

FIRST SIX-MONTHLY PROGRESS REPORT ON THE EMISSIONS REDUCTION PLAN

COVERING THE PERIOD JULY 2022-DECEMBER 2022

PREPARED BY THE CLIMATE CHANGE CHIEF EXECUTIVES BOARD
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Executive Summary

Aotearoa New Zealand is using emissions budgets to reach its climate change goals: net-zero long-lived gases by 2050 and a 24-47 per cent reduction in biogenic methane by 2050. The Government released the first emissions reduction plan (ERP1) in May 2022, which is the first whole-of-economy plan to reduce net greenhouse gases.

ERP1 sets out the strategy, targets and actions needed across every part of the Government and every sector of the economy, to meet the first emissions budget and sub-sector targets.

This report, prepared by the Climate Change Chief Executives Board (the Board), summarises the first six months of progress, using data and commentary supplied by Government agencies, and the latest emissions projections.

Overall progress and early successes

Six months into ERP1, agencies are reporting that implementation of actions is largely on track, and there have been some early successes. However, emerging risks reflect the size and scale of the challenge to deliver what is an ambitious programme of work.

Emissions: As at 31 December 2022, the most recent national level projections show achieving EB1 and EB2 is finely balanced and any reductions in scope or delays in delivery of ERP1 will make achieving emissions budgets even more challenging. We are currently not on track to meeting EB3.

Implementation: As at 31 December 2022, out of 301 actions, 221 actions were ranked green or 'on-track', 64 actions were ranked amber or have 'some delays', and 1 action was ranked red or 'at risk'¹. 15 x actions are grey or not progressing.

Successes: Early successes include the clean car discount delivering more initial abatement than anticipated, the Government issuing \$3 billion of Sovereign Green Bonds, the Waste Minimisation Fund significantly increasing, the stand up of the Centre for Climate Action on Agricultural Emissions, and Cabinet agreeing a new procurement model for public transport (the sustainable public transport framework) - together with improvements to bus driver conditions.

Risks to the programme

For the period to 31 December 2022, the Board has identified **the following risks that have potential for the programme to fall short of meeting the emissions budget:**

1. **Delays to the implementation of some actions, which may result in slower than expected abatement.**
 - i. A slow spending run-rate for CERF initiatives with spending at the end of Q1 averaging 6.8% of the baseline and 16.5% at the end of Q2, in part due to economy-wide skills and labour shortages.
 - ii. 19 x amber actions are unfunded; 14 are only partially funded, some of which are subject to Budget 23 decisions.
 - iii. Changes in scope, accountability, or timeline of deliverables to 122 out of 301 actions. While many are not material, five critical actions will be delayed by up to six months, and six actions will be delayed by more than six months.

2. **Capacity pressures, due to the size and scale of ERP1, are challenging implementation.**
 - i. Significant bottlenecks across the system, including ^{s 9(2)(f)} upcoming ERP1 Cabinet papers are due in the first six months of 2023, ^{s 9(2)(f)} of which include planned public engagement.
 - ii. ^{s 9(2)(g)(i)} [REDACTED]

3. **Limits to our data and modelling tools prevent accurate assessment of the impact of existing or future actions.** The Climate Change Chief Executives Board Unit (the Unit), the Ministry for the Environment, and delivery agencies are working together to improve this, and we anticipate ongoing refinements and improvements in data, modelling, and analysis with each report.

¹Using a standard traffic light RAG (Red, Amber, Green) framework.

Executive Summary (continued)

Other risks to the programme

Headwinds and tailwinds outside of the programme, such as the current domestic operating environment, together with disruptors and international trends, are impacting delivery of ERP1. In addition, international megatrends have potential to impact all ERPs over the long-term. **The key headwinds and tailwinds to watch include:**

1. **The domestic operating environment.** Labour and skills shortages are having a direct effect on delivery, including within the public service and in public transport. A period of slower economic activity creates risks that firms and households delay spending on low emissions alternatives, and historically, higher interest rates (raising the cost of capital) risk a chilling effect on investments in green technologies. In addition, severe weather events, such as Cyclone Gabrielle, are proving disruptive.
2. **International disruptions**, such as supply chain disruption and Russia's invasion of Ukraine, are also impacting the domestic economy, with most sectors reporting some effects. For example, we are seeing a rise in the demand for (and consequently the price of) biofuels, as Europe seeks alternative sources of energy to replace the gas that Russia formerly supplied.
3. **International megatrends**, which are long-term changes in individual, social, and technological structures, are expected to have a significant impact in the future. Examples to watch for include growing scarcity of resources (for example, water, food, energy, metals, and minerals), a more hyperconnected world, technological advancements, and disruption resulting from climate change impacts.

While these factors are largely outside of the control of the Board, they are important context for considering progress and setting direction. We have sought advice on international megatrends and disruptors to be considered as part of developing the ERP2 strategy, and the Board's adaptive management approach.

Strategic opportunities

The following opportunities have arisen over the past 6 months that could enhance delivery of EB1 and EB2:

1. **Partnerships with some of New Zealand's largest emitters** on large single capital projects with significant abatement potential for EB1 and EB2 are in the early stages of negotiation.
2. **Addressing gaps in publicly available decarbonisation funding** to accelerate the uptake of already available decarbonisation solutions that don't currently qualify for existing schemes.
3. **Exploring opportunities to use digital technology** to deliver additional abatement not addressed by ERP1, building on the evidence in the Spark report and our global insights report.
4. Exploring options to create a **regulatory environment that better supports the rapid uptake of new green technologies and innovation**, alongside the establishment of the Board's adaptive management approach and the Climate Innovation Platforms.
5. **Improving efficiency and cross-portfolio coordination through the alignment of key ERP strategies** in development in 2023, including the energy strategy, equitable transitions strategy and freight supply chain strategy.

These opportunities, among others, will be considered as a part of the Board's first adaptive management advice in early 2023.

Executive Summary (continued)

Focus for the next six months – out to June 2023

Over the next six months, there is a need to maintain focus on implementing actions and managing risks to critical actions, as well as exploring opportunities to deliver additional emissions abatement over the short to medium term.

Over the short-to-medium term, attention should be turned to developing adaptive management options, to be able to respond to programme risks and external economy-wide challenges and opportunities.

While outside of the first six-month period for delivery of the ERP, the cancellation of the Sustainable Biofuels Mandate (announced in February 2023), means options to address this potential abatement shortfall (possibly 1MT CO₂ in EB1) will form part of early advice from the Board to Ministers.

The next six-monthly report is due August 2023.




**Te Kāwanatanga
o Aotearoa**
New Zealand Government


Progress: At a Glance

KEY HIGHLIGHTS AND PROGRESS OVER THE PAST SIX MONTHS


Key successes from this period




20%
of new light vehicles were EVs in 2022




Joint venture with private sector successfully stood up Centre for Climate Action on Agricultural Emissions




Agreement reached to establish a Loss and Damages fund at **COP27**



\$3.7B of CERF allocated in 1st round

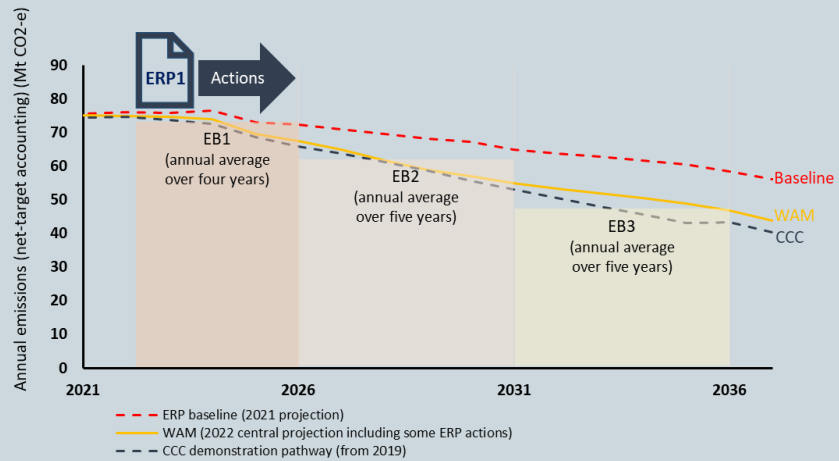


Energy Strategy TORs were published October 2022



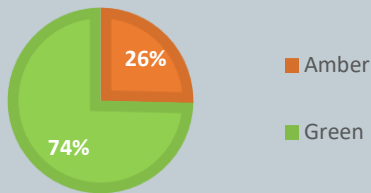
\$3B in NZ green bonds issued

The most recent national level projections show achieving EB1 and 2 is finely balanced. We are not currently on track to meeting EB3.*

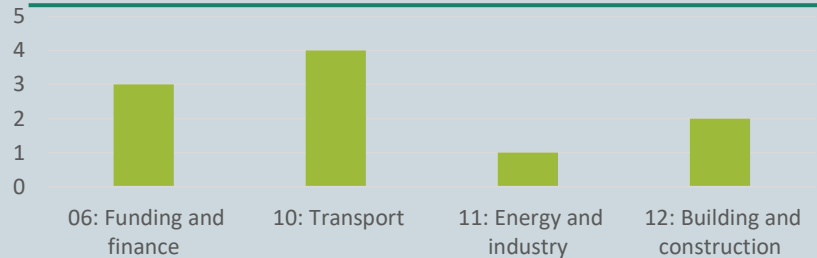


74% of critical actions* are on track for delivery

*62 critical actions were identified as material to ERP delivery by agencies. More information is in Appendix B.



10 actions have been completed in the first 6 months of ERP implementation

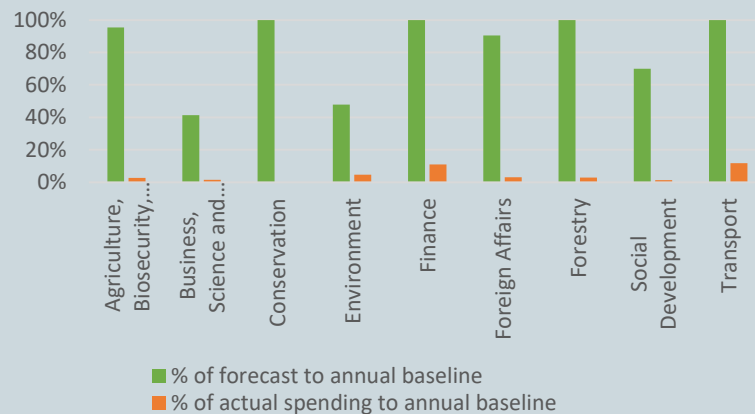


81% of actions are active, of which 67% are fully/partially funded



There has been a slow spending run-rate for CERF initiatives with spending at the end of Q1 averaging 6.8% of the baseline and 16.5% at the end of Q2

Percentage of 22/23 CERF Forecast Spending and Q1 Actual Spending Per Vote



Purpose and Context

OVERSEEING THE TRANSITION TO NET ZERO

Purpose

The key purposes of this report are to describe the progress being made against the delivery of the 301 actions in the first emissions reduction plan (ERP1) with a focus on the 62 most material 'critical actions'; to provide updated projections of economy-wide and sub-sector emissions, and to indicate key risks and strategic opportunities for the Government's whole of economy climate change mitigation programme².

The information in this report is intended to support management decisions by agencies, the Board, and Ministers. This report sets out:

- Emissions Budgets and how we are tracking progress on these, including projections of economy-wide and sub-sector emissions, considering the latest information about emissions data.
- Information on how well implementation of actions is tracking, benchmarked against a simple traffic light RAG (Red, Amber, Green) dashboard.
- Progress across the critical actions.
- Programme-level risks to the ERP over the short-term.
- Headwinds/tailwinds outside the programme that may impact implementation over the short-to-medium term.
- International megatrends that may influence delivery of the ERP or emissions budgets over the medium to long-term.
- Strategic opportunities that could be leveraged to support climate mitigation and adaptation.

Context

ERP1, released in May 2022, is the Government's strategy to meet the emissions budgets and sub-sector targets over the next 15 years, and the actions needed, across every part of the government and every sector of the economy, for the first three and a half years.

ERP1 is based on a strategy, with five key principles, and organised in 16 chapters (see Figure 1). There are 301 actions covering a wide range of work. Actions include the development of strategies, policy, legislation, funding and pricing/financing tools, investment mechanisms, procurement models, as well as stakeholder consultation and engagement. As all sectors of the economy need to reduce emissions.

Nine 'Priority Focus Areas' for ERP1 were identified by Prime Minister, Rt Hon Jacinda Ardern, and the Board has provided quarterly progress updates to CRMG (July 2022 & Dec 2022) on risks to these and critical decisions before Ministers. The nine priority focus areas are listed below, and we reference these in the Chapter Summaries, provided in Appendix A.

1. The New Zealand ETS scheme (including emissions leakage and forestry incentives)
2. He Waka Eke Noa
3. The Centre for Climate Action on Agricultural Emissions
4. The Energy Strategy, and the transition to a highly renewable electricity system
5. Climate Innovation Platforms
6. Nature Based Solutions
7. Transport Mode-Shift
8. Freight and Supply Chain Resilience
9. Overarching areas of focus for the 2024 ERP

² Future reports will also include the **National Adaptation Plan** – the Government's response to developing resilience in the face of the disruption climate change will create in our lives, communities and economy.

Organisation of ERP1

Sixteen + agencies are involved in delivering the ERP1 actions, and timeframes for delivery started from July 2022 and will go through to mid-2025. Each chapter is assigned a lead agency.

Figure 1: How the ERP is structured



Emissions Budgets

Our 2050 targets will be achieved by meeting a series of emissions budgets. The Government published the first three emissions budgets in May 2022, covering the period out to 2035.

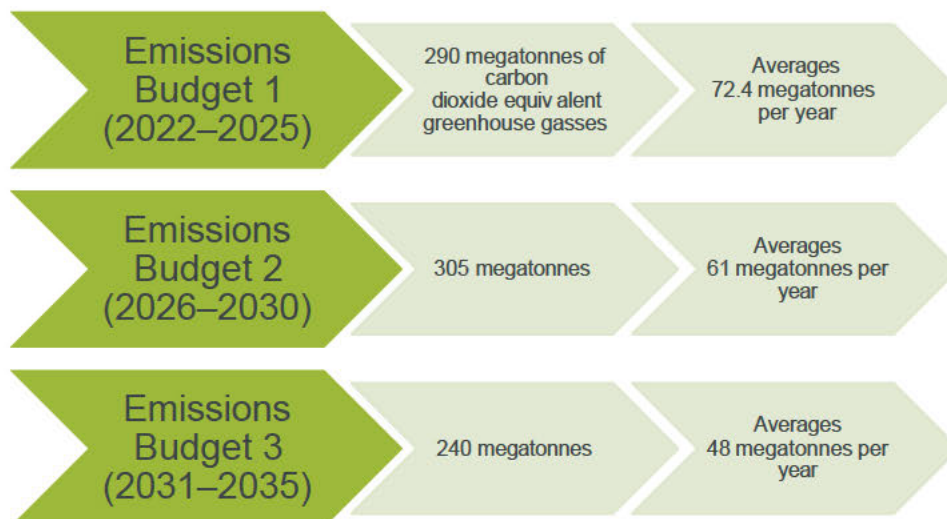
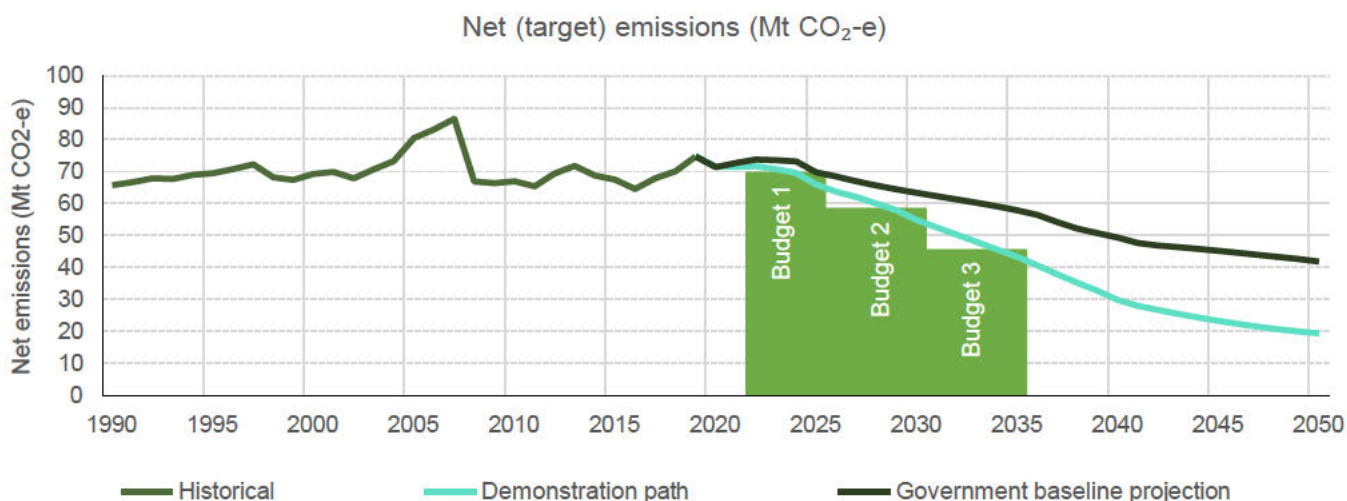
The budgets set out the total amount of greenhouse gases that can be put into the atmosphere. The Zero Carbon Act requires that our emissions budgets are met through domestic action alone to mitigate or offset emissions.

The ERP sets out how emissions budgets will be achieved, with the first ERP covering the period to 2025.

New Zealand's Nationally Determined Contribution (NDC) under the Paris Agreement is also managed as a multi-year emissions budget (from 2021 to 2030). The NDC is distinct from the domestic emissions budgets.

The ERP will generate some emissions reductions in Emissions Budget 1. The first emissions budget requires Aotearoa to make sustained cuts in our gross emissions, as well as storing more carbon through forestry. It is likely that the most significant emissions reductions will be in the energy and industry sector and the transport sector. Actions taken in this period are crucial to laying the foundations for emissions reductions in future budget periods (see graph below), and the Board's reporting will aim to capture this.

A new plan will be published before the start of each budget period. Each ERP will be informed by the Climate Change Commission's advice, and new data and information about what is working.



Source: ERP

Tracking Progress on Emissions Budgets

ECONOMY AND SUB-SECTOR LEVEL EMISSIONS REDUCTION UPDATE

The agreed emissions budgets set out the total amount of greenhouse gases that can be put into the atmosphere. **The emission reductions plans sets out how emissions budgets will be achieved**, with the ERP1 covering the period to 2025.

Recent data

Overall, GHG emissions are down 6% over the last 7 years (Figure 2) but seasonally adjusted quarterly figures paint a slightly more complex picture (Figure 3) and show the influence of COVID-19. In the year ended March 2022, greenhouse gas (GHG) emissions were down 1 percent when compared to the same period in 2021 (see Figure 4). The overall downward trend in GHG emissions is likely due to COVID-related restrictions on activity. Sharp decreases in GHG emissions seen in the June 2020 and September 2021 quarters of 9 percent and 10 percent respectively also correspond with the nationwide and Auckland COVID lockdowns.

Figure 2 Greenhouse gas emissions, total all industries and households, year ended March
Statistics New Zealand

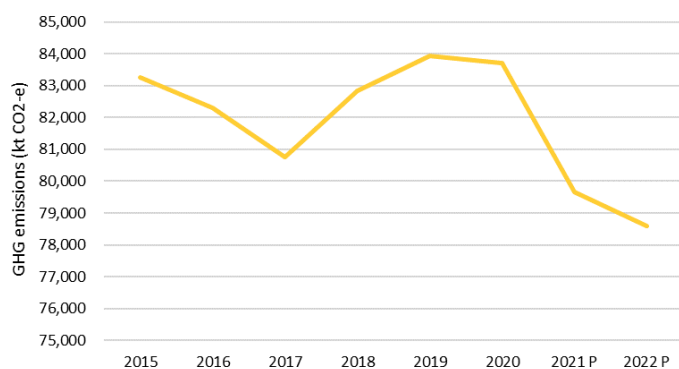
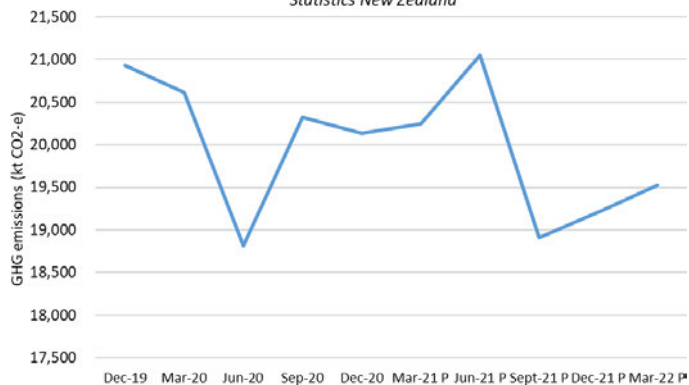


Figure 3 Greenhouse gas emissions, total all industries and households, seasonally adjusted
Statistics New Zealand



Emissions from the primary sector, including agriculture, accounted for 56 percent of total emissions in the 6 months to March 2022 and emissions were mostly unaffected by COVID-19 restrictions. Goods producing industries (including electricity, gas, water and waste services), accounted for 24% of emissions over the same period, meanwhile service industries accounted for 9%. Households accounted for 10% of New Zealand emissions³.

Note: The data above is classified by industry (published with a lag time of 7 months) rather than following the emissions inventory categories (which have a lag time 15 months). Policy impacts and outcomes would take even longer to estimate. The possibility of having more timely inventory data is being explored. We also expect updates and improved methods in each successive report, for example as new data become available. In some cases, there may be changes in underlying assumptions (e.g., related to the ETS) or scientific knowledge. In other cases, classifications or accounting changes can also influence whether we appear to be living within our emissions budgets.

Projections

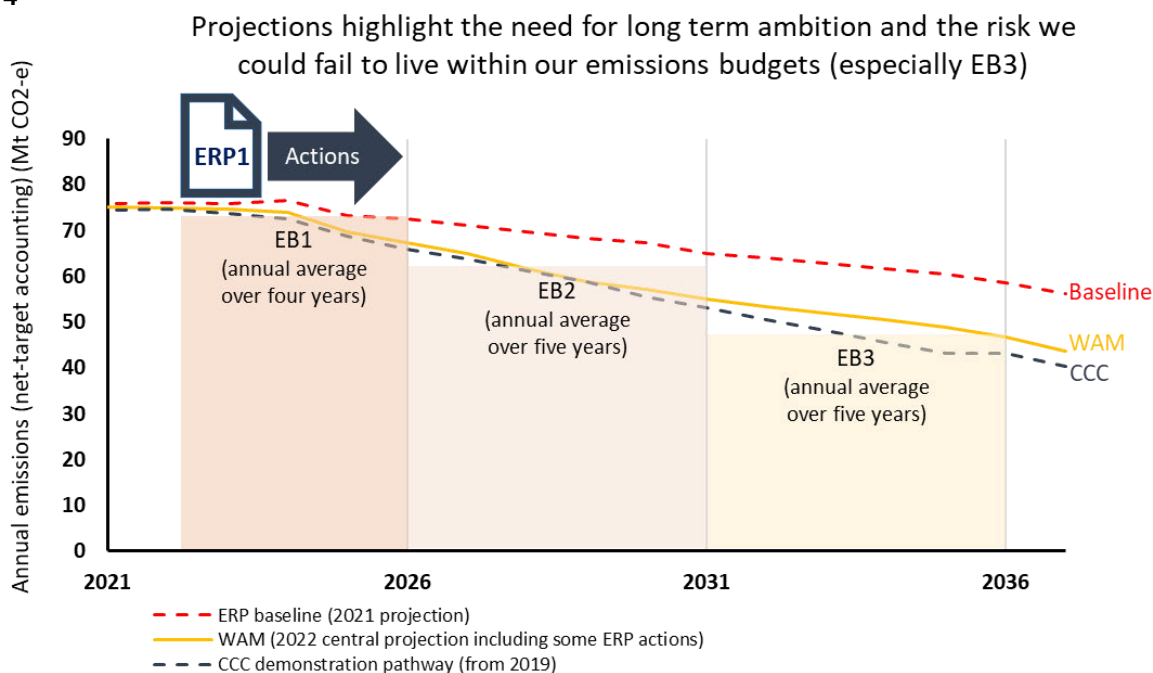
To understand whether we are on track to fulfilling our emissions budgets for periods 1, 2 and 3 we need to make projections, including the policy impacts we expect from our ERP actions. Importantly, **the extent to which we achieve our budgets will depend on ERP actions coupled with other domestic and international factors**. For example, the economic cycle, oil and minerals prices, changes in technologies, standards and practices in the private sector, export markets, and geopolitical events influence New Zealand’s activities, behaviors and related GHG emissions. Periodic headwinds and tailwinds are to be expected.

³ The data presented in Figures 2 and 3 are from Statistics New Zealand’s production-based greenhouse gas emissions series which are prepared following the System of Environmental-Economic Accounting (SEEA) framework. Likewise, the proportions of emissions presented in the text also follow the SEEA accounting. The SEEA framework only includes emissions from economic residents (e.g., excludes emissions from foreign tourists in New Zealand and includes emissions from NZ residents overseas) and differs from GHG inventory data which measures emissions on a territorial basis (e.g., includes emissions from foreign tourists and excludes emissions from NZ residents overseas). This leads to a difference with the GHG inventory, with SEEA estimates being around 2-3% higher.

Tracking Progress on Emissions Budgets (continued)

The most recent national level projections show **achieving EB1 and EB2 is finely balanced** and any reductions in scope or delays in delivery of the ERP will make achieving emissions budgets even more challenging. We are currently not on track to meeting EB3. This “with existing measures” projection (see solid orange line in Figure 4) from New Zealand’s 8th National Communication to the UNFCCC includes assumptions about economic growth and population growth as well as things like electric vehicle uptake and reductions in livestock numbers but does not include all ERP1 actions. ERP1 provides the foundations upon which future mitigation actions will build. **Any under-achievement in ERP1 will require more ambition in ERP2 and ERP3.**

Figure 4



Changes since ERP1

In contrast to the national top-down projections above, a ‘bottom-up’ way to consider progress towards achieving the emissions budgets is to consider significant policy changes since the ERP1 was prepared. We note the following significant policy decisions and potential impacts relative to the original programme for the six months to 31 December 2022 (the following section separately assesses risks to programme delivery):

- The removal of the Sustainable Biofuels Obligation with the loss of abatement of 8.4 MtCO₂e across EB1-3.
- In 2022 the Climate Change Commission recommended new price control settings for the ETS. Although not included in the 2019 baseline forecasts (CCC demonstration pathway), the recent decision not to follow their recommendations means we have less contingency or ‘insurance’ available to manage any overshooting of the budgets.
- Agricultural emissions pricing was assumed to have only a small contribution to EB1, then making a more significant contribution from EB2 and onwards. The base assumption at ERP publication was that pricing would occur at the processor-level from 2025 with 95% free allocation, decreasing by 1% per year. Whether this assumed impact will be achieved is subject to final decisions on HWEN’s recommendations, which will clarify how agricultural emissions pricing will look relative to the ERP assumptions. The overall effects will be updated in modelling, in time for the next six-monthly report in August 2023.

Agencies continue to refine how they calculate emissions against subsector targets. This includes agricultural emissions. New information on supplementary feeds, livestock births and deaths and nitrate leaching indicates agricultural emissions may be lower than previously estimated. If verified, data will be revised and could help agriculture pass its emissions sub-sector targets earlier than expected. However, ambition needs to be maintained if we are to reach net zero in 2050 and achieve our biogenic methane target (a 24-47% reduction). Advice will be provided to the Board on the implications of methodological changes to data, including recommendations for ERP 2.

Tracking Progress on Implementation

IMPLEMENTATION OF ERP1 ACTIONS IS IN THE FIRST SIX-MONTHS OF ITS THREE AND A HALF-YEAR LONG JOURNEY

At this early stage, agencies are focused on establishing the right structures (e.g., governance, finance partnerships), drafting and progressing legislation (where applicable), and putting in place project plans to roll out delivery.

That said, agencies are signalling good progress has been made across actions within the first six months, including those actions within the Nine Priority Focus Areas (identified by Prime Minister, Rt Hon Jacinda Ardern), and 62 x critical actions (identified by agencies)⁴.

Using a simple traffic light (Red, Amber, Green) dashboard, agencies assessed their progress against milestones set for the past six months that represent progress towards the actions' outputs (listed in the ERP Table of Actions). The aggregated information from agencies shows that:



221 x actions are 'on-track' (46 of which are critical actions)



64 x actions have 'some delays' (16 of which are critical actions)



1 x action is 'behind schedule' (the Sustainable Biofuels Obligation)



15 x actions are 'grey' and unfunded and are currently being progressed. However, they are not predicted to have high abatement impact over the short term.

✓ **Ten actions are complete**, including the following:

Funding and Finance - Support responsible investment through default KiwiSaver provider changes.

Transport - Establish a public-private leadership body focused on decarbonising aviation, including operational efficiencies, infrastructure improvements, and frameworks to encourage research, development and innovation in sustainable aviation.

Energy - Amendment to Electricity Code to facilitate distribution networks' ability to have small scale generation connect to, operate on, and export from networks without causing power quality issues.

Building and construction - Implement amendments to Building Code Clause H1 (energy efficiency) compliance pathways.

Out of the 64 amber actions, 19 are unfunded and 14 are partially funded. 45 have a change in SPAT (scope, process, accountability, timeline). [§ 9\(2\)\(f\)\(iv\)](#)

initiating an integrated work programme to deliver climate, biodiversity, and wider environmental actions, integrating circular practices across government, communities and businesses, and supporting mode shift actions such as increasing the uptake of e-bikes, and incentivising local government to quickly deliver bike/scooter networks, dedicated bus lanes, and walking improvements.

Out of the 62 critical actions : 46 are green or 'on-track', and 16 are rated amber. 6 x critical actions are unfunded, including the action to complete a national EV-charging infrastructure strategy.

Out of the 15 actions that are inactive and not progressing, these are not predicted to have high abatement impact in the short term and given the capacity constraints across the system, the additional value of funding these actions may be limited at this time.

Appendix A has further information on how each Chapter is progressing, prepared by the lead agency.

Risks to the Programme

We have identified three broad categories of risks to the programme, based on agency feedback and intelligence, and externally commissioned analysis:

1. **Programme-level risks**, arising from the roll-out of the programme, with implications for the short to medium-term. Key programme risks are discussed in **Table 1** below, with proposed responses to address them.
2. **Headwinds and tailwinds outside the programme**, such as the current domestic operating environment, together with international trends which are currently impacting delivery of ERP1 – and this may continue over the medium term. These are outlined in **Table 2**.
3. **International megatrends** that have potential to impact ERPs, over the medium-to long-term. These are summarised in **Table 3**.

Table 1: Programme-level risks that have the potential for the programme to fall short of meeting the emissions budget

Risk	Description	Action planned
<p>The loss of abatement opportunities, given the focus on managing cost of living impacts</p>	<p>(1) While outside the period of this Report, the recent removal of the Sustainable Biofuels Obligation from the work programme, will result in the loss of abatement of to 7.1 to 9.9 Mt CO₂-e across the emissions budgets or around half of the total transport abatement across each emissions budget period..</p> <p>(2) In 2022 the Climate Change Commission recommended new price control settings for the ETS. The recent decision not to follow their recommendations means we have less contingency or 'insurance' available to manage any overshooting of the budgets.</p>	<p>The Board will provide advice to Ministers on the significant implications of the Sustainable Biofuels Obligation decision and opportunities to find additional abatement to compensate for it.</p> <p>More widely over this year the Board is developing its adaptive management approach that will assess opportunities to make up any shortfall in emissions reductions, so there are levers ready to pull if needed.</p>
<p>Delays to implementation of some actions may result in slower than expected abatement</p>	<p>(1) Agencies have been slower than expected to begin implementation of new Climate Emergency Response Fund (CERF) with spending at the end of Q1 averaging 6.8% of the baseline and 16.5% at the end of Q2.</p> <p>(2) A range of agencies have reported changes in the scope, process, accountability, and/or timeline to 122 out of 301 actions, as compared to what was recorded in the ERP. Agencies report that most changes will not impact on delivery dates, but 11 will: five critical actions will be delayed by up to six months, and six critical actions will be delayed by more than six months.</p> <p>Changes are likely the result of moving from policy proposal and design to implementation and the identification of previously unforeseen complexity, and/or challenges. For example, the Waste Chapter Summary notes that the expected abatement in EB1 from waste infrastructure will be impacted due to delays between funding approvals and commissioning of plant.</p>	<p>Agencies are forecasting that spending will pick up in the remainder of the financial year. Given the broader labour market and supply challenges (discussed in Table 3) these forecasts may be ambitious.</p> <p>The Board will continue to monitor spending and investigate opportunities to reprioritise funding to actions that are partially or not funded.</p> <p>The Board will also review critical actions that have identified delays and ensure there are robust delivery plans in place to address delays or identify where abatement may need to be achieved elsewhere to compensate.</p>

Risks to the Programme (continued)

Table 1: Key programme risks continued

Risk	Description	Response to address
<p>Capacity pressures, due to the size and scale of ERP1, challenge implementation</p>	<p>(1) Significant bottlenecks are being experienced across the system. There are an estimated ^{s 9(2)(f)} Cabinet papers due for ERP related actions in the first six months of 2023, ^{s 9(2)} of which require planned public engagement.</p> <p>(2) ^{s 9(2)(g)(i)} [REDACTED]</p> <p>(3) ^{s 9(2)(g)(i)} [REDACTED]</p> <p>(4) Other capacity constraints within agencies may emerge as the first stage of implementation gets underway across may actions, for example delivering a proposal for an enduring Māori Climate Platform.</p>	<p>The Board is acting on the work programme risks that it can resolve, focussing on 'critical actions' with material abatement impacts and mapping dependencies across work programmes.</p> <p>However, there are some risks that only Ministers can address, in particular addressing the strategic challenges in delivering such an ambitious emissions budget, and the loss of abatement opportunities resulting from the focus on managing cost of living impacts.</p> <p>Ministers can also support prioritising (and reducing) the number of Cabinet papers, including report-back papers due in the first six months of 2023, and by taking decisions - and making announcements - on how to proceed with critical initiatives, such as the ETS review.</p>
<p>Limits to our data and modelling tools, and insufficient information, which is preventing accurate assessment of the impact of existing and future actions.</p>	<p>(1) There are considerable lags in GHG emissions data, with national accounts data having a 6 month lag and emissions inventory data having an 18 month lag – required to collect, process and publish the data.</p> <p>(2) There is also currently limited ability to understand the abatement impact and potentials through projections of ERP actions, and policy impacts (on emissions) requires further development of models, methods and capacities.</p>	<p>The Climate Change Chief Executives Board Unit (Climate IEB Unit), the Ministry for the Environment, and delivery agencies, are working together to improve this and anticipate ongoing refinements and improvements in data, modelling, and analysis with each report.</p>

Risks to the Programme (continued)

Headwinds and tailwinds

Outside of the risks of the programme, there are domestic and international trends (and disruptors), that could drive up emissions or disrupt the implementation of the ERP. Some of these are significant (e.g., Covid). And some could drive down emissions (e.g., technological advances or breakthroughs that disrupt incumbent high-carbon emitters in the market).

The top three system-wide risks that are currently impacting or have potential to impact on the implementation of the ERP, are highlighted in **Table 2** below.

Table 2: The top three domestic operating environment risks

Risk	Description and impact on implementation	Potential options to address
Labour and skills shortages	<p>Critical labour shortages are constraining New Zealand businesses, including in the:</p> <ul style="list-style-type: none"> • public transport sector: • building and construction sector • public sector. <p>Significant productivity losses could undermine efforts by businesses to shift to low-emissions technologies and increased costs in all sectors.</p> <p>Shortages of public transport/bus drivers risk New Zealand's ability to achieve a significant uplift in public transport services.</p> <p>Lack of capacity and capability in government agencies could impact on delivery of ERP and other climate policy programmes.</p>	<p>The work to understand bottlenecks across the programme would consider the extent to which labour shortages are impacting delivery.</p>
Cost of living increases and (global) inflationary pressures	<p>The rising cost of living (and a possible economic recession in 2023/24) may reduce progress towards meeting the first emissions budget. This is because:</p> <p>Firms delay or deprioritise spending on R&D or low emissions alternatives. EECA note that reducing greenhouse gas emissions dropped to last place out of 17 issues facing NZ businesses (survey in May 2022). The economy, the cost of living, and inflation rising - moved up the list to take the top three places.</p> <p>Reduced household spending on low emission (but expensive) technology (e.g., EV cars)</p> <p>Historically, higher interest rates (raising the cost of capital) risk a chilling effect on investments in the green technologies needed for the low-carbon transition.</p>	<p>The Board is noting these key issues as context for thinking about its adaptive management approach and strategic framework for ERP2.</p>
Global supply chain constraints	<p>As a small, trade-based economy, far from global markets, New Zealand is exposed and vulnerable to disruptions in global supply chains.</p> <ul style="list-style-type: none"> • Some large emitters (including freight and process heat users) cannot get equipment to decarbonise due to lengthy waiting lists. • Fragmented supply-chain with small operators less resourced to invest in low carbon technologies. 	<p>There is no clear role for the Board here, other than to keep a watching brief on this.</p>

Risks to the Programme (continued)

To support the Board's wider understanding of potential headwinds or tailwinds, Deloitte was commissioned to identify **international megatrends and their impacts on New Zealand**, to inform the Board's adaptive management approach and the strategy for the ERP2. **Table 3** discusses the top three international megatrends.

Table 3: The three international megatrends

Megatrend	Description	What this means for New Zealand and implementation of the ERP
Scarcity of resources and New Zealand's vulnerability	<p>Global population growth and a rising middle class are increasing demand for resources (for example: water, food, energy, metals, minerals, materials). Demand for resources using lower energy or lower emissions (such as renewable energy, electric vehicles) will continue to increase.</p> <p>New Zealand is vulnerable to global supply constraints and supply chain shifts. Our geographical position and small market size adds to the vulnerability. If resources are scarce, then price and order size will dictate who is able to guarantee the supply.</p> <p>The sectors at greatest risk are transport, energy, and industry. These require the import of solutions (e.g., products such as EVs) to decarbonise. As a small market taker, we will need to pay more for solutions, increasing the cost of meeting the emissions budgets.</p>	<p>Many critical actions in the ERP are around 'establishing the environment' or 'elevate and educate' categories. There is a risk that these policy levers are too soft and/or ambiguous.</p> <p>If New Zealand leaves it too late to secure tangible technological solutions, they will likely be more costly. This could result in a more expensive transition than anticipated. Should funding be unavailable, the goals of the ERP will not be met. Vulnerable communities, including Māori, will be most at risk.</p> <p>This may risk locking in certain solutions – but it mitigates having no solution at all.</p> <p>There are opportunities in a world with scarcity of resources. Where could NZ play its hand? Food production and supply? Green aluminium? Digital services?</p>
Hyperconnectivity	<p>The rise in ICT technologies continues to proliferate and the world is hyperconnected. This 'hyperconnectivity' will impact and 'disrupt' how we share data and knowledge, our consumption patterns, and how we respond to climate change.</p> <p>Climate data and knowledge will likely see a rapid improvement over the short term. In NZ, agriculture has the most potential to for growth through research, particularly if the trend towards open data sources continues.</p> <p>Long term consumption patterns may change and influence the climate profile of individuals – Working from home, online shopping, online health services, are examples/</p>	<p>Vulnerable and remote communities excluded from a hyperconnected world have the largest opportunity costs. Prioritising connectivity for all New Zealanders will have multiple benefits, even without understanding the exact platforms that will utilise connectivity.</p> <p>The ERP has a strong focus on improving data and knowledge centres, with a significant amount of critical actions aiming to elevate and educate collecting data and prioritising research. This is critical space for agricultural emissions where data and knowledge could provide solutions to methane emissions. NZ has an opportunity to lead in this space.</p>
Technological advances	<p>Improvements in known technologies and the development of new technologies are happening constantly. Although the timing of technological developments, including breakthroughs, are unknown, they occur regularly and will continue to do so.</p> <p>All sectors, but especially, energy, transport and agriculture are likely to be influenced by technological advancements.</p> <p>Energy – breakthroughs in energy solutions.</p> <p>3 D printing – could solve for natural resource scarcity and possibly waste (if used as an input).</p> <p>Artificial intelligence, drones and robots, augmented reality and virtual reality, and the internet of things will have a major influence on climate change response.</p>	<p>New Zealand has a large possible opportunity cost in the future if it cannot:</p> <ul style="list-style-type: none"> • Access technological advancements • Integrate and implement the technology. <p>As a country with small market buying power and a small manufacturing capacity, ensuring access to technology advancements is a large challenge. Implementation requires strong networks and infrastructure to support the technology, capacity building to ensure workforces complement the technology, and success user adaptation.</p> <p>One way to do this could be through making NZ attracting on the global stage for establishing technological innovation and implementation hubs. Agriculture and forestry could be areas to investigate.</p>

Strategic Opportunities

In addition to the recommendations to respond to programme-wide risks, we have identified the following initial list of opportunities based on agency feedback and intelligence, and the Board's own analysis of the past 6 months. The options presented are focused primarily on delivering additional abatement potential for EB1 and EB2, with consideration also being given to existing agency capacity and managing delivery pressure. These opportunities for pursuing additional abatement and better alignment will be further considered as part of the Board's first adaptive management advice in early 2023.

Table 4: Key programme-level opportunities

Opportunity	Description/impact	Possible/Recommended Response	Timeframe for benefits
<p>Partnerships with some of New Zealand's largest emitters through GIDI fund</p>	<p>MBIE and ECCA are working to partner with some of New Zealand's largest emitters through the GIDI fund to deliver large single-capital projects that could make a significant contribution to EB1.</p>	<p>ECCA and MBIE are in the beginning stages of negotiating with key private sector emitters. This information is currently commercially sensitive and MBIE will provide a more detailed update to the Board in April 2023.</p>	<p>Before 2025</p>
<p>[REDACTED]</p>	<p>s 9(2)(f)(iv) [REDACTED]</p>	<p>[REDACTED]</p>	<p>[REDACTED]</p>
<p>A regulatory environment to better enable rapid uptake of new green technology</p>	<p>In the European Commission's recently released Green Deal Industrial Plan, a regulatory environment that enables for quick deployment of clean innovation and solutions was identified as the first of four pillars to move into the net-zero industrial age. This is particularly relevant to New Zealand we move to establish our innovation environment, including the Innovation Platforms, and the Board's adaptive management function. A simple and predictable regulatory environment is crucial for attracting investment and responding rapidly to new opportunities to ensure we meet our emissions budgets.</p>	<p>In the context of developing the Innovation Platforms and the Board's adaptive management approach, we need to understand how our regulatory environment supports or impedes the uptake of innovative solutions. The Unit can engage MBIE and other key agencies about undertaking an initial assessment of where there are regulatory barriers that could inhibit the uptake of new climate solutions.</p>	<p>2025 onwards</p>

Strategic Opportunities (continued)

Table 4: Key programme-level opportunities continued

Opportunity	Description/impact	Possible/Recommend Response	Timeframe for benefits
<p>Building on the Spark report and the Deloitte global insights report to leverage digital technologies to support climate mitigation and adaptation</p>	<p>In a report in the end of 2022, Spark and thinkstep-anz identified that digital technology could potentially enable 7.2 Mt of CO₂ abatement by 2030 (<i>Meeting the climate challenge through digital technology report</i>).</p> <p>The Spark report both demonstrates the digital sector is willing and ready to act, and highlights opportunities to use digital technology to deliver abatement beyond what was addressed in the ERP.</p> <p>The Deloitte global insights report, indicates 'hyperconnectivity' will be a megatrend that will impact and 'disrupt' how we share data and knowledge, our consumption patterns, and how we respond to climate change.</p>	<p>The Climate IEB Unit can facilitate a workshop with Spark, key agencies (including MBIE), and Deloitte, to better understand the opportunities described in both reports, including the level of additionality to existing ERP actions.</p> <p>Key industries affected by the report:</p> <ul style="list-style-type: none"> • Transport: reduce travel through more remote work, services and learning, and accelerating EV transition through smart charging and better rural connectivity. • Energy and industry: grid load smoothing, automated or smart buildings, reducing ag energy use, and better use of cloud services. • Agriculture: precision use of fertilizers/water/feed, nitrous oxide exhibitors, utilising robotics and smart sensors, and reduced pesticides use. <p>Vulnerable and remote communities excluded from a hyperconnected world have the largest opportunity costs. Prioritising connectivity for all New Zealanders will have multiple benefits, even without understanding the exact platforms that will utilise connectivity.</p>	<p>Before 2030</p>
<p>Greater efficiency from the alignment of key strategies through better cross-sector and cross-portfolio collaboration</p>	<p>Many of the key ERP actions require a coordinated delivery across multiple portfolios and agencies to be successful. Better cross-portfolio planning could enable greater impact across the system. A key opportunity to enable this coordination is through the proper alignment of the major strategies in development in 2023, including; equitable transition strategy, Māori climate strategy, energy strategy, and the freight & supply chain strategy.</p>	<p>The IEB Unit can engage with the agencies responsible for the key strategies and come back to the Board for options to perform oversight function and ensure alignment.</p>	<p>Before 2025</p>