Green, Social and Sustainability (GSS) bonds have seen enormous amounts of issuance over the last few years and as the market has grown so too has the complexity of the instruments. Figure 23 shows eight different sub-categories of GSS bonds and the recent growth in issuance. Green bonds, Social bonds and Sustainability bonds, where the use of proceeds is dedicated to positive environmental, social or sustainable projects, have been around for many years. The market for these bonds has also grown rapidly in New Zealand, (Figure 24), with government entities such as Kāinga Ora/Housing NZ responsible for a large portion of the issuance.

Figure 21. Sustainable fund flows (US$bn)



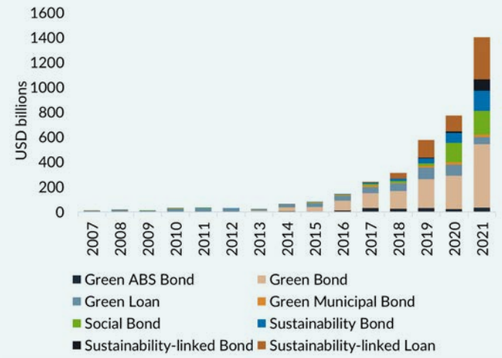
Source: Morningstar

Figure 22. Fund flows into ESG equity ETFs (globally)



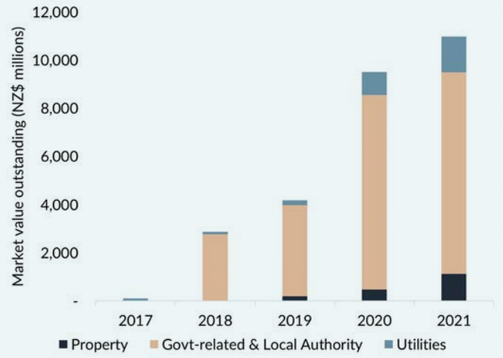
Source: Forsyth Barr analysis, Bloomberg

Figure 23. GSS bonds, amounts issued by security type



Source: Forsyth Barr analysis, Bloomberg. GSS = Green, Social, Sustainability

Figure 24. GSS bond market in New Zealand, market value



Source: Forsyth Barr analysis, Refinitiv

New Zealand developments

In 2019 when the Zero Carbon Act passed through Parliament, New Zealand was the first country in the world to put the target to hold global warming to no more than 1.5 °C in primary legislation. We are currently only one of 13 nations in the world that have formally passed laws establishing net zero targets. However, setting a goal is often the easiest step towards carbon neutrality. The real challenge is in solidifying that goal and starting to make progress towards it.

Like the rest of the world over 2021, and despite lockdown, New Zealand was not immune to climate change action on the streets, in the courtrooms and in the boardrooms. And climate change signals embedded in regulation in 2019 and 2020 began to be felt as implementation action started.

The effects of climate change
and NZ's response

New Zealand has a mixed track record on reducing emissions. Gross emissions (not including carbon offsets) have been largely flat over the past 10 years. Our 2019 levels were 26% above 1990, mostly due to increases in methane from dairy cattle and carbon dioxide from road transport. Emissions did fall around -5% in 2020 but this was a COVID-19 impact from the sharp drop in transport usage. However, data just released 9 November 2021, by Stats NZ, saw seasonally adjusted greenhouse gas (GHG) emissions from households and industry rose +4.8% in the June 2021 quarter, following a +1.4% increase in the March quarter.

It's pouring down on the West Coast, in Canterbury, in Wellington and in Auckland — and its starting to impact the P&L

The NZ Insurance Council members suggested that 2021 may be one of the most extreme NZ has seen in terms of total claims. For the industry significant events over 18 months have included quite a number of flood and rain related costs:

- July 2020 — Northland Flood (NZ$44m)
- October 2020 — Lake Ohau bushfire (NZ$35m)
- November 2020 — Wellington, New Plymouth, Plimmerton & Napier flooding (NZ$20m)
- December 2020 — Severe hail storm in Marlborough-Nelson
- January 2021 — Central Otago flood (NZ$3m)
- January 2021 — Canterbury rain and hailstorms
- May 2021 — Canterbury flooding (NZ$44m)
- June 2021 — South Auckland tornado (NZ$32m)
- July 2021 — West Coast/Upper SI/North Island and Wellington flooding (NZ$85m)
- September 2021 — Auckland flooding (NZ$57m).

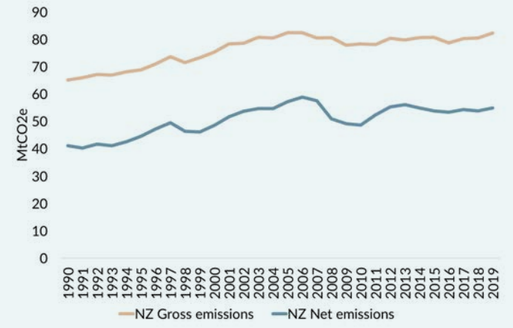
It's also been rather warm...

According to official National Institute of Water and Atmospheric Research (NIWA) data, the winter NZ experienced for 2021 (June, July and August) was +1.32°C degrees higher than average, while the winter of 2020 was +1.14°C above. The NIWA temperature series commenced in 1909 showed that for the calendar year 2020 it was the seventh warmest year on record for NZ. Six of the warmest years on record have occurred in the past eight years. NIWA noted that the 2020 and 2021 winters were impacted by "La Niña, warm coastal waters, frequent high pressure and more northerly and north-easterly winds than normal". How much La Niña affected recent weather against the longer-dated impacts of climate change is hard to determine but both likely had a compounding effect.

Activists are getting more targeted

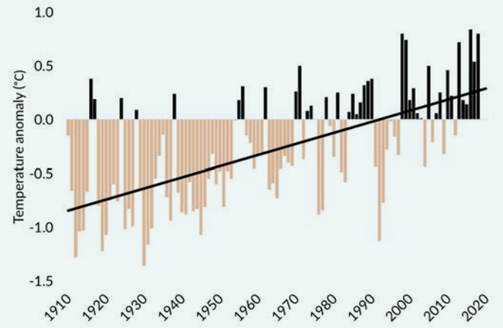
New Zealand is also experiencing a rising number of protests, as we have seen across the world. Extinction Rebellion, Strike for Climate, Fridays For Future were all active here, alongside our farmers, our nurses and midwives — but not always on the same side. When it comes to climate change, school kids are making their voices heard.

Figure 25. New Zealand's net and gross GHG emissions



Source: Forsyth Barr analysis, Stats NZ. 2019 Greenhouse Gas Inventory.

Figure 26. NZ Weather station annual average temperature



Source: Forsyth Barr analysis, NIWA. 7-station average.

Figure 27. Timeline for developing New Zealand's Climate-related Disclosure Standards

The standards will be developed and delivered through the following three iterations.

20 October 2021

This consultation provides proposed sections of NZ CS 1 on Governance and Risk Management for a four-week feedback period, closing 22 November 2021.

March 2022

This consultation provides proposed sections of NZ CS 1 on Strategy and Metrics and Targets, for a four-week feedback period.

July 2022

This consultation provides the formal exposure draft of NZ CS 1, and accompanying documents such as the draft adoption standard, for a three-month feedback period.

December 2022

The XRB expects to issue NZ CS 1 and accompanying documents.

Source: XRB

In the Courts...

On 1 July 2021, a group of hundreds of New Zealand lawyers sued the country's Climate Change Commission alleging that its recommendations to the Minister for Climate Change violated New Zealand law and the Paris Agreement. Plaintiffs allege that the commission's carbon budgets are inconsistent with holding warming to 1.5C, that it understated required emissions reductions under the Paris Agreement, and that the commission unlawfully relies on the uncertain prospect of paying other countries to reduce their emissions. Together, these actions violated New Zealand's Climate Change Response Act and its obligations under the Paris Agreement. A decision is still pending.

The campaign group Lawyers for Climate Action NZ also filed a complaint with the Advertising Standards Board against an advertising campaign from Energy Company, Firstgas. The campaign contained advertisements suggesting that the company was moving towards producing zero carbon gas and that customers could rely on this to reduce their fossil fuel consumption. The complaint was upheld (in part). The Board said it was misleading and contained unsubstantiated environmental statements. The advertisement was ordered to be removed.

Green tape: New Zealand leads the way on climate related disclosure

2021 was another very active year in terms of climate related policy in New Zealand, building on the Climate Change Response (Zero Carbon) Amendment Act that received royal ascent in late 2019, the Emissions Trading Scheme re-vamp in 2020 and the announcement that New Zealand plans to be the first country in the world making it mandatory to disclose against the Taskforce on Climate-related Financial Disclosures (TCFD).

In October 2021, the Financial Sector (Climate-related Disclosures and Other Matters) Amendment Bill was passed. As a result, the External reporting Board (XRB) now has a mandate to issue climate standards as part of a disclosures framework and guidance on ESG matters.

Once the XRB issues its first climate standard, climate-related disclosures will become mandatory for listed companies with a market capitalisation of more than NZ$60m; large licensed insurers, registered banks, credit unions, building societies and managers of investment schemes with more than NZ$1bn in assets, and some Crown financial institutions (via letters of expectation). The disclosure standard will be based on the recommendations of the TCFD. The XRB aims to issue its first climate standard in December 2022, meaning these entities would be required to make disclosures alongside wider year end reporting in 2023 at the earliest.

With New Zealand's Climate Related Disclosure standards currently under design, the XRB will need to take care not to get too far ahead of the ISSB.

Default KiwiSaver requirements kicked into action

In May, the government announced that KiwiSaver default funds will exclude any investments in fossil fuel production. The new default funds take effect on 30 November 2021 and require:

- Members to be invested in a balanced fund rather than a conservative fund.
- Charging of lower fees.
- Engagement with their members to help them make informed decisions about their retirement savings at key points.
- Not to be invested in fossil fuel production or illegal weapons.
- Maintenance of a responsible investment policy on their website.

Climate Change Commission Advice and Emissions Reduction Plan

New Zealand has committed to reaching net zero emissions of long-lived greenhouse gases by 2050 and reducing biogenic methane emissions between 24–47% by 2050. An independent government organisation, the Climate Change Commission has been established with the purpose of providing independent, evidence-based advice to the government to help New Zealand transition to a low-emissions and climate-resilient economy.

In June 2021, the Climate Change Commission released its first advice to the government on a low emissions future for New Zealand. The report details the possible paths that can be taken to meet our climate targets.

It is now over to the government to decide whether to accept the advice, and to show how it will shape climate action. The government had until 31 December 2021 to set the first three emissions budgets out to 2035 and release the country's first emissions reduction plan detailing the policies it would use to achieve the budgets. But, in September, the government announced a five month delay to releasing its Climate Plan because of COVID-19 and in order to align it with the 2022 budget. A consultation paper on the Emissions Reduction Plan was released in October.

Emissions Trading Scheme (ETS)

The New Zealand ETS was created through the Climate Change Response Act 2002 (the Act). In 2020, the government made changes to the ETS through the Climate Change Response (Emissions Trading Reform) Amendment Act 2020, which became law on 22 June 2020. A key change was the introduction of the auctioning of New Zealand units (NZUs) in 2021 and the removal of the NZ$25 cap on the price of each tonne of carbon.

Four auctions were scheduled for 2021. The government had expected to sell 19m NZUs in total during 2021, spread evenly across the four auctions. However, if an auction clearing price went higher than NZ$50 then the cost containment reserve (CCR) would be triggered allowing up to another 7m NZUs to be available at that auction. Therefore, the maximum volume of 26m NZUs could be available in 2021.

What happened?

The four auctions saw steadily increasing prices with the September 2021 auction testing the effectiveness of the cost containment reserve with all 7 million NZUs sold and the settlement price of NZ$53.85/unit breaching the cap price. The auction price stepped up further in the latest December auction, clearing at NZ$68/unit. With all CCR units sold at the September 2021 auction, there were no additional units available at the December auction.

The government increased the 2022 CCR trigger price to NZ$70/unit in August 2021. This would likely have been informed by the secondary market which had shown strong growth during 2021. However, the September and December 2021 auction results means that the CCR is likely to come into play in 2022, with the first NZU auction scheduled for 16 March 2022.

The secondary market provided a strong indication that the September 2021 auction was going to test the CCR, with an NZU market price of NZ$51.50/unit the day before the auction took place. Immediately after the auction the secondary price jumped to NZ$59.00/unit, +NZ$5.15/unit (+9.6%) more than the auction price.

Secondary market NZU prices have averaged NZ$47.70/unit in 2021, up +NZ$16.90/unit (+55%) on 2022. However, the current spot price of NZ$68.30/unit is up +NZ$30.75/unit (+82%) on the start of the year.

Companies creating hedge positions to protect against rising carbon prices

Most companies exposed to carbon prices are able to pass these costs on to customers, particularly in the Energy space. However, there is an opportunity for these businesses to benefit from hedging policies if they were able to lock in prices below the market price. Genesis Energy for example, has bought enough carbon units to cover expected emissions from its thermal generation units and retail gas & LPG sales out to 2028 (financial year 2029). In 2021 it achieved extra length by meeting its 2020 NZU obligations through the use of the fixed price option at NZ$35/tonne, allowing it save previously bought NZUs. It also participated in the government's NZU auctions.

Z Energy has adopted a similar strategy and at its 1H22 result reported a gain of ~NZ$20m from acquiring NZUs below market, equivalent to ~17% of its operating profit.

Carbon prices are having an effect on investment decisions

With carbon prices close to NZ$70/tonne, we expect more investment decisions to favour renewable electricity over fossil fuel.

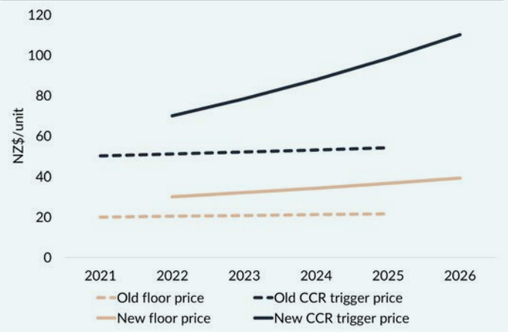
Diesel now includes a carbon cost of ~17cpl, ~10% of the total cost (excluding road user charges). Petrol prices include ~15cpl, ~6% of the cost of petrol. With fuel prices generally at record highs, there is an increasing incentive for motorists to switch to electric vehicles.

In the electricity sector the cost of carbon when running the Huntly coal units has increased to ~NZ$72/tonne at current spot prices. That is more expensive than building new wind generation (on good sites).

Figure 28. NZU 2021 auction results

Source: Forsyth Barr analysis, Ministry for the Environment

Figure 29. NZU auction price floor and CCR trigger price



Source: Forsyth Barr analysis, Ministry for the Environment

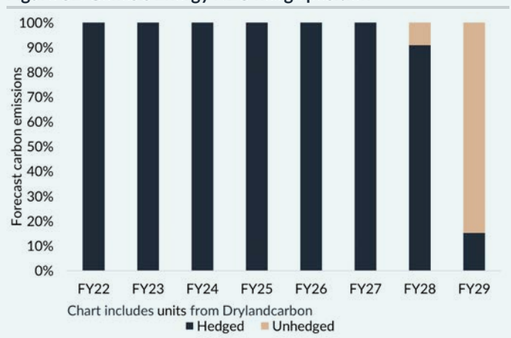
Figure 30. NZU auction prices vs. secondary market prices

Source: Forsyth Barr analysis, Bloomberg, Ministry for the Environment

Figure 31. NZU spot prices

Source: Forsyth Barr analysis, Bloomberg

Figure 32. Genesis Energy NZU hedge position



Source: Forsyth Barr analysis, company report.

COP 26 takeaways for NZ

New Zealand's delegation at COP26 was led by Climate Change Minister James Shaw. On the eve of the start of the conference NZ's Government announced a new, more ambitious emissions reduction target. This new target is to reduce net emissions by -50% below 2005 levels by 2030, compared to a -30% target previously (albeit two-thirds of this reduction will likely come from international carbon offsets). The plan for achieving New Zealand's targets is due to be released in May 2022.

Some of the other notable commitments made by New Zealand include:

- NZ joined the International Just Transition Declaration which acknowledges that countries must respond to the climate crisis in a way that is fair to everyone. This means transition planning with business and all affected communities and making sure the distributional impacts of climate policies on population groups are fully understood.
- The Glasgow Climate Pact, committed countries to "accelerate efforts toward phasing down of unabated coal power". Real progress on coal will require changes from China, who burns more than 50% of the world's total, and India, who consumes greater than the US and Europe combined. This will have implications for NZ's electricity, steel and dairy sectors. Coal represented around 10% of NZ's electricity production in 2021, 5% in 2020 and 7% in 2019. The rise of coal use in itself could be climate-related, given that drought led to lower inflows into lakes and hydro dams. This was the main culprit, along with gas shortages, that created pressure in the electricity market over winter. The government has already set a target to make electricity generation 100% renewable by the end of the decade. A tighter time frame for phasing out domestic gas use may also transpire from the already lengthy dated ban on new homes having bottled gas connections by 2025.
- NZ joined 130 countries in pledging to provide funding to halt and preventing deforestion. This is important because forests soak up carbon from the atmosphere while cutting them down releases it. On balance, forests removed the equivalent of 7.6 billion tonnes of CO_2 every year over the last two decades. This is roughly 20% of global emissions.
- New Zealand also signed the Global Methane Pledge which is a collective goal to reduce methane emissions by 30%, However, this does not require any additional action by NZ and the Government clarified that we won't be doing any more than the cut of 10% it's already obliged to under the Zero Carbon Act.

NZ inc displays a wide gulf between rhetoric and accomplishments to date

New Zealand's commitments made at COP26 broadly do not require much more action over and above what we are already committed to. New Zealand won a Fossil award on the penultimate day of COP26, for the Government's refusal to update the country's National Determined Contribution to constraining global temperature rises.

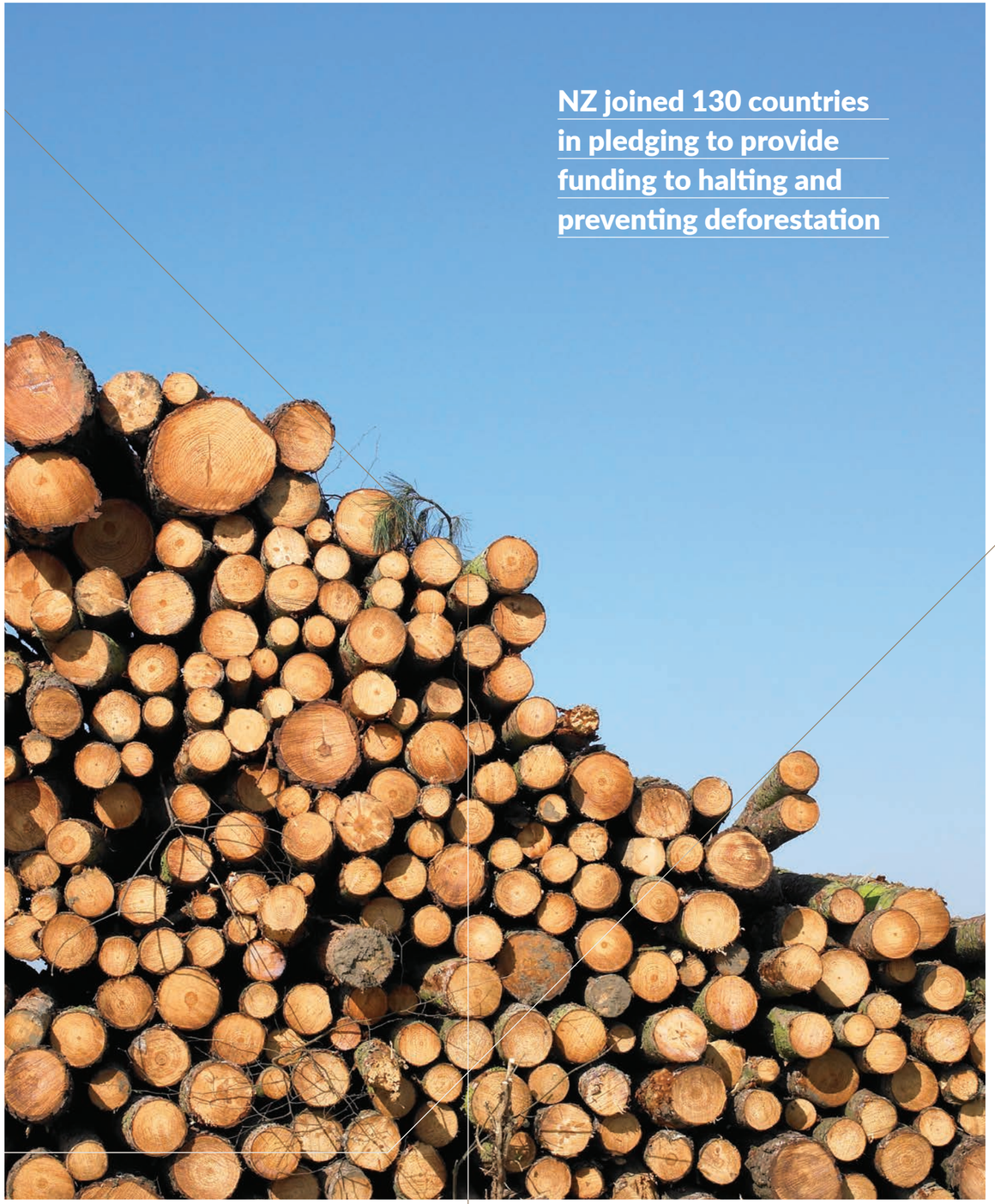


Figure 34 shows there has been no significant change in emissions from the New Zealand equity market over the last four years, other than a slight dip in both Scope 1 + 2 and total emissions in the most recent disclosure year, which likely contains significant COVID-19 impacts. This is largely consistent with New Zealand's gross CO2e emissions which have been mostly flat over the same period. However, we do see pockets of action and note the growing number of commitments to net zero and the strengthening of signals that are slowly but surely driving action.

Can equity investors make a difference to New Zealand's emissions profile?

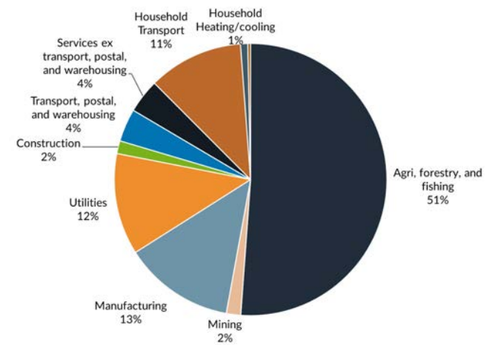
New Zealand's listed equity market covers a significant proportion of companies that contribute meaningfully to New Zealand's emissions profile. Scope 1 (direct) emissions of listed stocks made up ~13% of New Zealand's gross emissions in 2021. Expanding this to all scope emissions brings this to a very significant ~61% of New Zealand's emissions, which, while a misleading headline figure (including Scope 3 emissions will inevitably lead to double-counting between companies), indicates that equity-holders in New Zealand can influence companies to reduce their emissions and start making plans to transition to net zero economy.

Engage, exclude or risk management? Correctly identifying risks yields rewards

There is growing debate around the issue of climate change and the best approach for investors to manage climate risk. Many have sold down positions in the carbon intense industries or those with fossil fuel reserves on the back of the stranded assets thesis. Others argue that this does not actually reduce emissions from the atmosphere and the best way to drive this is to engage with companies to ensure they are on a net-zero pathway. Another perspective is that all companies face both physical and transition risk and investors should be aware of these, assess them and integrate this information into investment decisions. All have merits. In our view, all strategies are needed.

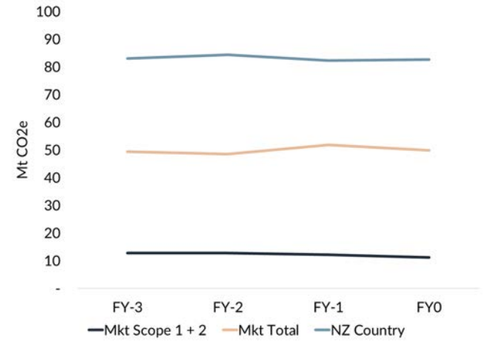
For those that have avoided emissions for the last few years, its been positive for performance. While many factors have contributed to the under performance of the energy sector, we should acknowledge that the early movers accurately identified that high emitting companies were exposed to additional risk whether it be regulatory, technology, consumer driven risk or even litigation risk. Withstanding volatility and looking out to the long term are important attributes.

Figure 33. Make up of New Zealand's emissions, year to June 21



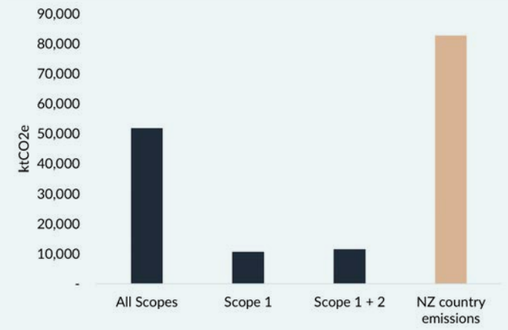
Source: Forsyth Barr analysis, Stats NZ. GHG emissions by industry and household as categorised by Stats NZ.

Figure 34. NZ listed equity market emissions through time



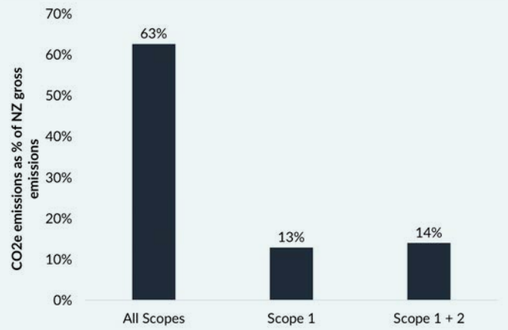
Source: Forsyth Barr analysis, company reports, Stats NZ.

Figure 35. Total emissions, NZ listed equity market



Source: Forsyth Barr analysis, company reports, Stats NZ. NZ emissions are as at 30/06/2021. Company disclosures used are the latest disclosed. Companies with Forsyth Barr coverage only.

Figure 36. NZ listed equity emissions relative to NZ country



Source: Forsyth Barr analysis, company disclosures, Stats NZ. These numbers will contain significant double-counting, especially with in Scope 3 emissions. Companies with Forsyth Barr coverage only are included.

A growing minority of NZX listed companies have explicit emission reduction targets.

Figure 37. NZX listed companies targets overview

Source: Forsyth Barr analysis, company reports

Figure 38. Target year of explicit emissions reduction targets

Source: Forsyth Barr analysis, company reports

Figure 39. Oil & Gas companies (market cap)

Source: Forsyth Barr analysis, Refinitiv. Average consists of Chevron, ExxonMobil, BP and Shell. S&P500 is capital only.

Figure 40. Uranium price

Source: Forsyth Barr analysis, Refinitiv, IMF.

Investors, as owners of companies and on behalf of clients, have the ability to engage with companies to influence activity if they identify a risk is not being managed appropriately. It is now standard practice, at least offshore, for investors to have an engagement strategy for talking to companies about their climate change management. Over 600 investors from across the world with more than US$60 trillion of assets under management have joined the Climate Action 100+ initiative, a global collaborative engagement that is engaging with 167 of the largest carbon emitters across the world.

The three main objectives of the collaboration are:

1. Implement a strong governance framework which clearly articulates the board's accountability and oversight of climate change risk.
2. Take action to reduce greenhouse gas emissions across the value chain, consistent with the Paris Agreement's goal of limiting global average temperature increase to well below two degrees Celsius above pre-industrial levels, aiming for 1.5 degrees. Notably, this implies the need to move towards net-zero emissions by 2050 or sooner.
3. Provide corporate disclosure in line with the TCFD recommendations.

The 2020 Progress Report for the Climate Action 100+ finds (the 2021 reported outcomes are due mid December 2021):

43%

of the initiative's focus companies now have goals or commitments for net-zero emissions by 2050 or sooner in some form.

51%

also have short-term emissions reduction targets (to 2025) and 38% have medium-term targets (2026–2035).

Just 10%

of focus companies have net-zero targets that include coverage of their most material Scope 3 emissions.

26%

of electricity utility companies on the initiative's focus list have coal phaseout plans that are consistent with the Paris Agreement goals (up from 13% in 2019).

194

new oil and gas projects sanctioned by focus companies this year are misaligned with the Paris Agreement goals. Further, 68% of planned oil and gas capital expenditure was also inconsistent with these goals.

68%

of planned oil and gas capital expenditure was also inconsistent with these goals.

Automotive focus companies are still largely falling short of the investment required to switch technologies at an appropriate pace from internal combustion engines to hybrid and electric vehicles.

Four sectors where climate change and society's response matters

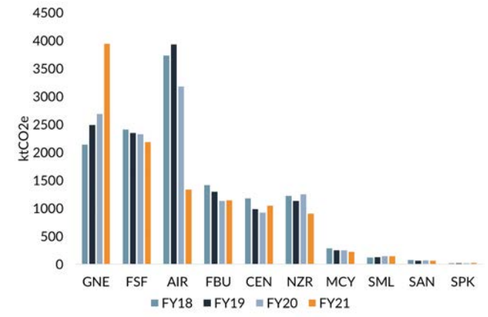
Climate change and society's response to climate change will impact every sector in New Zealand. Be it through direct consequences of warmer and wetter weather, new regulation, technology disruption, or changing consumer and investor preferences. However, there are four sectors for which we believe it to be crucial to understand the impacts of climate change, more acute and near term for some, more important and longer term for others. ESG factors started to have real implications on fund flows, regulation and investor performance 15–20 years ago. Investors into Oil & Gas, Coal, Tobacco, and Defence industries quickly realised that a thorough understanding of ESG issues surrounding these industries was paramount. Those who correctly identified where risks were under-priced were rewarded with meaningful outperformance. Focussing on the 'E' in ESG in general and on climate change in particular, we believe Agriculture, Construction, Transport & Tourism and, Energy are the sectors where investors need to understand the risks and opportunities going forward.

The focus on these four sectors is partly, but not only because these are the biggest emitters today. If we take energy as an example, we believe it to be equally important to understand the implications for 100% renewables companies, Meridian and Mercury, as it is for partly fossil fuel dependant Genesis Energy and Contact Energy. Looking at the ups and downs of the last year, one could argue it has impacted the share prices of those companies more as fund flows drove the share prices up rather than down. Environmental considerations will have played a part when Rio Tinto decided to keep the NZ Aluminium Smelter open, a positive for the whole sector. Within Agriculture the most obvious consideration is the enormous emissions from dairy farming, but we believe change of land use, warmer weather and consumer preferences are also key factors. Similarly within Construction and Real-estate there has been significant focus on the large emissions from cement production but less on the very large emissions from the built environment.

Net Zero buildings are already being built selectively across the globe. A REIT grabbing this opportunity could find itself able to charge a premium. Transport and travel could see flight shaming impact demand more than carbon prices impact price. There are also potential opportunities. Air New Zealand is at the forefront of research around renewable jet fuel, and EVs could transform the emissions profile for logistics companies albeit with a significant associated cost.

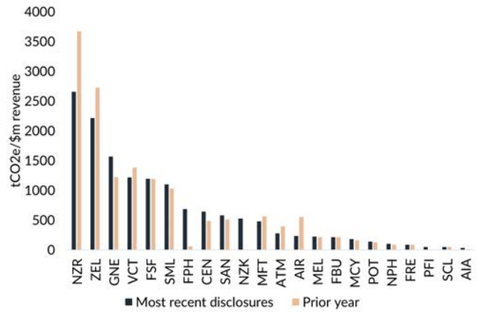
Below we take a deeper look at these four sectors. We have taken a future focussed approach to understand the sector drivers at play and how companies are positioning themselves for a net zero economy.

Figure 41. Top 10 emitters through time, Scope 1 +2



Source: Forsyth Barr analysis, company disclosures

Figure 42. Emissions intensity, all scope emissions



,Source: Forsyth Barr analysis, company reports. FY19 revenue used to avoid COVID impact.

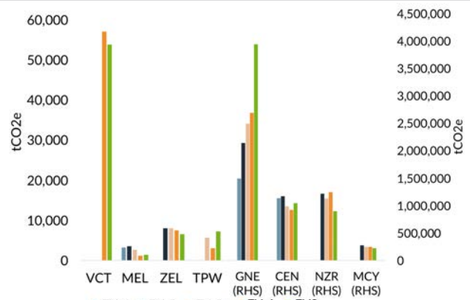
Energy (= Utilities + Oil & Gas)

It has been a dramatic year for the electricity sector, beginning with the announcement that NZAS will remain until at least the end of 2024, leading to a flurry of renewable electricity projects being announced that will result in thermal generation being pushed out of the market. Several key themes in 2021 directly related to climate change are:

1. Large increase in new renewable electricity projects and commissioning of first wind farms since Meridian Energy's Mill Creek wind farm in 2014.
2. Emergence of grid-scale solar projects, although roof-top solar instalments show little sign of faster uptake.
3. Sudden surge in electric vehicle numbers following the commencement of the feebate scheme in July 2021.
4. 2021 also saw record thermal generation heading into winter, falling to record lows in October and November.
5. More disclosures from energy companies about the impact of climate change on their business.
6. Refining NZ announces it will close in 2022, which will result in the single biggest reduction in carbon emissions in NZ, albeit will have no impact on global emissions.

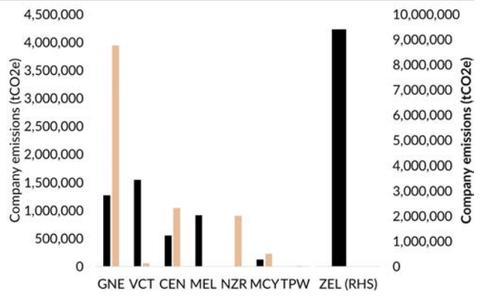
If New Zealand is to achieve Net Zero by 2050 the energy sector will clearly play a crucial part. So far it appears that the sector embraces this challenge, with the approach by the electricity companies (including Genesis Energy and Contact Energy) one of grabbing the opportunity. A transition to a low carbon economy will inevitably rely on significantly more electricity as part of the energy mix which should benefit all of them. Additionally, climate change is forecast to result in more rainfall, benefiting hydro generation. However there are some risks; near term are the substantial costs to offset current emissions, medium term is the regulatory risk, as well as potential threats from new entrants e.g. into solar.

Figure 43. Energy sector Scope 1 + 2 emissions through time



Source: Forsyth Barr analysis, company reports. Latest disclosure year may differ between companies. Only listed equities under Forsyth Barr coverage that disclose emissions have been included.

Figure 44. Energy company emissions, latest disclosure year



Source: Forsyth Barr analysis, company reports. Latest disclosure year may differ between companies. Only listed equities under Forsyth Barr coverage that disclose emissions have been included. NZR did not disclose an estimate for Scope 3 emissions.

Figure 45. Energy sector companies

Company	Carbon emission (ktCO2e) FY-1	Carbon emission (ktCO2e) FY0	Explicit Net Zero Commitment (NZC) and/or Emissions Reduction Target (ERT)	Positioning for a low carbon future
Contact Energy	1,202	1,601	No NZC yet but has committed to reduce Scope 1 and 2 by 45% and Scope 3 by 34% by 2026 (2018 base year)	Well positioned with new renewable projects being built and retirement of thermal plant moving forward. Currently exploring options to reduce fugitive geothermal emissions via carbon reinjection or alternative uses. Appears on track to meet emissions reduction target set under the Science Based Targets framework.
Genesis Energy	4,059	5,211	No NZC yet but has committed to reduce Scope 1 and 2 by 36% and Scope 3 by 21% by 2025 (2020 base year)	Moving in the right direction with FutureGen strategy designed to replace thermal generation with renewable generation. Most recent announcement relates to solar joint venture. Still progress to be made in phase out of coal and reduction of gas generation but signs are positive. Emissions targets set under the Science Based Targets framework.

Source: Forsyth Barr analysis, company reports. Disclosed emissions only. Scope 1, 2, 3 emissions are included if disclosed.

Figure 46. Energy sector companies continued...

Company	Carbon emission (ktCO2e) FY-1	Carbon emission (ktCO2e) FY0	Explicit Net Zero Commitment (NZC) and/or Emissions Reduction Target (ERT)	Positioning for a low carbon future
Mercury	312	347	No NZC yet. Plans to set ERT this financial year	100% renewable energy generator with only generation emissions are small amounts from geothermal and like CEN, the company is investigating methods to reduce these with a reinjection pilot project currently underway.
Meridian Energy	857	914	Have been Net Zero since 2019. ERT is to reduce Scope 1 and 2 by 50% by 2030 (2019 base year)	100% renewable generator with no fugitive carbon emissions. Has been carbon neutral for some time through buying and retiring carbon credits. Also intends on growing forests to increase carbon offset alongside reducing its own gross emissions.
Trustpower	4	8	No NZC or ERT yet	Effectively 100% renewable generator but does have a small Bream Bay diesel peaking station that accounts for 76% of total emissions.
Z Energy	11,583	9,405	No NZC yet but has committed to reduce Scope 1 and 2 by 42% by 2030 (2020 base year)	Remains a significant Scope 3 emitter as consumers continue to demand its product, progress in biofuels slow while awaiting government mandate. Is looking to pivot away from fossil fuel sales with investments in Flick Electric and car-ride sharing company, Mevo. Unclear what impact the Ampol takeover will have on emissions reduction targets.

Source: Forsyth Barr analysis, company reports. Disclosed emissions only. Scope 1, 2, 3 emissions are included if disclosed.

Figure 47. Renewable Energy Projects

Project name	Owner	Technology	Location	GWh	Commission date	Status
Ngawha – Stage 4	Top Energy	Geothermal	Northland	260	2021	Complete
Waipipi	MCY	Wind	Taranaki	455	2021	Complete
Turitea Stage 1 (North)	MCY	Wind	Manawatu	470	2021	Commissioning
Total to be commissioned in 2021				**1,185**		
Turitea Stage 2 (South)	MCY	Wind	Manawatu	370	2023	Under construction
Tauhara – Stage 1	CEN	Geothermal	Taupo	1,300	2023	Under construction
Mt Cass	MainPower	Wind	Kaikoura	300	2023	Waiting FID
Kaiwaikawe	MCY	Wind	Northland	230	2023	To be consented
Harapaki	MEL	Wind	Hawkes Bay	540	2024	Under construction
Lodestone solar	Lodestone Energy	Solar	Northland & BoP	375	2024	Consenting, construction to start 2022
GNE backed solar	GNE/FRV Australia	Solar	Upper North Island	850	2024	Project finalisation
Kowhai Park	Chch Airport/Solar Bay	Solar	Canterbury	230	2024	Early stage
Rooftop solar		Solar	Various	300		
Total to be commissioned by 2024				**5,680**		

Source: Forsyth Barr analysis.

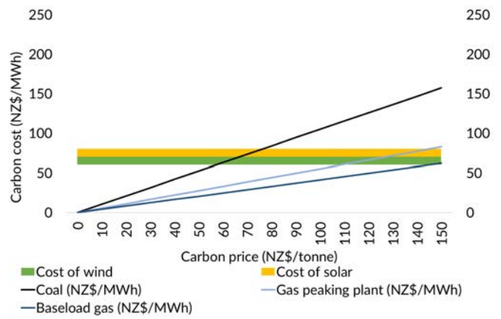
Renewable electricity prices get a kick start

A plethora of renewable electricity projects were announced in 2021. Some have firm commitments whereas others still have some work to do. In addition, three new projects were commissioned in 2021, adding almost 1,200GWh of new energy into the system, supplying ~3% of New Zealand's electricity. In total, if all of this new generation is built we estimate there will be almost 5,700GWh of new renewable generation built, ~14% of supply. That compares to annual average thermal generation of ~6,100GWh. In essence, subject to the amount of new electricity demand in the immediate few years, there should be no more baseload thermal generation in normal hydrological years by the middle of the decade.

We see three factors driving the announcement of several large scale renewable generation projects:

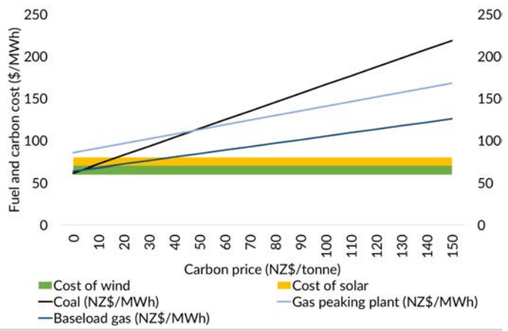
1. NZAS staying open until at least the end of 2024 provided confidence that its exit could be managed and that the downside risks from closure could be managed, enabling additional generation.
2. The Climate Change Commission report confirmed electricity's role in decarbonising the economy, providing added confidence around the long-term demand outlook. It estimates electricity demand will increase to 67TWh by 2050, consistent with earlier reports produced by MBIE and Transpower which estimate total demand of ~62TWh by 2050.
3. Rising carbon prices mean the cost of building new wind and solar is now lower than the cost of carbon from running the coal-fired Rankine units. At NZ$70/unit, the carbon cost of running the Rankine units is ~NZ$72/MWh. The cost of building a current wind project is ~NZ$60/MWh to NZ$70/MWh and solar ~NZ$70/MWh to NZ$80/MWh, with the variation due to site specific issues. Add in the cost of fuel (gas or coal) and it is not cost effective to operate thermal generation as baseload generator.

Figure 48. Carbon cost of running thermal generation vs. cost of wind and solar



Source: Forsyth Barr analysis, Bloomberg

Figure 49. Fuel plus carbon cost of running thermal generation



Source: Forsyth Barr analysis, Bloomberg

Solar takes a leap forward

One of the features of 2021 is the emergence of grid-scale solar. The largest installation is currently Todd Energy's 2.1MW plant at Kapuni in Taranaki. That is likely to get dwarfed by the new large-scale solar projects that have been announced. In addition to the projects noted in Figure 47 above, there are several smaller scale projects that are likely to be built before 2025, including:

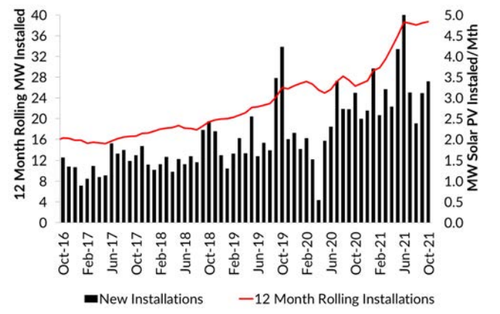
- Refining NZ's 27MW/45GWh plan
- Far North Solar 16MW project
- Lightyears Solar has plans to build 100MW of solar, with 3.4MW under construction at present

What is notable about all of the solar plans, with the exception of GNE's joint venture with FRV Australia, is that none of the existing large generators are building solar, yet.

Whilst grid-scale solar projects have taken a leap forward in 2021, roof-top solar installations continue to grow steadily. Total rooftop solar is closing in on 180MW, about the size of Genesis Energy's Tekapo hydro assets. However, those hydro assets produce ~950GWh per annum, vs ~235GWh for the roof-top solar.

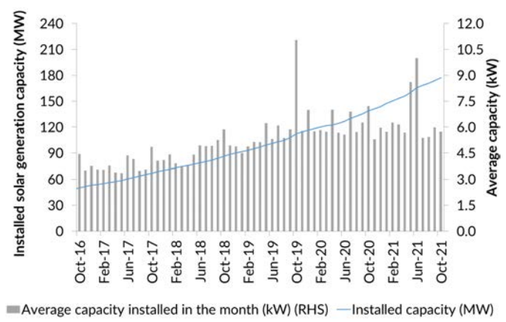
The growth rate has accelerated with +39MW added in the 12 months to 31 October 2021, up from +26MW in the prior 12 months, a growth rate of +45%. That said, both years have been impacted by COVID-19, so it is difficult to get a clear read on the trend. The average size of new installations remains relatively steady at ~6kW.

Figure 50. Solar installation rate



Source: Forsyth Barr analysis, Electricity Authority

Figure 51. Average size of solar installations and total capacity installed



Source: Forsyth Barr analysis, Electricity Authority

Surge in electric vehicles (EV) take-up following feebate scheme commencement

One of the government's more public climate change policies is the feebate scheme. In essence, buyers of low emission vehicles receive a rebate of up NZ$8,650, which in time will be paid for by fees on high emission vehicles. The "rebate" part of the scheme took effect in July 2021, whilst the "fee" part of the scheme does not take effect until 2022.

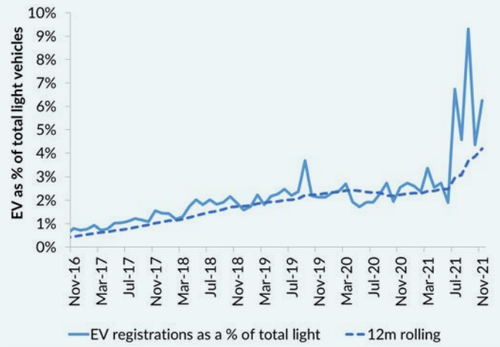
The impact on electric vehicle demand was immediate, with July 2021 setting a new EV record (1,934). Subsequent months have seen that demand continue with a new record set in September 2021 (2,275) despite Auckland being in lockdown. That said, EV growth does not appear to have accelerated with sale numbers swinging wildly from month to month (depending on when Tesla shipments arrive).

In addition, as good as the EV uplift is it is still well behind the now defunct 2021 government target of 64,000 EVs by the end of 2021, with the total EV fleet size currently just over 35,000 at the end of November — just over 50% of the target with one month remaining. Even during the record month of September, EV sales were still -746 (-25%) vehicles below what was needed if EV numbers were to reach the 64,000 target.

The uptake of EVs has been encouraging but potential headwinds remain. While it is the Tesla Model 3 that has been driving high sale numbers recently, New Zealand remains heavily reliant on Japan for much of its EV supply, particularly battery electricity second-hand vehicles (used BEVs). While demand is beginning to rise in New Zealand, BEV sales in Japan have been falling since 2014. This is an issue, with used BEV sales in New Zealand a material proportion (20%+) of Japan's new BEV sales. Anecdotally, we understand the increased demand for used BEVs has increased prices, wiping out much of the benefit of the feebate.

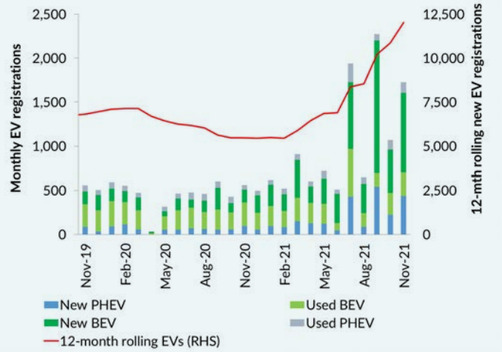
Annualising EV registrations over the past months points to an annual increase of ~18,500 EVs per annum. That suggests increased EV demand will increase electricity demand ~+40GWh per annum, or +0.1% per annum, slightly lower than the current rate of rooftop solar installation.

Figure 52. EV registrations % of total light vehicle registrations



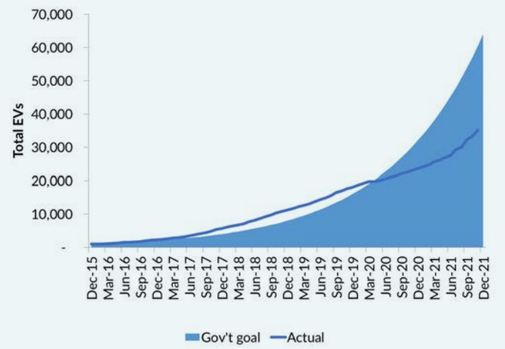
Source: Forsyth Barr analysis, Ministry of Transport

Figure 53. EV registrations



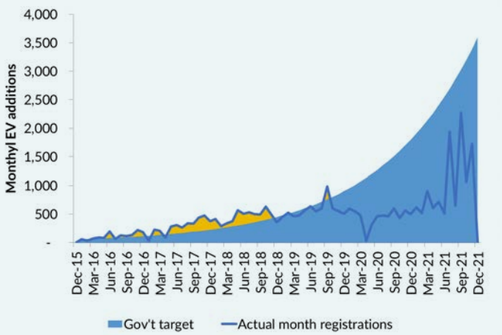
Source: Forsyth Barr analysis, Ministry of Transport

Figure 54. NZ Total EVs versus NZ Government Goal



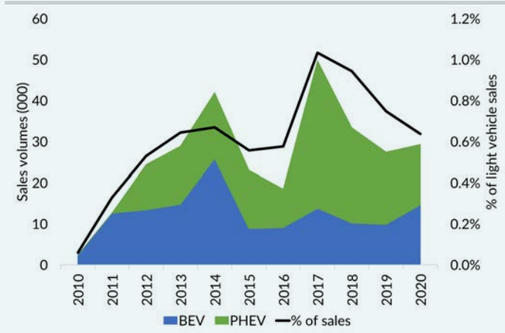
Source: Forsyth Barr analysis, NZ Govt, Ministry of Transport

Figure 55. NZ Monthly EV Additions vs NZ Government Goal



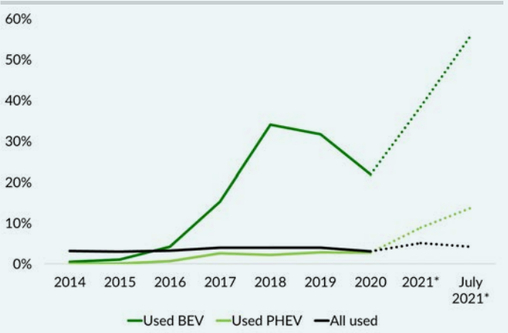
Source: Forsyth Barr analysis, NZ Govt, Ministry of Transport

Figure 56. Japan EV Sales



Source: Forsyth Barr analysis, IEA

Figure 57. Proportion of NZ used imports vs. Japan cars sales



Source: Forsyth Barr analysis, IEA

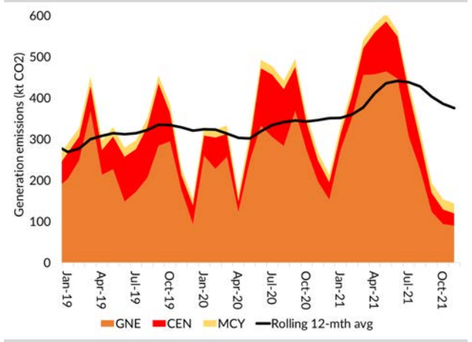
Sector carbon emissions spike then plummet in 2021

One of the features of 2021 was a reminder of New Zealand's current reliance on thermal generation, swiftly followed by a pointer to the future. Low rainfall in early 2021 and low gas availability resulted in the Rankine coal units burning more coal in the three months to May 2021 than in any three month period since 2008. 2021 has been a salient reminder that New Zealand still relies heavily on thermal generation to cover periods when there is insufficient renewable generation. As a result, 2021 will go down as a high carbon year for the electricity sector. That said, the more renewable generation that is built, the less thermal generation will be required, even during dry periods.

The reminder of the past was quickly followed by a pointer to the future with heavy rain from July to September filling hydro storage lakes. In addition, Mercury's Turitea windfarm started operating and geothermal generation was near full capacity. The net result was October then November 2021 breaking records for the highest renewable generation proportion on record, 90.6% and then 91.1% — above 90% for the first time.

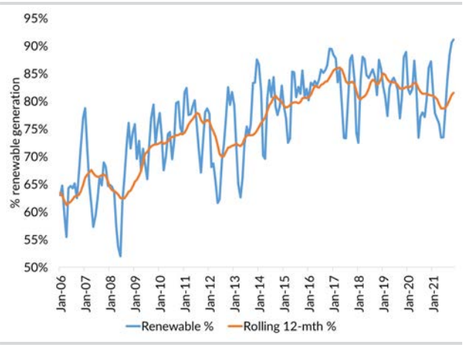
The long-term trend has been increasing renewable generation and on average New Zealand has produced more than 80% of electricity from renewable sources since 2015. This highlights that the wholesale electricity market has been able to deliver more sustainable electricity without direct government intervention. Not many overseas markets have been able to achieve growth in renewable generation without subsidies.

Figure 58. Estimated monthly carbon emissions from electricity generation

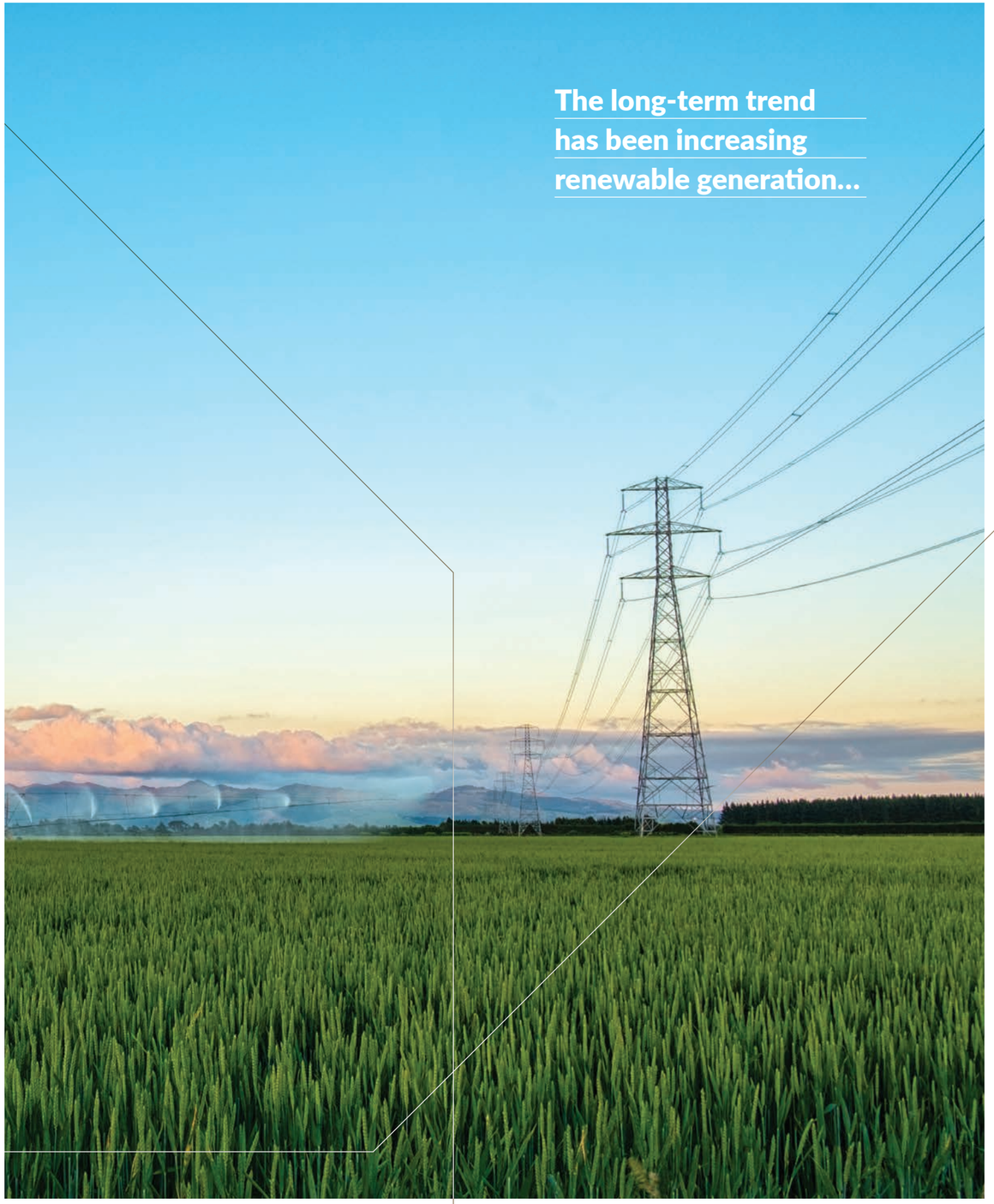


Source: Forsyth Barr analysis, company reports, Energy Link

Figure 59. Renewable generation %



Source: Forsyth Barr analysis,NZX Energy, Electricity Authority



Impact of climate change disclosures continue to evolve

Physical impact of climate change to have an outsized impact on hydro

In October 2021, New Zealand's parliament passed the Financial Sector (Climate-related Disclosures and Other Matters) Amendment Bill. This will require most New Zealand listed companies, along with a selection of other entities, to increase disclosure and comply with the Task Force on Climate-Related Financial Disclosures (TCFD) framework in their financial reporting. The aim is to bring consistency to how companies consider and report the potential impact of climate change on their operations. While a first compliance date has not yet been confirmed, it will likely become compulsory when companies report FY24 results. Recommended disclosures include the consideration and quantification of risks and opportunities to a company's operations arising from the physical changes climate change will present over the short (<5 years), medium (5–10 years) and long-term (>10 years).

Electricity generators/retailers will be acutely and uniquely impacted by the changing climate with both outsized opportunities and risks relative to other sectors. The companies are well aware of this, and in line with the sector's history of market leading disclosure, at the time of writing all of New Zealand's listed companies have made TCFD disclosures in varying degrees of detail ensuring they are well placed for the upcoming legislation on Climate-related Financial Disclosures. Meridian Energy (MEL) and Mercury (MCY) are the only companies thus far brave enough to attempt to quantify the impact on climate change on their operations and the estimates should be taken with a pinch of salt.

Despite the varying levels of details in the current disclosure there are some common themes emerging. All companies highlight increased electricity demand from the electrification of heat and transport as a long-term tailwind for the sector. MCY estimates the annual impact on its EBITDAF will be +NZ$6m, +NZ$35m and +NZ$98m over the short, medium and long term respectively. MEL estimates the annual impact will increase from +$10m in the short-term up to +NZ$43m in the long-term.

Climate scientists also expect that climate change will increase average rainfall, benefiting hydro generators. While all five companies have identified a potential benefit, due to all having hydro in their generation portfolios, it will likely be most beneficial for MEL, as the largest hydro generator by some volume, with the company estimating an +NZ$12m to +NZ$58m annual boost over the long-term.

On the flip side, climate change comes with risks to electricity companies as well. Climate change has already shown to increase the risk of extreme events, which places a risk on all exposed generation plant, with the companies highlighting the greatest risk to be from extreme rainfall events damaging catchments and dams. MEL estimates the cost of this to be between –NZ$7m to –NZ$11m, annualised over 30 years and assuming an issue occurs. All companies also forecast increased regulation as a potential risk that could increase costs to operate.

In these early disclosures the companies also highlight opportunities and risks more specific to their individual companies as opposed to the overall sector. GNE, and to a lesser extent CEN, will benefit from an improved emissions profile as they retire thermal generation and replace it with renewables. However, in the meantime they remain exposed to regulatory risk focussed on curbing fossil fuel generation. Prematurely, CEN and MEL forecast the potential for demand from data centre and green hydrogen production as a potential opportunity.

However, what is clear from early estimates given by MCY and MEL, is that while there are risks from physical changes brought on by climate change, the benefits should exceed those risks as the sector is at the centre of the decarbonisation push.

Figure 60. Opportunities and risks identified in current TCFD reporting

Opportunities	CEN	GNE	MCY	MEL	TPW
Increased rainfall increases hydro generation	X	X	X	X	X
New technologies/markets (hydrogen, data centres, etc) increasing demand	X	n/m	n/m	X	n/m
Electrification of heat and transport	X	X	X	X	X
Improving emissions profile	X	X	n/a	n/a	n/a
Risks					
Risk to assets from extreme rainfall	X	X	X	X	X
Supply chain cost increases	n/m	n/m	n/m	X	n/m
Power system flexibility and wholesale price volatility due to thermal plant closure	n/m	n/m	X	X	n/m
Regulation changes resulting in increased costs to operate	X	X	X	X	X
Thermal plant related regulatory risk	X	X	n/a	n/a	n/a
Potential short-term decrease in demand from de-industrialisation	n/m	n/m	X	n/m	n/m

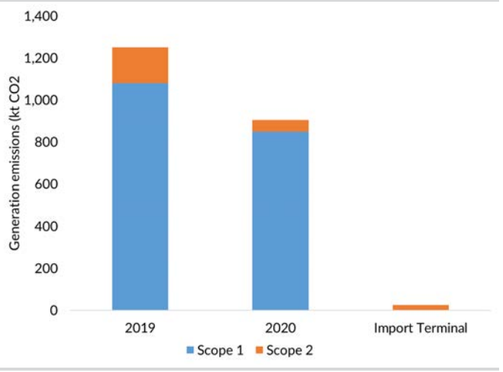
Source: Forsyth Barr analysis: X= mentioned; n/m = not mentioned; n/a = not applicable (MCY, MEL, TPW have no thermal plant

Refining NZ announces it will close in 2022, cutting emissions

Refining NZ has recently confirmed it is converting to an import terminal, the victim of COVID-19. One of the benefits, from an NZ Inc perspective, is the resulting decline in carbon emissions. When it was at full production in 2019 the refinery produced almost 1.1m tonnes of Scope 1 emissions. Then COVID-19 struck, hitting 2020 production and in 2021 the refinery had cut capacity, such that its production volumes will be similar to 2020. However, from 1 April 2022 the refinery will be operating as an import terminal only, so there will no longer be any Scope 1 emissions.

Whilst the ~1m tonne reduction in carbon emissions is positive for NZ Inc, it will make no impact on global emissions as the fuel New Zealand consumes will simply be refined offshore. Whilst we do not know for sure, we suspect any benefits from using more efficient offshore refineries will be offset by increased emissions from bringing in more product fuel ships vs. the large crude oil ships used to supply the refinery.

Figure 61. Refining NZ Carbon Emissions



Source: Forsyth Barr analysis, company reports

Agriculture

The agricultural sector, in particular dairy, represents NZ's largest polluter, contributing about half of NZ's GHG emissions. In order for NZ to achieve net zero it is clear that agriculture will be impacted in a major way. However, contrary to many other sectors, the path to net zero remains uncertain within agriculture and the medium term commitment of a relatively modest 10% reduction in methane emissions has been described as "incredibly challenging".

But it is not all about emissions and the associated regulation in relation to those emissions. Competition for land to plant forests in order to create carbon credits is already impacting land prices. An unexpected future has arrived, with it now more profitable to plant pine trees than apple trees or to graze livestock. What will this do to the agricultural sector of New Zealand? The risk of unintended consequences is very present.

The agriculture sector, both in water and on land, is also facing the very real challenge of global warming. NZ's climate is highly suitable for wine grapes, with the entire country inside the traditional band of 30–50 degrees North and South. Additionally the "not too hot, not too cold" climate is suitable for milk production. Hot enough to grow grass, cold enough so that cows do not spend too much energy on keeping cool. But already global warming is having tangible impacts. In Europe, Southern Scandinavia and England are already starting to be able to grow wine, and the cows in Sweden spend a shorter part of the year inside. Overall, NZ may very well be a net beneficiary, as traditional agricultural competitors in the Southern Hemisphere such as Australia and South America heat up as well. But the Waikato of the second half of the 21st century may very well be in Southland.

Agricultural companies are generally aware of the challenges facing their industry. Sector pathways for lower emissions are being led by dairy, where the greatest risks lie. Both Fonterra and Synlait recognise the strategic importance of reducing sector emissions, and like A2 Milk, are committed to Net Zero by 2050. Elsewhere, the sector appears to be less focussed on carbon related sustainability.

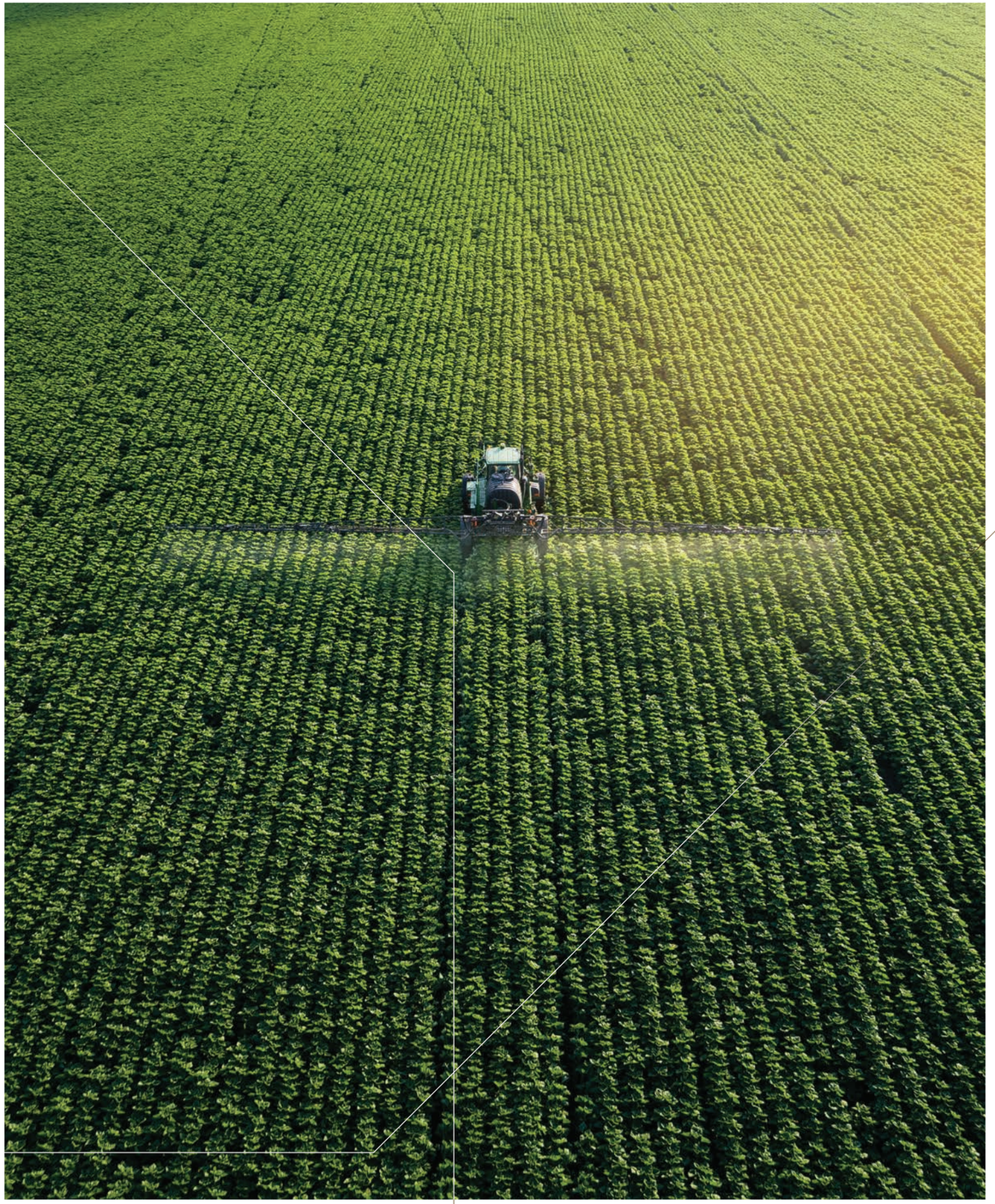
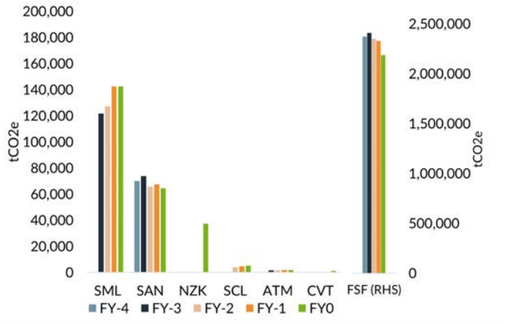
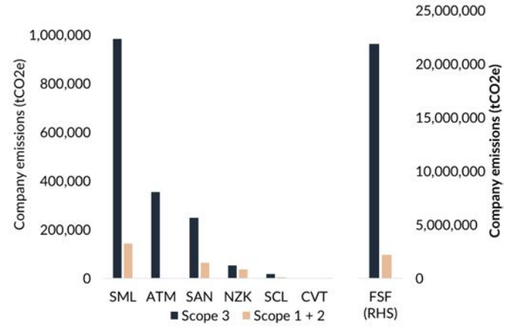


Figure 62. Agri company Scope 1 + 2 emissions through time



Source: Forsyth Barr analysis, company reports. Latest disclosure year may differ between companies. Only listed equities under Forsyth Barr coverage that disclose emissions have been included.

Figure 63. Agri company emissions, latest disclosure year



Source: Forsyth Barr analysis, company reports. Latest disclosure year may differ between companies. Only listed equities under Forsyth Barr coverage that disclose emissions have been included.

Figure 64. Agriculture stocks summary

Company	Carbon emission (ktCO2e) FY-1	Carbon emission (ktCO2e) FY0	Explicit Net Zero Commitment (NZC) and/or Emissions Reduction Target (ERT)	Positioning for a low carbon future
The a2 Milk Company	510	357	Has committed to be Net Zero by 2050	Success is largely contingent on SML, however, the purchase of Matuara Valley Milk will require investment (including the conversion of the current coal boiler used on site).
Fonterra	23,920	24,058	Has committed to be Net Zero by 2050	By FY30 it intends to invest ~NZ$1bn in reducing carbon emissions and improving water efficiency. The key challenge is reducing on-farm emissions which is reliant on third parties (most importantly from farmers). The processors do offer incentives to improve farming practices and encourage sustainability measures which will go some way to improving this.

Source: Forsyth Barr analysis, company reports. Disclosed emissions only. Scope 1, 2, 3 emissions are included if disclosed.

Figure 65. Agriculture stocks summary continued...

Company	Carbon emission (ktCO2e) FY-1	Carbon emission (ktCO2e) FY0	Explicit Net Zero Commitment (NZC) and/or Emissions Reduction Target (ERT)	Positioning for a low carbon future
Synlait Milk	1,056	1,125	Has committed to be Net Zero by 2050. SML's on-farm target is 30% reduction in Scope 3 emissions, per kilogram of milk solids, by FY28 from a FY20 base year. SML's off farm target is 45% reduction in absolute Scope 1 and 2 GHG emissions by FY28 from a FY20 base year.	SML is a clear stand-out in terms of disclosure with sustainability included throughout its strategy. Like FSF, the large majority of emissions are on-farm.
Sanford	276	314	No NZC or ERT yet	Achieving fisheries goals relies on some key assumptions, prime among those is the availability of renewable marine fuels at NZ ports. This means renewable fuels and renewable fuel blends being consistently available at the ports in commercially relevant scales.
NZ King Salmon	91	n/a	No NZC or ERT yet	NZK doesn't have a path as yet but is working on it. Options include growing more seaweed on farms, electric boats, improving feed to conversion ratio to be more efficient on feed costs and lowering footprint. Like SAN, achieving fisheries goals relies on the availability of renewable marine fuels at NZ ports.
Comvita	2	2	No NZC or ERT yet	Currently has no plan but key focus areas are; (1) moving the supply chain from air to sea freight, (2) investing in solar energy to ensure each site is self-sufficient, and (3) expanding its harvest plantation strategy.
Scales	22	24	No NZC or ERT yet	Currently working on its pathway. SCL will endeavour to reduce its carbon footprint where it reasonably can.
Delegat Group	n/a	n/a	No NZC or ERT yet	No company specific statements but New Zealand winegrowers has committed to the goal of the NZ wine industry being net zero before 2050. As a result, the sustainable winegrowing NZ programme encourages vineyards and wineries to adopt a variety of energy-saving initiatives and practices. The programme benchmarks wineries against each other on reducing energy costs, and improving energy performance.

Source: Forsyth Barr analysis, company reports. Disclosed emissions only. Scope 1, 2, 3 emissions are included if disclosed.

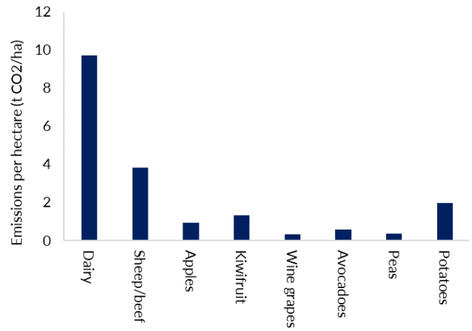
The effects of climate change and society's response

The direct impacts of climate change on NZ's agriculture sector are significant with product (and ultimately earnings) outcomes driven by a number of climate related factors. This is most acute for those sectors that are regionally concentrated and/or have short harvesting windows.

Dairy — climate related events can have a material impact

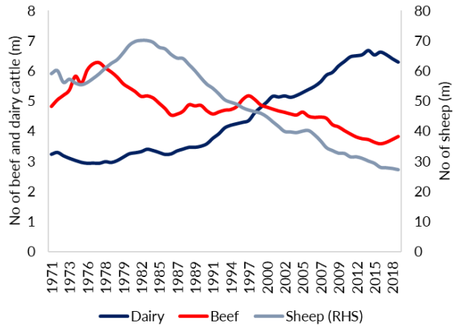
The NZ dairy processors rely on favourable growing conditions to maximise production. Therefore, adverse weather events can have a significant impact. Looking at the NZ dairy industry, dairy cow distribution is regionally diverse with ~58% of dairy cows in the North Island and ~42% in the South Island. The Waikato is NZ's largest dairy region with 22.4% of dairy cows, followed by North Canterbury (14.6%) and Southland (12%). Historically, the temperate climate of almost all of New Zealand is suited to cattle with most of the dairy farms in lowland areas of the North Island, where naturally fertile or improved soils make for good grass growth. At the moment there is no good evidence to suggest that dairy cattle are suffering from the direct effects of climate in these areas, but climate does play a large part in determining their productivity through its effects on the feed supply. Severe or prolonged winters, or droughts in summer, are the most usual causes of lowered yields of dairy produce. Fonterra, with ~80% of New Zealand's total milk supply, is most exposed to adverse events, particularly given the high fixed cost nature of dairy processing. Despite SML only having ~5% of NZ's milk supply, it is also significantly exposed given it is reliant on a smaller/more concentrated number of farms in the Canterbury and Waikato regions with current excess capacity compounding the impact. This farm/supply concentration vulnerability was showcased in early June when Canterbury experienced significant flooding, resulting in farm damage and the Dunsandel facility operating at reduced capacity for a period of 36 hours.

Figure 66. Dairy is the most emissions intensive agricultural practice in NZ...



Source: Forsyth Barr analysis, ICCC

Figure 67. ...and the number of cattle has increased significantly



Source: Forsyth Barr analysis, Environment NZ

Other agriculture; the impacts are potentially more severe

We discuss on a sub-sector by sub-sector basis below.

Fisheries

We are beginning to see the impacts of climate change on the wider New Zealand agricultural sector. Warmer sea temperatures is a significant risk for NZ King Salmon (NZK) and Sanford (SAN). The optimal SST (sea surface temperature) range for fish performance is 12˚C to 17˚C, with days over 17˚C a key driver of higher mortalities (alongside low oxygen, disease, and stress). FY18 and FY19 had as many as 18 and 19 weeks (respectively) with temperatures over 17˚C in the period December-April. NZK annual mortalities spiked to 20% and 23% in those years from 8.5% in FY17. Mortalities reduce both the current and following year harvests, as well as increase cost per tonne. From early indications, temperatures for the coming period December 2021 to April 2022 are set to see elevated levels.

NZ viticulture

New Zealand's wine produce is geographically concentrated (70% of our wine is produced in Marlborough) which mean adverse weather events can have a material impact on crop yields for NZ's export industry. Wine is one of the most sensitive agri products to climate change and the NZ wine industry faces a number of issues it needs to manage such as water shortages, frost, wind, increase in mildew and a short-growing cycle. However, there is a prevailing sense across the New Zealand industry that we are better positioned than most other winegrowing countries (at least in the short to medium-term).

Australia and international viticulture

In Australia, higher temperatures trigger advance phenology, affecting grape composition, with increased water stress impacting yields and fruit composition. This is compounded by droughts and wildfires. As a result producers have begun moving to cooler regions such as Tasmania. In the US a 2007 study (Cahill et al) found that wine grape yields in California are expected to decline by -5% by the end of the century if climate change does not exceed current patterns, but if historical extremes are exceeded this could reach -10%. Wine quality may also be reduced by 7% to 39% by 2030 according to Webb, Whetton & Barlow in 2008. In Europe, 2021 was a difficult year for the three largest wine producing countries; Italy, Spain and France (which combined make-up 45% of the world's wine production). In Italy, frosts in April reported a 15% drop in yields, France was exposed to a damp spring, early summer and mildew followed by a three month drought which made for a good quality harvest but very low yield (down 55% vs 2020). Global wine production was below average in 2021 for the third year in a row despite the southern hemisphere enjoying a bumper harvest.

Other NZ agriculture

Other agriculture companies; Comvita (CVT) and Scales (SCL) are also exposed to climate change risk. The short harvesting window nature of the honey industry (4–6 week window) leaves CVT susceptible and we have seen evidence of this throughout CVT's history. CVT has diversified to an extent over recent years into regions across the North Island (namely, the central plateau), however, it is still significantly exposed. SCL is also sensitive to adverse weather events but is less so than other agricultural companies as lower supply is generally offset by an increase in prices (no evidence that the recent Nelson storm, which reduced harvest by ~7-8%, had any material impact on earnings). SCL also has methods to mitigate against weather events like; (1) orchard diversification, (2) defect sorting technology — allows it to export its best apples only, and (3) insurance at risk policy, which allows it to partially mitigate against weather related events.

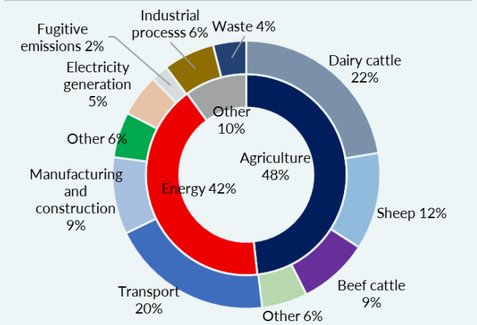
Regulatory momentum

The core issue for the agricultural sector is around biogenic methane emissions, the current targets are to reduce biogenic methane emissions by at least 10% by 2030 and between 24–47% by 2050. This is predominately a dairy issue with limited impacts (at this stage) on other listed agricultural companies. For the fisheries stocks, the biggest regulatory challenge the industry faces in relation to climate change is energy pricing and ETS related effects. Fuel use on board vessels represents a large proportion of company emissions (>80%). Recent changes to the functioning of the ETS have resulted in increases in the incremental ETS cost on fuel, with further increases being anticipated over the course of the coming years. Limited other regulatory requirements have been put in place for other sectors.

Closing the gap – a call for action

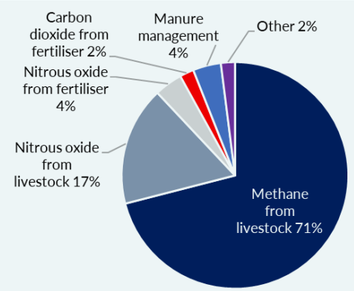
Reducing emissions from agriculture will be critical to achieving the target to reduce biogenic methane by at least 10% by 2030 and between 24–47% by 2050. Dairy NZ has labelled the task as "incredibly challenging" for farmers, particularly given the lack of readily available solutions — industry commentary suggests it is now up to the government to deliver a credible emissions reduction plan for New Zealand and the investment in tools and support required to achieve it. Dairy NZ feedback to the commission stated that it would be hard to cut agricultural emissions just by improving farming techniques, with herd reduction estimates sitting at 13.6% by 2030. The first phase till 2030 is about shifting practices to reduce emissions with the country still expected to produce about the same amount of milk and production but using fewer animals. It has been estimated that biological emissions can be reduced by up to 10% for the dairy sector with currently available farm management practices. It is still early days in the technological advancements of methane reduction initiatives with a number in the early phases such as methane vaccines, and the use of asparagopsis (native red seaweed), among others. Reducing emissions from other activities (manufacturing and transport) will require significant investment but should be achievable, however, the concentrated nature of NZ's agricultural emissions (towards natural methane) makes achieving a net zero target very difficult and reliant on government support (unless there is a dramatic reduction in cattle numbers).

Figure 68. Breakdown of NZ's emissions — agriculture is the largest emitter...



Source: Forsyth Barr analysis, Ministry for the Environment

Figure 69. ...driven by livestock methane emissions



Source: Forsyth Barr analysis, ICCC

COP26 takeaways

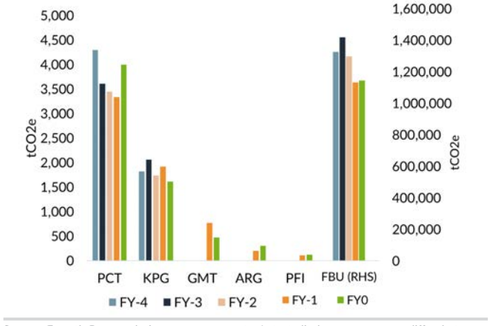
There were little direct COP26 takeaways that relate to the NZ agriculture sector but it did reinforce two key items New Zealand is already addressing;

1. **Methane pledge:** A number of countries pledged to reduce global methane by 30% by 2030 on 2020 levels. Subsequently, the Minister for Climate Change in New Zealand, James Shaw, stated there would be no changes to NZ's already standing own methane reduction policy of "24 to 47% below 2017 biogenic methane emissions by 2050, including 10% below 2017 biogenic methane emissions by 2030".
2. **Coal phase-down:** New Zealand was part of an agreement to phase down burning unabated coal for electricity generation over the next 10 to 20 years. As part of this, signatories have committed to ending all investment in new coal power generation domestically and internationally, along with agreeing to phase out coal power in the 2030s "for major economies". This likely has no new implications for NZ companies who are already looking to phase out coal use. The most significant user of coal in the NZ agriculture sector is Fonterra, which is looking to reduce exposure through a combination of energy efficiency initiatives and switching fuels at its nine manufacturing sites that still use coal. FSF's goal is to ultimately stop using coal by 2037, and there is potential this is brought forward on the back of the COP26 coal agreement.

Construction (= Materials + Property)

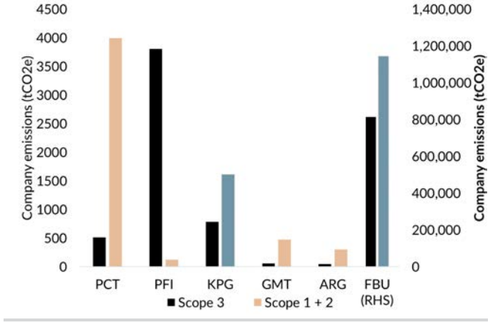
The building sector is both a substantial source of emissions, contributing up to 1/5 of total emissions, and a potential opportunity. The technology to build net zero buildings is already well established and practised selectively around the world. In New Zealand there are signs that there is both a regulatory push towards "green building" and a demand for it. The opportunity set for construction and property may very well be the largest of all sectors in New Zealand. The companies that correctly identify these opportunities have the potential to deliver substantial value.

Figure 70. Construction Scope 1 + 2 through time



Source: Forsyth Barr analysis, company reports. Latest disclosure year may differ between companies. Only listed equities under Forsyth Barr coverage that disclose emissions have been included. STU disclosed total emissions only. PCT emissions are preliminary and subject to change.

Figure 71. Construction company emissions, latest disclosure year



Source: Forsyth Barr analysis, company reports. Latest disclosure year may differ between companies. Only listed equities under Forsyth Barr coverage that disclose emissions have been included. STU disclosed total emissions only. PCT emissions are preliminary and subject to change.

Figure 72. Construction stocks summary

Company	Carbon emission (ktCO2e) FY-1	Carbon emission (ktCO2e) FY0	Explicit Net Zero Commitment (NZC) and/or Emissions Reduction Target (ERT)	Positioning for a low carbon future
Building materials				
Fletcher Building	1,980	1,959	Has committed to reduce emissions by 30% by 2030	Well positioned and already undertaking initiatives such as alternative fuels to lower coal consumption in its cement kiln, investigating natural pozzolan to replace portland cement, and replacing factory and warehouse lighting with LEDs.
Steel & Tube	2	2	No NZC or ERT yet	Already reducing waste with recycling, optimising freight routes and loads to reduce emissions, and developing expertise to help deliver green infrastructure projects.
Landlords				
Asset Plus	n/a	n/a	No NZC or ERT yet	Yet to be announced
Argosy	0	0	Has committed to reduce emissions by 30% by 2031	Well positioned, with a number of internal policies already enacted and the current greening of the portfolio underway.
Goodman	1	1	Is already Net Zero	GMT (and the wider Goodman group) had aimed for 2025 net zero carbon, however, in July 2021 announced that they had met this target, with operations already net zero.
Investore	n/a	n/a	No NZC or ERT yet	Yet to enact a policy, but IPL has begun to measure its emissions.
Kiwi Property Group	3	2	Aims to be net carbon negative by 2030	Well positioned through using lower waste materials, improving energy efficiency and through achieving consistently high green star ratings for its assets.
Stride	n/a	n/a	No NZC or ERT yet	SPG has a number of objectives including seeking to own high rated Greenstar or NABERSNZ buildings, however, SPG has yet to announce a net zero commitment.

Source: Forsyth Barr analysis, emissions are measured in ktCO2e. Scope 1, 2, 3 emissions are included if disclosed.

Figure 73. Construction stocks summary continued...

Company	Carbon emission (ktCO2e) FY-1	Carbon emission (ktCO2e) FY0	Explicit Net Zero Commitment (NZC) and/or Emissions Reduction Target (ERT)	Positioning for a low carbon future
Precinct	4	5	Is already Net Zero	PCT currently offsets its "unavoidable" emissions, has offset embodied carbon in recent developments and is Toitu carbon zero certified. It also measures its building using the NABERSNZ energy efficiency rating system, with a target of all buildings being greater than 3 stars (3 star indicates good performance, 4 star indicates excellent).
Property for Industry	0	4	Net zero scope 1, 2 and selected scope 3 emissions	Investing to reduce emissions from HVAC systems (largest source of scope 1 emissions), roof top solar, and Green Star certification.
Vital Healthcare	n/a	n/a	No NZC or ERT yet	Roof top solar (installed generation of 1,000KW), LED lighting, rain water harvesting, and using recycled and environmentally conscious building products.

Source: Forsyth Barr analysis, emissions are measured in ktCO2e. Scope 1, 2, 3 emissions are included if disclosed.

The effects of climate change and society's response

Climate change can have a very direct impact on buildings. Rising tides impact the land available for development, more severe weather patterns degrade façades faster and rising temperatures lead to increased climate control. Most buildings were designed for current or earlier climates, however, climate change may cause many parameters (temperature, rainfall, wind and snow) to be outside of the range designed for. Furthermore, a large portion of Auckland and Wellington CBDs sit on low lying reclaimed land.

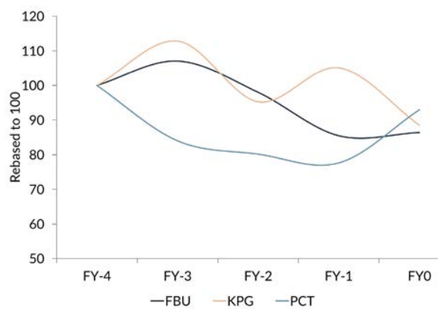
There is also a call for property to pull its weight in reducing emissions. The built environment is responsible for 13–20% of NZ carbon emissions according to the Green Building Council, and commercial buildings in NZ consume 9% of all electricity. Many tenants now require buildings to be of a certain environmental standard before agreeing to leases.

The NZ Government (the largest owner and tenant in NZ) as part of their climate change initiatives now requires offices and public buildings it constructs or leases that are >2,000sqm in size to be 4 stars (although the target is 5 stars) based on the National Australian Built Environment Rating System New Zealand (NABERSNZ) energy efficiency standard. However, the New Zealand Green Building Council (NZGBC) recently highlighted a lack of urgency and ambition to implement wider changes.

Figure 74. Original Auckland waterfront level

Source: Forsyth Barr analysis

Figure 75. Scope 1 & 2 emissions index to FY-4



Source: Forsyth Barr analysis. company disclosures

Closing the gap – a call for action

Lifetime emissions of a new building are, broadly speaking, evenly split between (1) day-to-day use, and (2) construction, materials and waste. To achieve net zero all new buildings will have to be highly energy efficient and run on renewable energy, and all current buildings will have to be renovated to operate the same way. However, the manufacturing of materials used, the construction and the waste of deconstructed buildings will all also have to be net zero.

Material efficiency will play a large part in reducing construction emissions, this can be done through (1) reducing the amount of materials used, (2) re-use materials where possible, and (3) the use of longer lasting materials that may be more costly. The way these materials are converted to usable product, including transport and fabrication, will also need to be done using renewable energy and low emissions processes.

Running commercial buildings using renewable energy also helps in achieving net zero emissions. This can be done through drawing energy from a 100% renewable grid in NZ, or by installing solar on buildings. In Auckland alone there is approximately 5.4m sqm of prime industrial roof space, covering just 1% of this with solar panels could produce enough power to support c. 10,000 homes. Less standardised and more high rise commercial buildings such as office, accommodation and retail have less space available relative to the size of the building so likely require more novel energy solutions.

COP26 takeaways

Whilst there were no direct implications for buildings from COP26, the coalition #BuildingtoCOP26 set out a number of targets to halve the built environment's emissions by 2030, and has committed to the UN's Race to Zero campaign. #BuildingtoCOP26's three objectives are (1) all countries must have building decarbonisation targets, concrete policies and related measures and mechanisms within their NDC's, (2) 1,000 cities and at least 20% of the largest built environment businesses by revenue committed to the UN's Race to Zero, and (3) a shared ambition by the sector towards 100% net zero carbon operations in new buildings by 2030, with embodied carbon reduced by at least 40%, and by 2050 all buildings net zero across the whole lifecycle.

Fund flows

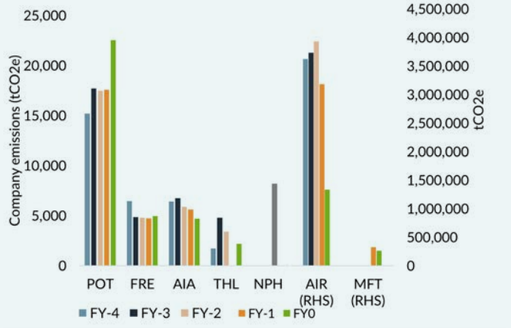
Whilst real estate companies aren't generally included in ESG related investment funds due to the relatively high current emissions of the sector, a number of REITs have issued "Green Bonds" in New Zealand. Green Bonds are used when a company has designated the proceeds towards reducing emissions or reducing the environmental impacts of the business. For example Argosy (ARG) has used Green Bonds to help with the conversion of over 50% of its portfolio to green assets (as judged by either NABERSNZ and/or Green Star rating) by 2031. There has not yet been an economic advantage for issuing green bonds (i.e. a lower coupon rate) but this may occur as this type of debt instrument becomes more common.

Transport and Tourism

Tourism and transport, particularly aviation, is at the forefront of consumer's perception of climate change. While aviation is a meaningful contributor, the majority of transport related emissions come from private vehicles (i.e. cars), the fuel for which we discuss earlier in the Energy section. Transport related emissions fell over the past 12 months, almost exclusively due to the impact of COVID-19 restrictions on aviation as evidenced by Air New Zealand's (AIR) significantly lower Scope 1 emissions (Figure 76).

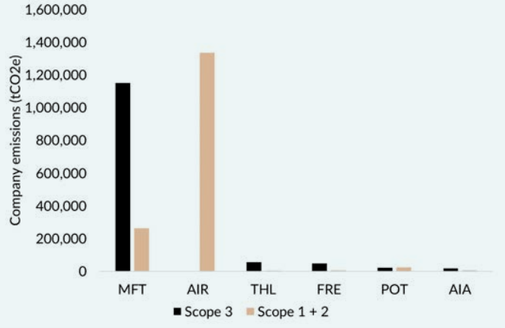
Most sector companies have created and published sustainability strategies and targets, as we outline in Figure 78, albeit remain largely reliant on other sectors to provide solutions.

Figure 76. Transport and Tourism Scope 1 + 2 through time



Source: Forsyth Barr analysis, company reports. Latest disclosure year may differ between companies. Only listed equities under Forsyth Barr coverage that disclose emissions have been included.

Figure 77. Transport & Tourism emissions, latest disclosures



Source: Forsyth Barr analysis, company reports. Latest disclosure year may differ between companies. Only listed equities under Forsyth Barr coverage that disclose emissions have been included. AIR does not disclose an estimate of Scope 3 emissions.

Figure 78. Transport and Tourism companies

Company	Carbon emission (ktCO2e) FY-1	Carbon emission (ktCO2e) FY0	Explicit Net Zero Commitment (NZC) and/or Emissions Reduction Target (ERT)	Positioning for a low carbon future
Air New Zealand	3,179	1,336	Has committed to be Net Zero by 2050 (Scope 1 and 2). Currently working through accreditation for the Science Based Target Initiative.	Has four levers: (1) sustainable aviation fuels (SAF), (2) zero emissions aircraft (hydrogen, battery or hybrid), (3) fleet renewal to more efficient fleet, (4) operational efficiencies, plus carbon offsetting if necessary for any residual.
Auckland Airport	6	21	Has committed to set a pathway to reach net zero by 2030 (scope 1 and 2 emissions). AIA committed to an SBTi target in 2017, which reflected a 45% reduction in CO2-e emissions per square metre by 2025. This target was achieved five years early in 2020.	Phasing out the use of natural gas in the terminal, electrifying corporate vehicle fleet, using refrigerants with the lowest global warming potential possible, and using 100% renewable electricity.
Freightways	51	52	No NZC yet but has set targets to reduce total emissions by -35% by 2030 and -50% by 2035	Focus on driving greater efficiencies, maintaining modern fleets, a move away from fossil fuel consumption, electrification of our road fleet over time, and a more fuel efficient air fleet in the future.
Mainfreight	1,663	1,412	No NZC or ERT yet	Sustainability initiatives include moving capacity from road to rail and coastal shipping, better route planning, and conversion of gas and diesel powered forklifts to electric.
Napier Port	8	8	Has committed to be Net Zero by 2050	Launched a Sustainability Strategy and Action Plan earlier this year.
Port of Tauranga	40	43	Has committed to be Net Zero by 2050 and has a goal to reduce emissions by -10% per cargo tonne by FY22	Emissions reductions from automation and electric stacking cranes.
Tourism Holdings	89	58	No NZC or ERT yet	THL's climate and carbon strategy and ongoing Future Fit programme will play a key role.

Source: Forsyth Barr analysis, company reports. Disclosed emissions only. Scope 1, 2, 3 emissions are included if disclosed.

The effects of climate change and society's response

We expect the transport and tourism sectors to be most affected by two key climate change issues: (1) rising sea levels on ports and low lying airports, and (2) consumer demand for air travel given the flight shaming movement. We don't expect either to have a meaningful impact on the sectors over the medium term but recognise they could become material issues over time. We discuss both below.

Rising sea levels

New Zealand's low lying coastal areas are at risk from rising sea levels. A 2019 report prepared by NIWA suggested that 13 airports in New Zealand are currently at risk from coastal flooding, including Auckland Airport (AIA) and Wellington Airport (67% owned by Infratil [IFT]). The risk of more frequent flooding events would increase as sea levels rise, necessitating capex to provide greater flood protection and mitigate the impact of a rising water table on airport assets.

Sea ports are also at risk from rising sea levels given the increased flood risk. There is not a one size fits all solution for ports, given challenges will be different by region and location. A 2019 Maritime Economics and Logistics report called for main adaptation steps to combat rising sea levels to "include storm defences, elevation to compensate for projected sea levels and even relocation".

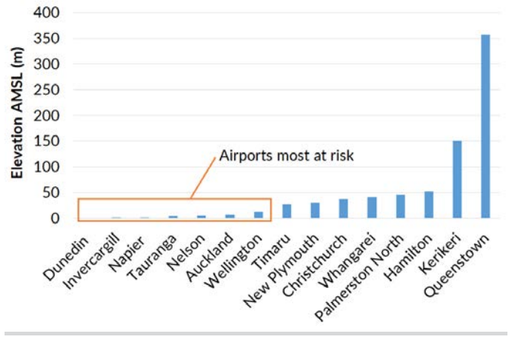
Flight shaming

Flight shaming became a global phenomenon in 2019 having first gained momentum in Sweden several years prior where it is known as "flygskam". It pushed individuals to reassess the necessity of flying and consider alternatives, like the train. COVID-19 has reduced the impact of flygskam, albeit we anticipate the movement to respond to the eventual aviation recovery.

The impact on an island nation (i.e. New Zealand) with no alternative access is likely to be less pronounced than in Europe, however, it cannot be ignored and is likely to have some negative impact on longer term demand. We suspect the impact will be greater on corporate travel than consumer travel given the former will increasingly be keen to impress upon their stakeholders that they are carbon neutral.

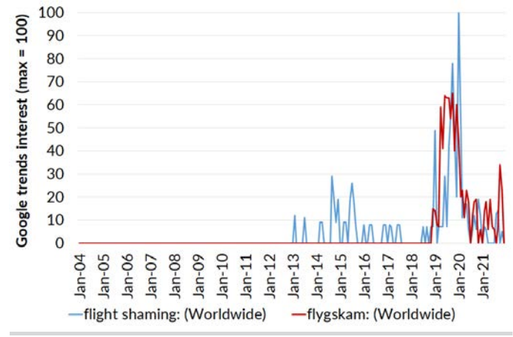
The concept of flight shaming will ultimately erode as lower carbon technologies (i.e. hydrogen, electric batteries, sustainable aviation fuels) replace kerosene as the main aviation fuel.

Figure 79. NZ Airports at risk from coastal flooding



Source: Company data, Forsyth Barr analysis

Figure 80. The global flight shaming trend



Source: Google trends, Forsyth Barr analysis

Closing the gap — a call for action

In the absence of carbon offsetting (already at 100% for domestic aviation) the transport and tourism sectors are reliant on new technology adoption by suppliers to achieve net zero. Alternative energy sources to oil-based diesel and kerosene are required. Significant investment is being undertaken in developing electric, hydrogen and bio-fuel powered land, sea and air transport options.

Electric power offers the simplest solution but also the most constrained given the weight to storage ratio of batteries. While this has and will continue to improve, and offer viable commercial solutions within the next 5–10 years (in some instances it already has) for all modes of transport, long-haul and line-haul transport options will likely need combustion-based power. This will come in the form of hydrogen (the bi-product of which is water) and bio-fuels (similar to oil but sustainably produced with carbon sequestration from the atmosphere taking place during the crop growing phase).

While aviation represents just ~12% of global transport emissions we estimate that aviation represents ~46% of the listed transport and tourism sectors' carbon emissions. This is partly a function of the relative geographic isolation of New Zealand.

COP26 takeaways

With an entire day (labelled "Transport Day") dedicated to transport-related topics, COP26 provided the platform to lay the pathway towards the reduction of carbon emissions from transport and tourism activities. The electrification of passenger vehicles was the primary focus of the day, however, aviation, trucking and shipping were also addressed.

Following on from the discussions, New Zealand has made commitments to a number of causes, among which are declarations to move towards both net zero aviation and shipping (it signed the Clydebank declaration for green shipping corridors and is committed to zero emission shipping by 2050). New Zealand also committed to aim for 100% zero-emission new vehicle sales by 2040, with an interim goal of 30% zero-emission vehicle sales by 2030.

Fund flows

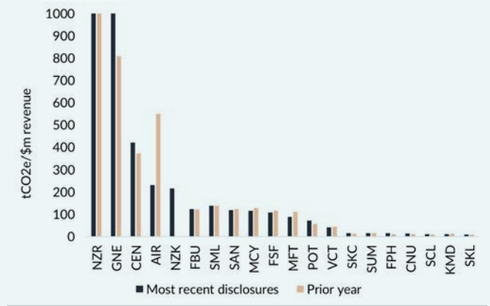
It is difficult second guessing investor behaviour around exclusions as the collective global conscience evolves over time, however, we believe two factors will mean the transport and tourism sector remains off sin/virtue lists for the time being.

First, as the ESG world evolves and begins to focus more on the relative (companies improving their ESG credentials) rather than absolute aspect of ESG (those heavy carbon emitters or those with poor governance), we expect the incremental improvements that sector participants make through gradual technology change and carbon offsetting will become more important.

Second, industries that have ended up on a sin/virtue list have to date either been harmful to humans (i.e. controversial weapons, tobacco, gaming, and alcohol) or very harmful to the environment with existing alternatives (i.e. coal). While the wider transport and freight industry is harmful to the environment it is reliant on the technology from industry suppliers, akin to the electricity users from coal fired power stations. We do not expect aviation or freight related sectors to enter sin/virtue lists, and recognise the bigger risk reflects consumer behaviour being increasingly driven by environmental factors.

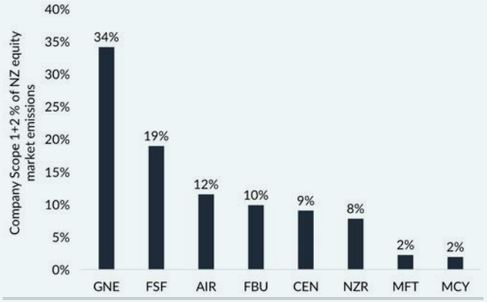
Appendix 1:
Emissions data for New Zealand companies

Figure 81. NZ Emissions intensity, Scope 1 + 2



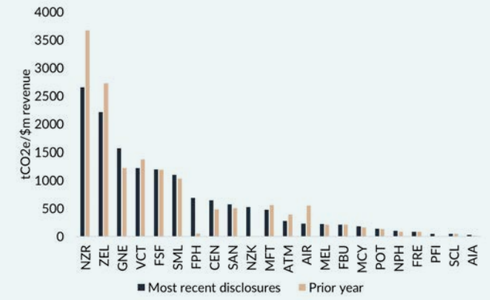
Source: Forsyth Barr analysis, company reports.

Figure 82. Company emissions % of NZ market emissions, scopes 1 + 2



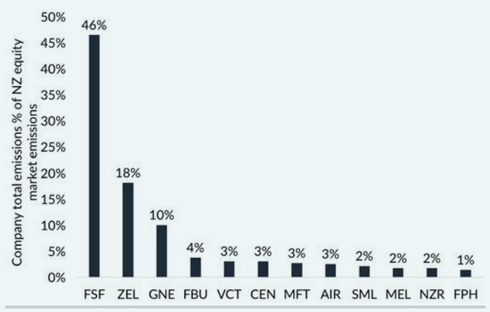
Source: Forsyth Barr analysis, company reports. Most recent disclosure year only.

Figure 83. Emissions intensity, all scope emissions



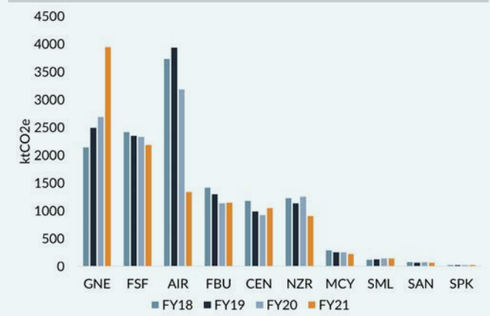
Source: Forsyth Barr analysis, company reports. FY19 revenues used to avoid COVID impact.

Figure 84. Company emissions % of NZ market emissions, all scope



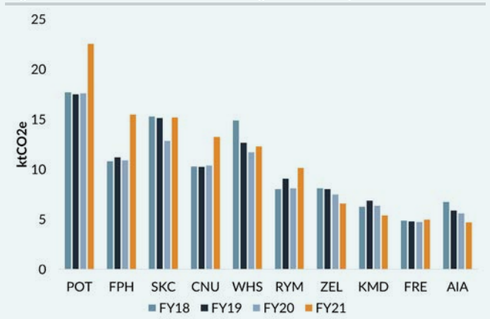
Source: Forsyth Barr analysis, company reports. Most recent disclosure year only.

Figure 85. Top 10 emitters through time, Scope 1 +2



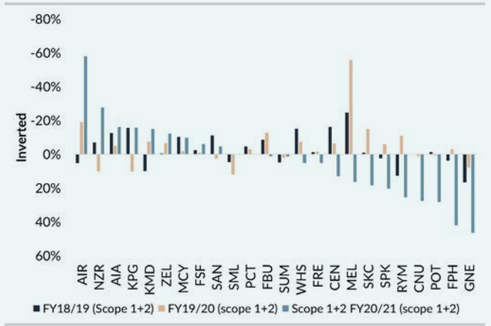
Source: Forsyth Barr analysis, company reports. 'FY21' refers to the most recent disclosure year.

Figure 86. Next 10 emitters through time, Scope 1 + 2



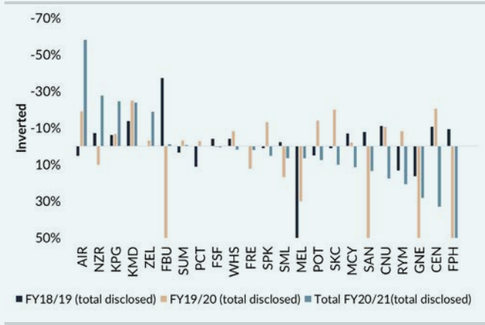
Source: Forsyth Barr analysis, company reports. 'FY21' refers to the most recent disclosure year. For some companies this may actually be FY20.

Figure 87. Year on year change in emissions through time, scopes 1 + 2



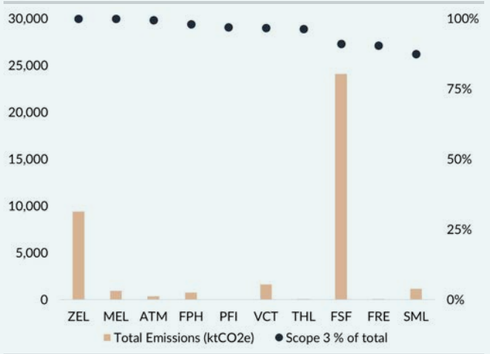
,Source: Forsyth Barr analysis, company reports. 'FY21' refers to the most recent disclosure year. For some companies this may actually be FY20.

Figure 88. Year on year change in emissions through time, all emissions scopes



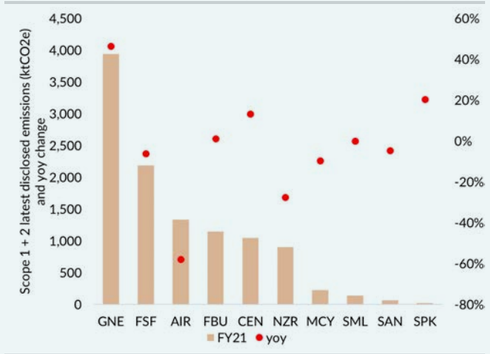
,Source: Forsyth Barr analysis, company reports. 'FY21' refers to the most recent disclosure year. For some companies this may actually be FY20.

Figure 89. Scope 3 emissions as % of total emissions



Source: Forsyth Barr analysis, company disclosures.

Figure 90. Scope 1 + 2 emissions, latest disclosed and yoy chg



Source: Forsyth Barr analysis, company disclosures.

Appendix 2:
Glossary of key terms

Acronym	Explanation
APRA	Australian Prudential Regulation Authority
BEV	Battery-powered Electric Vehicle
CCR	Cost Containment Reserve
COP26	The 26th edition of the Conference of Parties
CSRD	Corporate Sustainability Reporting Directive
ERT	Emissions Reduction Target
ESG	Environmental, Social and Governance
ETS	Emissions Trading Scheme
EV	Electric Vehicle
GFANZ	Glasgow Financial Alliance for Net Zero
GHG	Greenhouse Gas Emissions
GSS	Green, Social and Sustainability Bonds
IEA	International Energy Agency
IFRS	International Financial Reporting Standards
IPCC	Intergovernmental Panel on Climate Change
ISS	Institutional Shareholders Service
ISSB	International Sustainability Standards Board
NABERS	NZ National Australian Built Environment Rating System New Zealand
NDC	Nationally Determined Contribution
NIWA	National Institute of Water and Atmospheric Research
NZAM	Net Zero Asset Managers Initiative
NZAOA	Net Zero Asset Owner Alliance
NZAS	New Zealand Aluminium Smelter
NZBA	Net Zero Banking Alliance
NZC	Net Zero Commitment
NZFSPA	Net Zero Financial Service Providers Alliance
NZGBC	New Zealand Green Building Council
NZIA	Net Zero Insurance Alliance
NZICI	Net Zero Investment Consultants Initiative
NZU	New Zealand Units
PAII	Paris Aligned Investment Initiative
PRI	United Nations Principles for Responsible Investment
SBTi	Science Based Targets initiative
SEC	US Securities and Exchange Commission
SST	Sea surface temperature
TCFD	Taskforce on Climate-related Financial Disclosures
UNFCCC	United Nations Framework Convention on Climate Change
XRB	External Reporting Board

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