He Pou a Rangi
Climate Change Commission

Advice on NZ ETS unit limits and price control settings for 2025-2029

Technical Annex 1: Unit limit settings

February 2024

Contents

Introduction

This document is published by He Pou a Rangi Climate Change Commission in support of our *Advice on NZ ETS unit limit and price control settings for 2025–2029*.

It is a technical annex to that advice, providing further information on the data, methodology, and key assumptions we have taken to reach our final unit limit settings recommendations.

The document should be read alongside *Part 3: Unit limits* of our advice, and the accompanying spreadsheet also published on our website.

About our advice

He Pou a Rangi Climate Change Commission is an independent Crown entity established by the Climate Change Response Act 2002 to provide expert, evidence-based advice and monitoring to successive governments on how to reduce emissions and adapt to the effects of climate change.

As part of our responsibilities under the Act (section 5ZOA), the Commission is required to provide the Government with annual advice on the unit limits and price control settings for the Aotearoa New Zealand Emissions Trading Scheme (NZ ETS) across a five-year window. This is to support the Minister of Climate Change, who is required to update these settings every year.

Annual updates to settings are intended to keep the NZ ETS aligned to emission reduction targets and give market participants information they need to make decisions.

About this document

As set out in our NZ ETS settings advice, we use a seven-step method for calculating unit limits. We go through these steps in this document, with a final section on the comparison between the updated unit limit settings recommendations and status quo.

The seven steps are:

1. Align with emissions reductions targets
2. Allocate volume to NZ ETS and non-NZ ETS sectors
3. Technical adjustments
4. Account for industrial free allocation volumes
5. Set reduction volume to address unit surplus
    - 5a. set base surplus reduction volume
    - 5b. adjust for unit discrepancies
6. Set approved overseas unit limit (not discussed in this annex)
7. Calculate the auction volume and assess risks.

In some steps, volumes are shown out to 2030, even though the Commission's unit limit recommendations only cover 2025-2029. This is to illustrate how our methodology could affect unit limits if it were extended to the end of the second emissions budget.

Step 1: Align with emissions reduction targets

The first step for advising on the unit supply volumes in the NZ ETS is determining the most appropriate way to align unit limits with Aotearoa New Zealand's emissions reduction targets. Once this is determined, the unit limit volumes can be calculated in alignment with achieving these targets.

The full explanation of the options and findings in step 1 are provided in the NZ ETS settings advice report so we have not duplicated or expanded on this here. This includes information on the methodology used to reach the updated Nationally Determined Contribution (NDC) provisional budget.

To briefly recap, to align with emissions reduction targets we set the total volume in step 1 based on emissions budgets, as the stepping-stones to the 2050 target and intended domestic contribution to the first NDC.

This is consistent with our previous advice, however this year we have also changed volumes based on methodological updates to New Zealand's National Greenhouse Gas Inventory (GHG inventory).[1] We refer to this level throughout this annex as the 'volumes aligned with emissions reduction targets'. We have not applied any changes to target emissions levels based on updated government emissions projections released in December 2023[2].

All emissions volumes in this advice use Global Warming Potentials (GWPs) with a 100-year timeframe from the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report (AR5). This is explained in the first Technical Annex published in 2022.[3]

Step 2: Allocate volume to NZ ETS and non-NZ ETS sectors

Step 2 of determining unit limits is to allocate the chosen overall volumes aligned with emissions reduction targets from step 1 between NZ ETS and non-NZ ETS sectors. This is sometimes referred to as 'setting the emissions cap'.

This step requires identifying emissions that do not face NZ ETS emissions surrender obligations and subtracting these from the overall volumes aligned with emissions reduction targets to determine the emissions volume available to NZ ETS sectors.

We established the approach used for this step in our 2022 NZ ETS settings advice.

Previously, the Government had allocated emissions volumes to NZ ETS and non-NZ ETS sectors based on emissions projections under current policy settings. This meant that NZ ETS sectors would be required to deliver all the abatement beyond current policy projections to meet emissions budgets, i.e., NZ ETS sectors would have to bear additional effort if non-NZ ETS sectors did not reduce their emissions in line with their share of the emissions target.

Instead, we advised to allocate the available emissions volume aligned with emissions reduction targets to NZ ETS and non-NZ ETS sectors based on specified shares of effort set by the Government's sector sub-targets from the first emissions reduction plan. We considered that this

[1] Ministry for the Environment (2023b).
[2] Ministry for the Environment (2023a).
[3] He Pou a Rangi Climate Change Commission (2022).

approach better reflected the split-gas nature of the 2050 target, as well as the Commission's previous advice that every sector needs to play its part in meeting emissions budgets, the NDC and the 2050 target.

The Government subsequently agreed on unit limits that were based on our approach. In line with this method, to allocate emissions to NZ ETS and non-NZ ETS sectors, we have used sector target emissions pathways based on the sector sub-targets[4] set out in the first emissions reduction plan, adjusted to reflect the GHG inventory methodological updates applied in step 1.

Sectors outside the NZ ETS and allocation of volumes

The sectors and sources identified as outside of the NZ ETS are described below. The total emissions volumes by sector are shown in Table 1.

Agriculture

Biogenic methane and nitrous oxide from agriculture are not covered by the NZ ETS. They account for 61% of the total volumes aligned with emissions reduction targets over 2025-2029, and 92% of the emissions outside of the scheme (approximately 37.5 megatonnes of carbon dioxide equivalent (Mt CO_2e) per annum).

The updates to volumes aligned with emissions reduction targets based on GHG inventory methodological updates have resulted in a minor reduction in total agricultural emissions, but the sector's proportion of the total volume made up by agricultural emissions has remained virtually the same.

Waste

Only methane emissions from municipal landfill disposal facilities are covered by the NZ ETS. All other waste emissions are outside of the NZ ETS. This includes emissions from non-municipal landfills, farm fills, and wastewater treatment. These non-municipal landfill waste emissions account for 5.2% of non-NZ ETS emissions.

There have been no changes in waste volumes aligned with emissions reduction targets from the GHG inventory methodological updates.

F-gases

A portion of fluorinated gases (F-gases) emissions associated with certain goods and vehicles are priced through the Synthetic Greenhouse Gas (SGG) levy instead of facing NZ ETS unit emissions surrender obligations. This includes items such as air conditioners and refrigerators.

To estimate the percentage of F-gases covered by the SGG levy instead of the NZ ETS we reviewed historic data on associated emissions volumes reported in the NZ ETS, SGG levy and GHG inventory. F-gases within the NZ ETS show significant annual fluctuations due to a top-down approach where participants only pay when they import or export products from the country, often in bulk.

Due to these fluctuations, we have used estimates based on an average figure over the past 8 years. During this time, F-gas emissions covered by the SGG levy accounted for approximately 49% of total

[4] The sector sub-targets set out in the first emissions reduction plan (Ministry for the Environment (2021)) align to a large extent with the with the modelled demonstration path that the Commission developed as part of providing advice on emissions budgets in 2021 (He Pou a Rangi Climate Change Commission (2021)).

F-gases reported in the combined schemes. This is an update from our previous estimate, that assumed only 38% of F-gases were covered by the SGG levy. Our estimate is now that F-gases covered by the SGG levy account for approximately 0.7Mt CO_2e per year, 1.6% of non-NZ ETS emissions.

There has been a methodological update in calculations of F-gases in the GHG inventory that results in a minor decrease the sector's volumes aligned with emissions reduction targets.

Industrial Processes and Product Use

Several small emissions sources in the Industrial Processes and Product Use (IPPU) inventory category are outside the NZ ETS. These include:

- non-energy products from fuels and solvent use
- sulphur hexafluoride and perfluorocarbons from medical and other product use
- nitrous oxide from medical applications
- other uses of carbonate.

Our estimate of these volumes uses the previous percentages calculated for the IPPU sector emissions not covered by the NZ ETS (approximately 5%) and applied this to the updated IPPU volumes aligned with emissions reduction targets.

The total emissions volume estimated outside the NZ ETS is approximately 0.2Mt CO_2e per annum – 0.5% of non-NZ ETS emissions.

Forestry

Aotearoa New Zealand's emissions budgets, 2050 target and NDC use a target accounting approach primarily focused on forestry, i.e., a subset of the wider land-use, land-use change and forestry (LULUCF) emissions. The NZ ETS has been designed to broadly align with this target accounting approach.

As with our 2023 advice, we assume all eligible post-1989 forestry planting in the future will be registered in the NZ ETS, even though participation in the NZ ETS is voluntary for post-1989 forests. This equates to allocating almost 100%[5] of net post-1989 forestry emissions (both carbon dioxide removals from forest growth and emissions from deforestation) to the NZ ETS sectors.

Our 2024 advice does not make any changes to the forestry target emissions pathway which continues to be based on the sector sub-targets in the first ERP.

Biomass combustion emissions are another element of the wider LULUCF sector that are also accounted for in Aotearoa New Zealand's emissions reduction targets but is not covered by the NZ ETS. The total volume is approximately 0.12 Mt CO_2e per annum – 0.3% of non-NZ ETS emissions.

[5] There are a small amount of emissions from post-1989 forests allocated to sectors outside the NZ ETS equating 0.3 Mt CO_2e over 2025-2029. These are emissions rather than removals because even though some post-1989 forestry carbon dioxide removals remain outside of the NZ ETS, this is offset by the greater volume of emissions occurring due to deforestation.

Table 1 Emissions volumes inside and outside the NZ ETS[6]

Mt CO_2e		2025	2026	2027	2028	2029	2030
Volume aligned with emissions reduction targets		**66.7**	**64.2**	**61.8**	**59.3**	**57.0**	**53.8**
Volume allocated to sectors outside the NZ ETS		**41.5**	**41.0**	**40.7**	**40.4**	**40.0**	**39.6**
Breakdown of volumes across emissions outside the NZ ETS	Agriculture	38.1	37.8	37.5	37.2	36.9	36.6
	Waste	2.2	2.2	2.1	2.1	2.0	1.9
	F-gases	0.7	0.7	0.7	0.6	0.6	0.5
	IPPU	0.2	0.2	0.2	0.2	0.2	0.2
	LULUCF – biomass combustion	0.1	0.1	0.1	0.1	0.1	0.1
	LULUCF – post-1989 forestry	0.1	0.0	0.0	0.1	0.1	0.2
% of emissions outside the NZ ETS		62.2%	63.9%	65.7%	68.0%	70.2%	73.6%
Volume allocated to sectors inside the NZ ETS (NZ ETS cap)		**25.2**	**23.2**	**21.2**	**19.0**	**17.0**	**14.2**

Step 3: Technical adjustments

Step 3 involves identifying any differences between historical emissions reported in in the NZ ETS compared to the target accounting emissions in the GHG inventory, and assessing whether these differences justify an amendment to unit limit settings.

The emissions reporting approaches used in the NZ ETS have been designed to broadly mirror the way emissions are accounted for in Aotearoa New Zealand's emissions reduction targets. However, there can be differences for a range of reasons, including practical issues connected with the different purposes of the GHG inventory and the NZ ETS.

Any consistent differences between the GHG inventory emissions used in target accounting and emissions reported in the NZ ETS may affect the NZ ETS settings' ability to accord with emissions reduction targets. This makes it necessary to identify what differences exist and whether a technical adjustment is needed to keep the units in the scheme aligned with targets.

[6] The methodology for arriving at volumes in table 1 is described in step 1 and step 2. In summary, the available emissions volume aligned with emissions reduction targets (step 1) that is allocated to NZ ETS and non-NZ ETS sectors uses sector target emissions pathways, based on the sector sub-targets set out in Aotearoa New Zealand's first emissions reduction plan. These align to a large extent with the modelled demonstration path that the Commission developed as part of providing advice on emissions budgets in 2021 (He Pou a Rangi Climate Change Commission (2021)).

Table 2 shows the groupings of emissions we have compared by the different activities in the NZ ETS to the corresponding emissions in the GHG inventory. The analysis used remains generally the same as our previous advice, with minor refinements to the comparison categories used.

Table 3 shows the resulting recommended technical adjustment unit volumes.

Table 2 NZ ETS activities and corresponding GHG inventory emissions

Grouping	NZ ETS activities	GHG inventory categories
Liquid fossil fuels and gas	• owning obligation fuels • purchasing obligation fuel • combusting used or waste oil • using crude oil or other liquid hydrocarbons • mining natural gas • importing natural gas • purchasing natural gas • embedded substances	• LFF combustion minus oil refinery • gaseous fuels combustion • fugitive emissions, natural gas venting and flaring • IPPU chemical industry, excluding H2 production* • Liquefied petroleum gas (LPG)
Coal and steel production**	• importing coal • mining coal • purchasing coal • producing iron or steel	• solid fuels combustion emissions • fugitive emissions, coal mining • iron and steel production
Geothermal	• using geothermal fluid	• fugitive emissions, geothermal
IPPU	• producing aluminium • producing clinker or burnt lime • producing glass using soda ash • operating electrical switchgear using sulphur hexafluoride (SF_6)	• aluminium production • cement production and lime production • other uses of soda ash • electrical equipment (SF_6)
F-gases	• importing hydrofluorocarbons (HFCs) • exporting HFCs	• product used as substitutes for ozone depleting substances
Waste	• operating a disposal facility	• managed waste disposal sites
Forestry***	• deforestation of pre-1990 forestry • harvest / deforestation of post-1989 forestry • post-1989 forestry removals	• afforestation exotic • afforestation native • deforestation exotic • deforestation native

* Refining NZ was exempt from the NZ ETS under a Negotiated Greenhouse Agreement.

**Emissions from use of coal as a reduction agent in steel production are classified differently between the NZ ETS and the GHG inventory, hence it is necessary to combine total coal and steel emissions in the comparison.

*Emissions and removals by forests have not yet been published in the GHG inventory using the target accounting approach that will be used for emissions budgets, the NDC and the 2050 target (they are expected to be published later in 2024). We have therefore instead used target accounting emissions as calculated in the ENZ model.

Table 3 Total technical adjustment estimates

Units (millions)	2025	2026	2027	2028	2029	2030 (For visibility)
Liquid fossil fuels and gas	0.7	0.7	0.7	0.7	0.7	0.7
Coal and steel production	0.0	0.0	0.0	0.0	0.0	0.0
Waste	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0
IPPU	0.0	0.0	0.0	0.0	0.0	0.0
F-gases	0.0	0.0	0.0	0.0	0.0	0.0
Forestry	0.0	0.0	0.0	0.0	0.0	0.0
Total	**0.7**	**0.7**	**0.7**	**0.7**	**0.7**	**0.7**

The following sections describe the findings of key comparisons and how we reached our conclusions on technical adjustments.

Liquid fossil fuel and gas

In our 2022 advice we found that the historical NZ ETS emissions reported for liquid fossil fuels (LFFs) were on average approximately 0.8Mt CO_2e lower than LFF emissions in the GHG inventory. As a result, we advised a making technical adjustment of 0.8 million units per year over the period covered by the NZ ETS settings regulations.

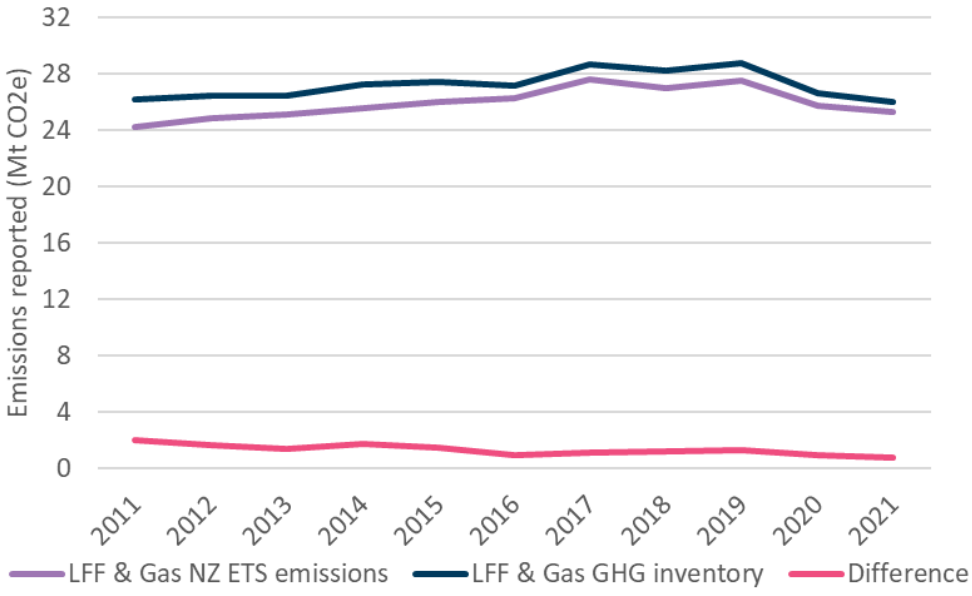
Since that analysis, officials have further investigated the possible causes of the difference. This found that under the NZ ETS, liquid petroleum gas (LPG) is classified as a stationary energy, but in the GHG inventory it is reported under LFFs.

To incorporate this finding in our 2024 analysis, we reviewed emissions from LFF and gas together, so that LPG would be included in the comparison regardless how it is categorised (see the first row of Table 2 above).

In our updated analysis, an ongoing historical discrepancy is evident within the combined total LFF and gas sector going back to 2010. In 2021 the discrepancy resulted in LFF and gas emissions reported within the NZ ETS being approximately 3% lower than reported in the inventory (Figure 1). The cause of this difference has not been identified.

Based on this updated analysis, we recommend a technical adjustment to reduce auction volumes by the equivalent of 3% per year of the total LFF and gas volumes aligned with emissions reduction targets. This results in a reduction in auction volumes of approximately 0.7 million units per year across 2025–2029.

Figure 1 LFF and gas emissions reported in the NZ ETS and GHG inventory



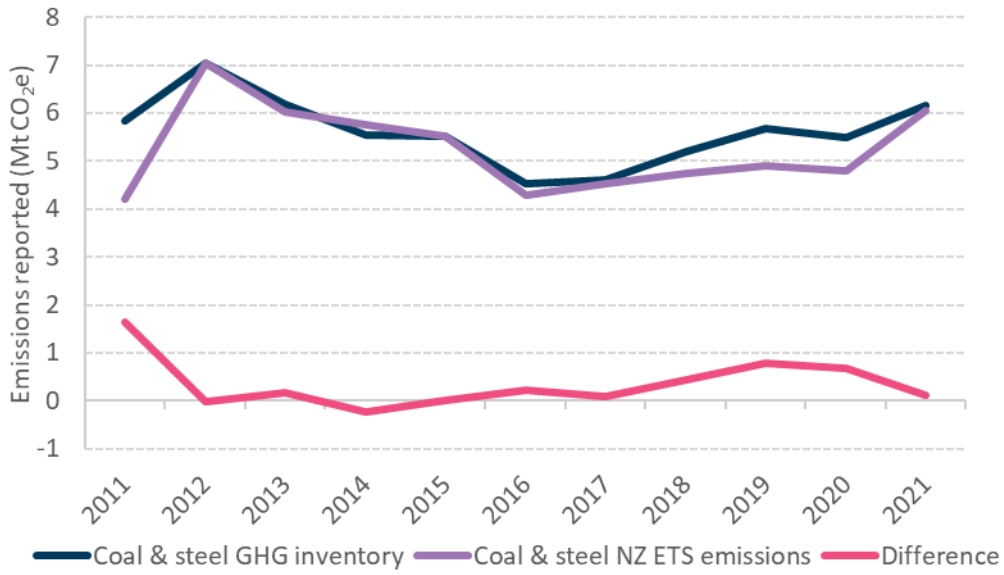
Coal and steel production

In our 2022 and 2023 advice, due to consistent historical discrepancies reported between the NZ ETS and GHG inventory coal and steel emissions, we recommended a technical adjustment to reduce auction volumes by between 0.6–0.5 million units per year. This was calculated by taking the average historical discrepancy of 16% and applying this to future coal and steel target emissions.

In the 2023 GHG Inventory, the discrepancy between the emissions reported in the NZ ETS and in the GHG inventory related to coal and steel in 2021 had been reduced to less than 2% (see Figure 2 below). After discussion with government agencies (Ministry for the Environment and Ministry of Business, Innovation and Employment), we understand that the reduction in the difference is due to a previous technical error in emissions reporting by an emitter which has now been resolved.

On this basis, there is no need to make any further technical adjustment. In calculating this year's recommended unit limits we have not incorporated any technical adjustments related to coal and steel emissions.

Figure 2 Coal and steel emissions reported in the NZ ETS and GHG inventory



Waste, geothermal, IPPU, and F-gases

We provide a summary of our updated comparisons of reported emissions in the GHG inventory and the NZ ETS for these sectors in Table 4 below. For these areas we continue to observe no need to make technical adjustments.

Table 4 Summary of groupings with no technical adjustments

Grouping	Summary of the comparisons of NZ ETS and GHG inventory reported emissions
Waste	Previously, the emissions factor for the NZ ETS waste sector used the GWP values[7] based on the IPCC's Fourth Assessment Report (AR4) rather than the AR5 values, which meant we observed a 12% difference between historical emissions reported in the 2023 GHG Inventory compared with the NZ ETS. We understand that the default NZ ETS waste emissions factor has now been updated to reflect AR5 GWP values, although unique emissions factors (UEF) for waste have not yet been updated in this way. Provided that the waste UEFs are updated to use AR5 GWP values in a timely manner, there would be no need for technical adjustments.
Geothermal	There are no significant discrepancies between emissions reported in the NZ ETS and GHG inventory.
IPPU	There are no significant discrepancies between emissions reported in the NZ ETS and GHG inventory.
F-gases	We calculated that approximately 49% of F-gas emissions are covered by the SGG levy (see step 2). However, there are challenges in discerning whether there are material differences between emissions reported in the NZ ETS compared to the GHG inventory due to the high annual variability of F-gas reporting in the NZ ETS. To assess F-gases for alignment with the GHG inventory we combined total volumes from the NZ ETS and SGG levy. Although there are some significant annual discrepancies, the total volumes over the last 5 years are reasonably aligned. We do not suggest making any technical adjustments based on F-gases in the NZ ETS.

Data and graphs of these comparisons are provided in *Supporting spreadsheet to technical annex 1*, released alongside our 2024 NZ ETS settings advice.

Forestry

In our 2022 advice we noted there are significant challenges when reviewing forestry emissions and removals data over time and comparing this between the GHG inventory target accounting emissions and NZ ETS emissions reporting. These challenges include that there are two accounting methods used in the NZ ETS for forestry (stock change and averaging), while in target accounting an approach similar to averaging is used. The NZ ETS also only requires foresters to submit emissions returns every few years at the end of a mandatory emissions reporting periods (MERPs), which usually cover five years.[8]

We have not applied any technical adjustments related to forestry in this round of advice, however this is an area of our methodology that we expect to consider further in future advice. Further

[7] All emissions values presented in this annex use Global Warming Potentials (GWPs) with a 100-year timeframe from the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report (AR5).
[8] However, the next MERP (MERP4) is only three years long.

analysis may be possible after more details become available about Aotearoa New Zealand's target accounting approach when its first biennial transparency report tracking progress on its first NDC is submitted to the UNFCCC in late 2024.

Another challenge relates to the timing of the next MERP, which means that significant information regarding NZ ETS forest registrations, planting and harvesting over 1 January 2023 to 30 June 2026 may only be available in late 2026 or 2027. The implications of this need to be considered either in this step 3 on technical adjustments, or in step 5 as part of the approach to estimating surplus units in the NZ ETS market.

Step 4: Industrial free allocation forecasts

The method for forecasting industrial free allocation has remained largely the same as previous years. The steps are shown below:

1. Update for the most recent allocation data from the previous year broken down by activity and apply estimated growth in industrial production volumes (assumption of 0% across all activities).
2. Calculate impact of the industrial free allocation phase down rate (1 percentage point reduction per annum 2021–2030, 2 percentage point reduction per annum 2031–2040).
3. Apply any new information regarding significant changes that may affect allocations for eligible activities, such as plant closures or changes to less emissions intensive production methods.

Our updated forecast of industrial free allocation volumes has reduced slightly from our previous estimate due to:

- updated 2022 industrial free allocation data (slightly lower than previously forecast)
- a reduction in the allocation for iron and steel making of 0.8m units from 2027 onwards, related to NZ Steel's expected installation of an electric arc furnace[9]
- a minor revision to the forecast calculations method.

Forecasts broken down by activities eligible for industrial free allocation (some grouped) are shown in Table 5.

[9] This is based on an estimated value stated in a Cabinet paper (Ministry of Business, Innovation and Employment (2023)) proposing a grant via the *Government Investment in Decarbonising Industry* (GIDI) Fund to NZ Steel for the installation of an electric arc furnace. However, the exact arrangements are not set, so the forecast iron and steel industrial allocations may need to be updated over time.

Table 5 Industrial free allocation forecasts by activity

Forecast unit allocations (millions)	Activity	2025	2026	2027	2028	2029	2030 (for visibility)
High emissions intensity and trade exposed (EITE) activities	Iron and steel	1.9	1.8	1.0	1.0	1.0	1.0
	Aluminium	0.6	0.6	0.6	0.6	0.6	0.6
	Methanol	0.8	0.8	0.8	0.8	0.8	0.4
	Cement and lime	0.8	0.8	0.8	0.8	0.8	0.8
	Urea	0.4	0.4	0.4	0.4	0.4	0.3
	Other high EITE activities	0.1	0.1	0.1	0.1	0.1	0.1
Moderate EITE activities	Dairy	0.1	0.1	0.1	0.1	0.1	0.1
	Meat processing	0.1	0.1	0.1	0.1	0.1	0.1
	Horticulture	1.0	1.0	1.0	1.0	1.0	0.9
	Pulp and paper	0.0	0.0	0.0	0.0	0.0	0.0
	Other moderate EITE activities	0.2	0.2	0.2	0.2	0.2	0.1
	Total	**5.9**	**5.8**	**5.0**	**4.9**	**4.8**	**4.4**

These forecasts do not include estimates of the impact of the upcoming industrial free allocation reforms that will update allocative baselines and the electricity allocation factor across industries. The Commission has insufficient information on the impact of these changes to factor them into the industrial free allocation forecasts at this time. If more certain information is available to the Government later in 2024 when it makes policy decisions on the NZ ETS unit limits, it would be beneficial to incorporate it into the industrial free allocation forecast used to calculate the unit limits.

Step 5a: Unit surplus estimate

Step 5 involves estimating the volume of surplus units currently held in private accounts.

Our updated surplus estimate is based on the same methodology as our 2022 and 2023 advice with minor refinements.

The surplus is calculated by taking the total units held in private accounts (the stockpile as of 30 September 2023), and subtracting estimates of:

- units held for post-1989 forest harvest liabilities
- units held for hedging purposes by emitters
- pre-1990 forest allocation units held long term.

Our analysis is focused on units already in the market only to give a snapshot of the surplus as it exists today and does not attempt to project the surplus in future years. For example, it does not take into account how forestry unit allocations may increase or decrease in future.

There is uncertainty inherent in this analysis, much of which is connected with the design of the NZ ETS so cannot be resolved. In particular, the options available to post-1989 foresters participating in the NZ ETS make it challenging to analyse their potential use of units. This is why we have estimated

a surplus range, and why it is necessary to use an adaptive management approach where the surplus is re-estimated each year as new information becomes available.

Total unit holdings

Total unit holdings, commonly referred to as 'the stockpile', means the total of all privately held units in the NZ ETS registry at a point in time. Data on total unit holdings is reported quarterly by the Environmental Protection Authority (EPA).[10] The volume of units varies across reporting quarters due to the timing of unit allocations and surrenders, with key factors being:

- Non-forestry NZ ETS participant unit surrenders which are due by 31 May each year.
- Foresters' surrenders and allocations, many of which occur following the end of the multi-year mandatory emissions reporting periods (MERPs) for post-1989 forestry but which can also occur at other times as foresters can optionally submit emissions returns more frequently.
- When eligible businesses receive provisional industrial free allocation units and final allocation adjustments occur, usually during the first half of each calendar year.

The figure used for our original surplus estimate in 2022 was based on the total stockpile of 145.3 million units, held as of 1 June 2022, after unit surrenders in respect of 2021 emissions by non-forestry participants had occurred.

For our most recent estimate we have taken the stockpile volume of **160.8 million** units as of 30 September 2023, after unit surrenders by non-forestry participants in respect of 2022 emissions.

The main reasons for the increase in the stockpile between 1 June 2022 and 30 September 2023 are:

- Units entering the market via the 15 June, 7 September, and 7 December 2022 NZU auctions, and sale of all available cost containment reserve (CCR) unit volume.
- An overall net increase of approximately 10 million post-1989 forestry units in the scheme connected to the end of a five year forestry MERP, covering years 2018–2022.

Adopting a consistent method and time of year to base the total unit holdings on when reviewing the surplus estimate will help provide consistency and comparability in future settings. Thus far the Commission has used data from the second half of the year after the deadline for non-forestry unit surrenders and will aim to follow this practice consistently in our future advice as much as circumstances and the timing of the advice allows.

At the time we undertook this analysis, the data available did not include all information regarding deforestation surrenders in the 2018-2022 Mandatory Emissions Reporting Period (MERP 3). This is due to an extension granted to some participants allowing them a longer period to replant after harvest before deforestation liabilities would be incurred, where severe weather experienced in 2023 delayed or prevented forest re-establishment. If the Government has updated information available to it in 2024 about deforestation surrenders in respect of MERP3 that would affect the unit stockpile and estimate of the surplus, we would encourage the Government to incorporate this

[10] This data can be accessed via the Environmental Protection Agency's website available at: www.epa.govt.nz/industry-areas/emissions-trading-scheme/market-information/privately-held-units.

information in its update to the unit limit settings, in a way that is consistent with the Commission's advice.

Units held for post-1989 forest harvest liabilities

We assume that a portion of units currently held in the stockpile will need to be surrendered when a post-1989 forest is harvested (harvest liabilities, if the forest is subject to stock change accounting) or deforested. These units are not considered part of the surplus, as they will not be available for use by other participants to allow emissions above emissions budget levels.

To make this estimate we have developed a forestry model based on public information on forest carbon storage (yield tables), and non-public data from the Ministry for Primary Industries (MPI) related to forest area broken down by species, year of planting and MERP registration.

This model assumes that all production forests are replanted. However, there is a small proportion that do not replant and so deforestation occurs. We estimate that this is only approximately 3% of all NZ ETS registered post-1989 forests and therefore it is unlikely to have any material impact on final unit estimates.[11]

When estimating the volume of units held for future harvest liabilities the model considers multiple factors:

- forestry accounting method (stock change vs. averaging)
- proportion of production forests that may remain unharvested
- low risk carbon unit levels (units that may never have to be repaid under stock change based on mix of forest age, rotation and species. These are the units that are more likely to be available for use by other NZ ETS participants)
- harvest rotation lengths.

We discuss each of these components of the methodology below. All these factors require estimates and assumptions, which makes the estimate of units held for future harvest liabilities subject to significant uncertainty. This can be managed adaptively over time as discussed in the main report.

Forestry accounting method (stock change vs. averaging)

We factored into our estimate that there is now a mix of forests registered under both stock change accounting and averaging accounting.

Before 1 January 2023, stock change accounting was the only available method to calculate unit allocations and liabilities for forests registered in the NZ ETS. Under stock change accounting participants earn units while their forest grows but need to repay a large portion of these units when the forest is harvested.

Foresters earning units under the stock change accounting method are unlikely to sell all units they receive because of the significant volume they must then surrender when the forest is harvested. If all units earnt are sold immediately this creates a significant financial risk as they may have to purchase the equivalent volume in future years when NZU prices could have increased.

[11] MPI (2023a).

From 1 January 2023, all standard post-1989 forests newly registered in the NZ ETS will use the averaging accounting method in which participants earn units until the forest reaches an average age (e.g., 16 years for radiata pine, 26 for Douglas fir, 23 for indigenous forest). Forests registered in the permanent post-89 category will continue to use stock change.

All forests registered before 1 January 2019 must remain on stock change and forests registered between 1 January 2019 and 31 December 2023 had the option of moving to averaging in 2023.

Under averaging accounting, forestry participants do not need to repay units when the forest is harvested, but do not earn further units for second or later forest rotations. If the forest is deforested (harvested but not replanted) all units earnt under averaging will have to be repaid. As the portion of forests registered under averaging in the NZ ETS increases, the volume of total units allocated will slow, but the portion of units needing to be held for harvest liability will decrease. MPI manages forestry in the NZ ETS and is responsible for collecting this data.[12]

In our previous advice we assumed that all forests up to 1 January 2023 would remain registered under stock change. However, in 2023 new data showed that approximately 25% of forests registered between 1 January 2019 and 31 December 2023 chose to change to averaging accounting.

Proportion of production forests that may remain unharvested

Some production forests registered on stock change may choose not to harvest their forests, i.e. transition them to being permanent forests, to keep earning units and avoid harvest liabilities. This could occur for a range of reasons and due to economic conditions (e.g. log prices, harvesting costs, attractiveness of NZ ETS returns).

We have developed an estimated range of forests that are using stock change accounting that may remain unharvested based on a 2018 study by MPI on intentions of post-1989 forest owners,[13] recent trends and engagement with foresters, which indicates increasing intentions to not harvest production forests due to increasing NZU prices.

We evaluated the impacts of three assumptions for the proportion of production forests that may not be harvested[14]:

- 10% (low)
- 20% (central)
- 30% (high).

If further harvest intentions research becomes available that provides a more up-to-date evidence base, we will re-evaluate these assumptions in our future settings advice.

Low risk unit assumptions in stock change accounting

This part of our methodology remains the same as in our 2022 advice, but we have explained this concept and assumption in more detail below.

[12] MPI (2024).
[13] MPI (2018).
[14] This assumption does not correspond to the forests registered in the NZ ETS as "permanent forestry", a different category to standard forestry which applies from 1 January 2023.

The carbon stock of forests does not return to zero immediately on harvest due to residual carbon stored in roots underground. There are a portion of the units earnt that are considered low risk to sell (often termed 'low risk carbon' or 'safe carbon') and will likely never have to be surrendered if the forest is replanted. The time period over which a portfolio containing forests of different age classes is planted and harvested and how they overlap also impacts the units needing to be held for future harvest liabilities.

MPI data on forestry contains information about how many hectares and type of species have been planted each year but does not have information on how these forests are owned and managed by separate foresters.

We have analysed different scenarios for the low risk carbon units across the entire NZ ETS forestry estate:

- minimum low risk units scenario, which is the theoretical amount of low risk units for a forest portfolio of a single age class
- maximum low risk units scenario, which is the theoretical low risk units for a forest portfolio evenly split across all age classes (equal to the long term average carbon stock)
- central low risk units scenario, which is our current estimate of the overall average low risk units across all forests.

Any NZ ETS forestry participant sits somewhere on a spectrum between the theoretical maximum and the theoretical minimum low risk unit scenarios. Our low risk unit estimate used in our analysis assumes that the overall low risk carbon units across the NZ ETS is 85% of the maximum low risk carbon unit amount. This reflects that the majority of total hectares of forests registered in the NZ ETS are managed by large commercial forestry operators who have diverse forestry portfolios.[15] A much smaller portion of total hectares are made up of small forestry blocks planted in a single year and owned or managed by small businesses or individuals. This estimate of 85%, is the same as used in our original 2022 surplus estimate and is also informed by observing the quantity of total units held in the NZ ETS registry over time.

We further explain the concept of 'low risk carbon' units using an example of *radiata pine* in Box 1 below.

[15] MPI (2023b).

Box 1. Forest owners have ways to manage post-1989 forest unit liabilities to increase their low risk carbon units

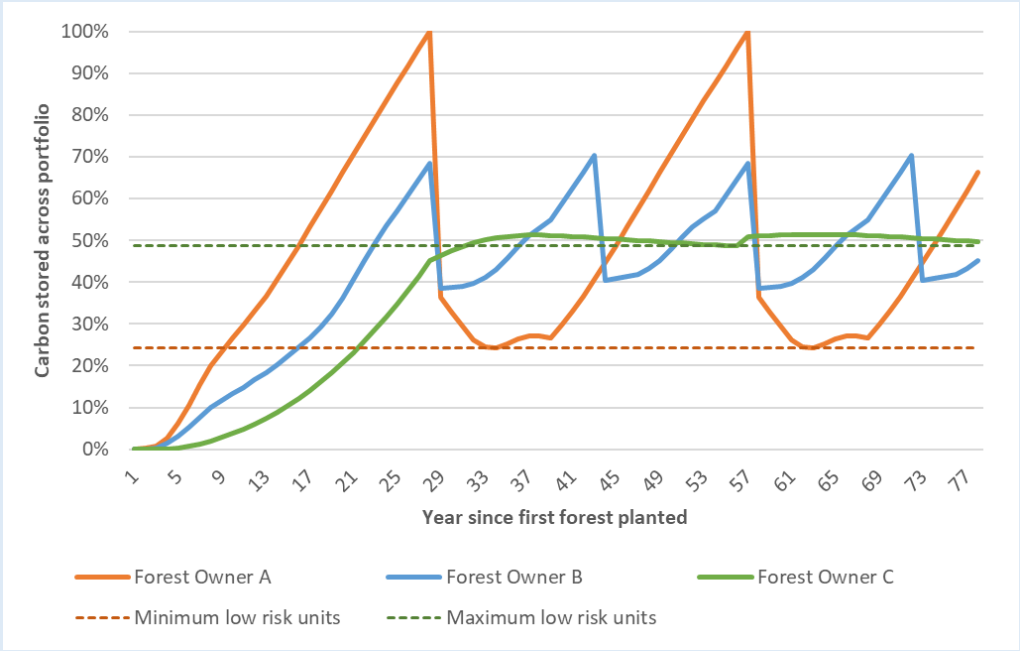
Imagine three different forestry participants each with 100,000 hectares of production forests registered in the NZ ETS in the year they were planted. The units each forest owner would earn and need to surrender at harvest per hectare would be the same over the long run but the timing of when they earn and surrender them will depend on their planting and harvest strategy.

To take radiata pine forest species **as an example** (based on a 28-year harvest cycle), the residual carbon remaining after each harvest cycle will differ for each forest owner as follows:

- If Forest Owner A plants the full amount (and subsequently harvests) in a single year, it would not be liable for approximately 25% of units earned – *minimum low risk units scenario*.
- If Forest Owner B plants at different times and correspondingly staggers harvests, for example around 25,000 hectares roughly every 7-8 years, it would not be liable for around 36% of units earned – *central low risk units scenario.*
- If Forest Owner C plants and harvests a set amount each year, for example 3,570 hectares each year for 28 years to represent the full age class in a rotation, it would not be liable for around 50% of units earned – *maximum low risk units*.

Forest Owner C with a more diverse forestry portfolio has maximised its low risk carbon units compared with Forest Owner A, and is able to sell a higher proportion of the units it is earning. Figure 3 below provides an illustration of various low risk carbon unit levels using radiata pine under the different hypothetical examples discussed above.

Figure 33 Net carbon stored from different illustrative forest planting portfolios



This graph is a simplified illustration based only on radiata pine forest rotations registered in the same MERP they were planted. The actual model used to calculate low risk carbon unit levels is weighted based on all forest hectares of age, species and registration period.

Rotation lengths assumptions

The effect of different harvest rotation lengths significantly impacts the estimate of unit volumes currently held for harvest. This is important due to a significant portion of radiata pine forests within the NZ ETS reaching likely harvesting ages from 28 years (40% of hectares planted between 1990-1997[16]). Whether these forests were harvested with unit surrenders within MERP 3 (2018-2022) or still to be harvested during MERP 4 (2023-2025) has a significant impact on units assumed held for harvest.

For this updated estimated, we analysed the impacts of a wider range of potential radiata pine harvest rotation lengths, between 28 and 31, rather than basing the total estimate on a single harvest age assumption of 29 years[17]. This is supported by information from the forestry sector about how foresters may alter rotation length to stagger harvesting over time for a range of reasons.

Calculate the volume of units held for post-1989 harvest liabilities

To arrive at a potential range of volume of units held for future harvest liabilities we apply the factors discussed in earlier sections.

Table 6 below shows the full range of volumes of applying these factors to estimate a low, central and high estimate range of unit volumes held.

Table 6 Modelled estimates of post-1989 units held for future harvest liabilities.

	High estimate	Central estimate	Low estimate
Estimates in million units	65.5 million	**58.2 million**	50.9 million
Variables informing estimates	• 10% not harvested • Central safe carbon level • 28-31 radiata pine harvest rotation length range	• 20% not harvested • Central safe carbon level • 28-31 radiata pine harvest rotation length range	• 30% not harvested • Central safe carbon level • 28-31 radiata pine harvest rotation length range

Our central estimate of units held for post-1989 harvest liabilities is 58 million within a range of 45-90 million units. These assumptions represent the same low risk units and harvest percentage assumptions as in our 2022 advice.

Pre-1990 units held long term

When the NZ ETS was first established, those who had forests planted before 1990 were allocated units to partially compensate for the restriction the NZ ETS put on their future ability to change land use. As long as the pre-1990 forests are not deforested, these units are not encumbered by surrender obligations and are theoretically available for purchase and use by other NZ ETS

[16] This is based on data from MPI of forest registrations up to 15 December 2022, which is not currently publicly available.

[17] The impact of harvest age assumptions on other forest species is lower as average harvest ages has not yet been reached in post-1989 forests, such as Douglas Fir, with an average harvest age of 45 years.

participants. This would make them part of the surplus, as they that present a risk of allowing emissions above emissions budget levels.

We continue to assume, as per our previous advice, that a proportion of these pre-1990 units will remain held long term by those who originally received them. That is, they are unlikely to be available for use by other NZ ETS participants before 2030 and so do not contribute to the surplus or present a risk of allowing emissions above emissions budgets. This assumption is based on feedback from market participants, with reasons cited for why these units may be held long-term including:

- Some pre-1990 forest owners may hold these units as insurance in case requirements to replant or regenerate the land with species that meet certain criteria within a set timeframe are not met.
- Some iwi/Māori forest owners may wish to retain the units as an asset for future generations.
- Units held as a hedge in case of future deforestation decisions to enable use of land for another purpose (e.g. developed for pasture or for housing).
- Slow and deliberate decision-making about the sale of units, for example due to collective decision making within iwi/Māori entities.
- Some recipients of pre-1990 units may have low awareness of what these units are and be unclear on the implications or how to go about selling them.

Estimating how many of these units may be retained is challenging, as no information is collected specifically on the intentions or behaviour of the entities who received them.

The most relevant data that we have been able to source to inform our analysis is from the EPA about transfers of these pre-1990 units out of the accounts that originally received them. This is the closest proxy available to us for estimating the extent to which these units may be available for use in the NZ ETS market.

The key issue for understanding what share of pre-1990 units might be surplus depends on the unit holding behaviour of the participants who originally received those units. Other available data does not provide much insight into that. While information is available on how many pre-1990 units in total are surrendered annually, this will include pre-1990 units purchased and used by other emitters. Pre-1990 units are fully fungible with all other units in the NZ ETS so if they are not held long-term by the original recipients, they are part of the overall pool of units that may contribute to the surplus.

For our previous advice, we used EPA data about transfers of pre-1990 units from original recipients' accounts to develop a range of the potential unit volumes that may remain in those accounts in 2030. That analysis extrapolated paths for how the units may be sold in future, based on recent trends in pre-1990 unit transfers. Our central estimate was based on data from Q1 2021 – Q2 2022.

For this 2024 advice, we applied the same methodology using updated EPA data, which now includes transfers up until the end of 30 September 2023. Over this period, the transfer rate increased, aligning more closely with the 'fast' transfer rate that we observed in our 2022 advice.[18]

[18] In our 2022 analysis we observed that the rate of unit transfers had slowed significantly after 2019.

Our updated central forecast is that 6.6 million of the pre-1990 units currently in original accounts will remain in those accounts in 2030. By varying the time over which the trend forecast is based, we also came up with a high estimate and low estimate of units remaining unsold in 2030.

Figure 4 shows the new transfer data, our original 2022 central trends path estimate, and our updated slow, central and fast trend estimates. The resulting estimates are shown in Table 7.

Figure 4 Pre-1990 units remaining in original accounts (historic and projected)

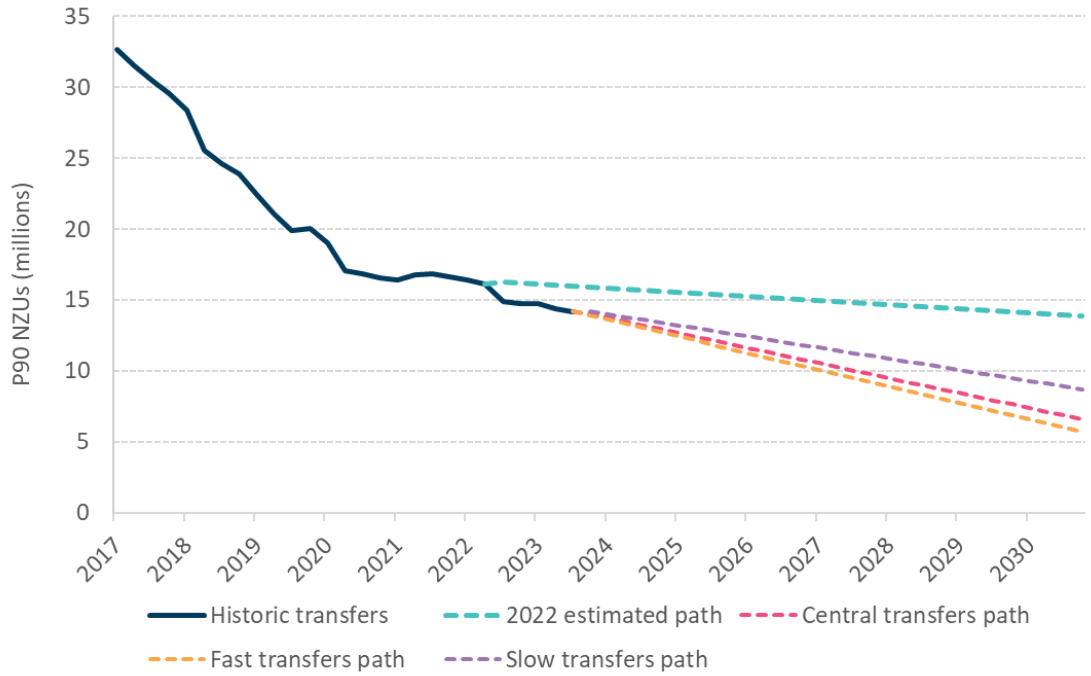


Table 7 Pre-1990 units held in original accounts

		Estimated volumes in 2030		
Million units	Current units as of 30 September 2023	Fast transfers path (based on trends data from Q1 2021 – Q3 2023)	Central transfers path[19] (based on trends data from Q1 2020 – Q3 2023)	Slow transfers path (based on trends data from Q4 2022 – Q3 2023)
Total volume of pre-1990 units in original accounts	14.2	5.7	**6.6**	8.1

The updated trend paths shown in the graph indicates a constant rate of transfers but should not be treated as a fixed trend as it can change with updated data as our methodology allows. For example, new data next year could show further changes such as transfers plateauing or speeding up; in that case the trend line can be adjusted in next year's advice.

Units held for hedging by emitters

It is common practice for non-forestry participants in the NZ ETS to hold NZUs to cover a proportion of their compliance obligation over a certain period in advance ('hedging'). Hedging involves emitters pre-purchasing NZUs when they fix prices with customers or suppliers, to manage their exposure to NZU price risk.

Our methodology assumes a portion of units currently in the registry are held by (or for) emitters to meet their future emissions surrender obligations. These units will likely not be able to be used to enable emissions above emissions budgets.

We estimate the portion of units held for hedging by multiplying the target emissions levels for non-forestry sectors (resulting from step 1 and 2), taking into account that some emissions will be automatically hedged due to technical discrepancies (step 3) and industrial free allocation (step 4).[20]

We have kept the hedging assumptions and methodology largely the same as in our 2022 and 2023 advice. The hedging assumptions for NZ ETS waste and liquid fossil fuels sectors are unchanged, but we have made minor refinements to separate out and apply tailored hedging assumptions to the stationary energy and industrial processes sectors due to feedback from engagement with entities that participate in the NZ ETS market. The central assumptions by sector are:

- Liquid fossil fuel participants on average have a hedge profile that drops from 100% to 0% over one year forward given their ability to rapidly pass on NZ ETS price changes, i.e. at any one time these participants are likely to hold units equating to 50% of their annual liabilities.
- Stationary energy participants on average have a hedge profile that drops from 100% to 0% over three years forward, to reflect that they often set prices with customers using relatively long-term contracts.

[19] The central transfers path is not the average of the fast and slow sales paths, it is the median volume out of three output volumes reached based on trends using data tested over different time periods.
[20] Our step 1 methodology does not use government projections (Ministry for the Environment (2023a)) which may indicate different emissions trends.

- IPPU and synthetic greenhouse gas (SGG) participants on average have a hedge profile that drops from 100% to 0% over three years forward, but with a more steeply dropping profile in year three compared to stationary energy. From engagement feedback we understand businesses in this sector fix prices in advance to a lesser extent than stationary energy.
- Waste participants on average hedge a full year in advance, as landfills generally set their prices on an annual basis.

The low, central and high scenarios of hedging profiles reflect that:

- Different industries have different hedging practices due to their ability to pass through costs to their consumers, and how they manage financial risks and the possibility of facing significant penalties if their surrender requirements are not met.
- Several large emitters in the stationary energy and IPPU sector (which might be expected to have extensive hedging practices) are in practice hedged to a large extent by the industrial free allocation they receive.[21]

[21] We have not accounted for upcoming changes to industrial free allocation as set out in *Part 3: Unit Limits Sensitivities, risks and future developments in auction volumes* in the NZ ETS settings advice report, but we have factored in industrial free allocation based on the current regulations as set out in step 4.

Table 8 below shows the assumed emissions by sector that are exposed to emissions price risk and so will need to be hedged (i.e. subtracting emissions expected to be hedged by industrial free allocation) and our, high, medium and low hedging estimates.

Table 8 Emissions exposed to emissions price risk by sector

Sector	2024	2025	2026	2027
Liquid fuels	19.5	18.8	18.7	18.6
Stationary energy	7.5	6.3	6.1	5.9
Industrial processes + SGGs	2.4	1.8	1.8	1.8
Waste	1.1	1.0	1.0	1.0

Table 9 shows how the hedging profile assumptions apply in a given year.[22]

Table 9 Hedging profile assumptions by sector, scenario, and year

Sector	Scenario	2024	2025	2026	2027
Liquid fuels	Low	25%	0%	0%	0%
	Central	50%	0%	0%	0%
	High	75%	0%	0%	0%
Stationary energy	Low	100%	50%	0%	0%
	Central	100%	67%	33%	0%
	High	100%	75%	50%	25%
Industrial processes + SGGs[23]	Low	100%	50%	0%	0%
	Central	100%	50%	25%	0%
	High	100%	67%	33%	0%
ETS Waste	Low	100%	0%	0%	0%
	Central	100%	0%	0%	0%
	High	100%	0%	0%	0%

Table 10 below shows the resulting volumes by sector and total of NZUs estimated to be held for hedging across our range of estimates by sector. These numbers are calculated by multiplying the assumed emissions to be hedged by sectors in Table 8 by the hedging percentages in Table 9.

Table 10 Estimated range of units currently held for hedging purposes by sector (millions)

Sector	High estimate	Central estimate	Low estimate
Liquid fossil fuels	14.7	9.8	4.9
Stationary energy	16.7	13.7	11.7
IPPU and F-gases	4.2	3.7	2.2
ETS Waste	1.1	1.1	1.1
Total	**36.6**	**28.3**	**19.8**

[22] The assumed reduction in emissions from NZ Steel due to changing to an electric arc furnace have been included, to be consistent with our industrial free allocation forecasts, but only affect the stationary energy high hedging estimate.

[23] We separated out stationary energy and IPPU sectors, assuming lower hedging in the third year for IPPU. This is the only changed assumption from the 2022 and 2023 advice.

Total base surplus estimate

To reach the final estimate of surplus units as set out in Table 11, we have used the total units held in private accounts (as described above) and removed our estimates of the three types of units considered not to be surplus.

For each estimate of units that are not surplus, we have presented a range of low, central and high values, but for our final unit supply recommendations we have used our central estimate to determine surplus reduction volumes.

We analysed the full range to highlight the uncertainties associated with these estimates and examine the impacts on final auction volumes if applying the low or high estimate. For example, we have checked whether, if the surplus is closer to the low end of the range, it would still be possible to adaptively manage the unit limit settings. This involved checking that the surplus reductions over the near term (2025-2027) do not exceed the low surplus estimate. This means that if information comes to light next year that indicates that the surplus is lower than previously estimated, it would still be possible to adjust for this within the rules of the process for updating unit limits, which in 2025 would normally only allow changes to until limits from 2028 (within the 2026-2030 period).

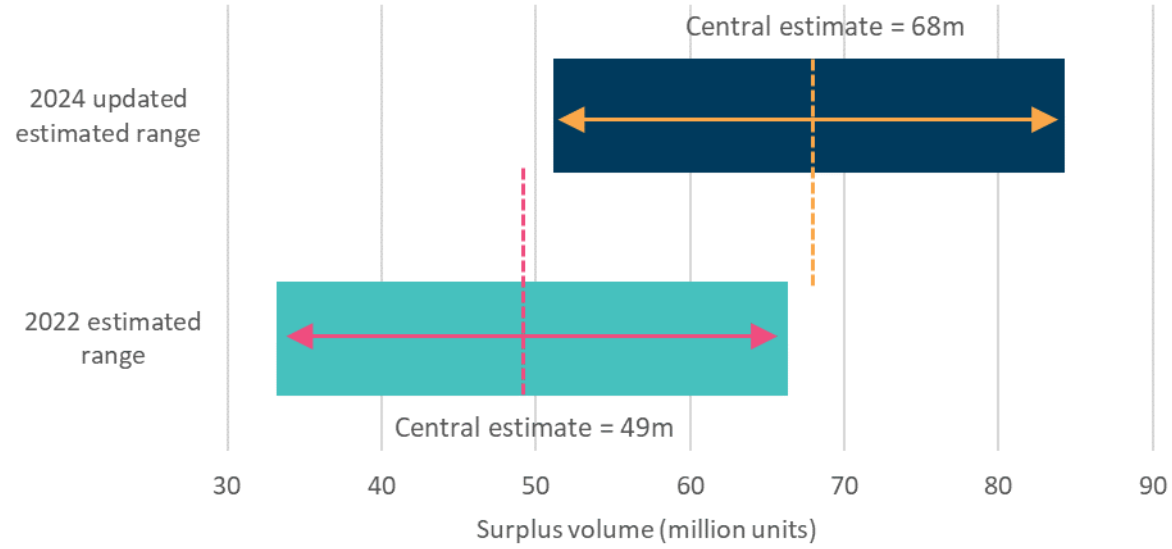
Table 11 Total base surplus estimate and breakdown, with range (million units)

Total units in registry (30 September 2023)	**160.8**		
Breakdown of surplus estimate	**Low estimate**	**Central estimate**	**High estimate**
Held for harvest liabilities	65.0	58.0	51.0
Pre-1990 units held long term	8.4	6.6	5.7
Units held for hedging	35.8	27.5	19.2
Total estimated surplus	**50.7**	**67.8**	**84.0**

It is important to recognise that the estimate of the surplus is not a static figure. Participants' future behaviour in terms of buying, selling, or holding units can vary depending on multiple factors, e.g., the radiata pine log price, the cost of capital, and macroeconomic conditions. The estimate of the surplus itself can also have somewhat circular impacts. For example, a low estimate of pre-1990 units remaining in original accounts would increase the surplus estimate and lower the available auction volumes. This could drive faster sales of pre-1990 allocation units as the NZU price reaches a level at which the owners of those units are more willing to sell.

As highlighted in the discussion of this step, the information available for analysing the surplus is limited and uncertain. This highlights why an adaptive management approach must be used to manage the surplus via the NZ ETS unit limit settings. We note, however, that if more information was collected by the government that is relevant to these issues, for example requiring market participants to report their positions or information about intentions through NZ ETS market governance reforms, it may be possible to reduce the uncertainty in this type of analysis. Figure 5 shows the range of our updated surplus estimate compared to the estimated range in our 2022 advice.

Figure 4 Comparison of the 2022 and updated surplus estimate ranges



Annual surplus reduction volume calculations

We have used the same methodology as previous advice to manage the estimated total surplus removal via a reduction in annual auction volumes. This is set out in this year's NZ ETS settings advice report, with a fuller explanation of the rationale for this approach provided in our 2022 NZ ETS settings advice report.

The aim is to remove the volume of the current base surplus estimate from annual auction volumes by 2030. The total surplus removals are divided up over the remaining period to 2030 based on each year's proportion of the NZ ETS emissions cap over the total period. The resulting volumes are shown in Table 12. Table 12 also shows the percentage of the NZ ETS emissions cap allocated to the surplus reduction. This shows that over 2025-2029, approximately half of all potential units available under the cap are removed to address the surplus.

Table 12 Annual surplus reduction calculations

	2024 (status quo)	2025	2026	2027	2028	2029	2030	Total
Annual unit reduction volume (million)	7.7	12.7	11.7	10.7	9.5	8.6	7.2	68.0
Annual % of total 2025–2030 NZ ETS emissions cap	NA	21.0%	19.4%	17.7%	15.8%	14.2%	11.9%	100%
Annual % of NZ ETS emissions cap allocated to surplus reduction	26%	50%	50%	50%	50%	50%	50%	50%

Step 5b: Discrepancy adjustment

This step enables adjustments to address potential updates to unit limits that are unable to be made due to limitations around when settings can be updated in the 5-year rolling process.

As we propose to update unit limit settings from 2025 onward, we have only considered whether a discrepancy adjustment is needed due to the unit limit settings for 2024 which are fixed and cannot be changed.

We identified a small net discrepancy resulting from step 1, 3 and 4 (0.2 million units). This volume is then divided and applied to unit limits over 2025-2029, resulting in a very minimal increase on overall unit limit volumes. Even though it is very small, we consider it is important to still conduct this analysis, assess the impacts and apply the same methodology as previous advice to provide consistency. This helps ensure that the mechanism is clear for the adaptive management of the settings due to changes in information, estimates and forecasts.

Three factors contribute to the estimated 2024 discrepancy:

- lowering the NZ ETS emissions cap to reflect the GHG inventory methodological updates
- reduced technical adjustment volumes
- reduced forecast of industrial free allocation.

Table 13 below shows the difference in current settings with updates across these categories.

Table 13 Difference in current settings with updates across these categories (million units)

	Current volumes for 2024	Updated 2024 estimate	Discrepancy	Theoretical impact on auction volumes
NZ ETS cap	29.40	28.83	-0.57	Reduce
Technical adjustment volume	1.40	0.79	0.61	Increase
Industrial free allocation forecast	6.10	5.99	0.11	Increase
Total net impact	**21.90**	**22.05**	**0.15**	**Increase**

This total discrepancy is divided and applied over the following 5 years (2025-2029) as shown in Table 14. The annual volumes are calculated through the same methodology as the base surplus reduction – a constant portion of the year's percentage of the NZ ETS cap volume over that time.

Table 14 Discrepancy adjustment volumes applied

	2025	2026	2027	2028	2029	SUM
Annual increase auction volume (million units)	0.04	0.03	0.03	0.03	0.02	0.15

Note: These volumes are shown rounded to 2 decimal points, to provide added visibility of the calculation and results. However, generally in unit volume calculations results are shown rounded to 1 decimal point, in which case these volumes are shown as 0.0.

Step 7: Calculate auction volumes

Step 7 takes the total NZ ETS cap and removes estimates of the remaining steps to reach final auction volumes. Base calculations in each step are not rounded until reaching final auction volumes, potentially resulting in some minor inconsistencies with the numbers shown in the table below.

Table 15 Proposed annual auction volumes

Units (millions)		Updated recommendations					For visibility
		2025	2026	2027	2028	2029	2030
Step 1.	Align with emissions reduction targets	66.7	64.2	61.8	59.3	57.0	53.8
Step 2.	Allocate volume to non-NZ ETS sectors	41.5	41.0	40.7	40.4	40.0	39.6
	Allocate volume to NZ ETS sectors (NZ ETS cap)	**25.2**	**23.2**	**21.1**	**18.9**	**17.0**	14.2
Step 3.	Technical adjustments	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7
Step 4.	Industrial free allocation	-5.9	-5.8	-4.9	-4.9	-4.8	-4.4
Step 5a.	Surplus reduction	-12.6	-11.6	-10.6	-9.5	-8.5	-7.1
Step 5b.	Discrepancy adjustment	0.0	0.0	0.0	0.0	0.0	0.0
Step 6.	Approved overseas units	0.0	0.0	0.0	0.0	0.0	0.0
Step 7.	**NZU auction volumes**	**5.9**	**5.0**	**4.9**	**3.9**	**3.0**	2.0

Comparing recommended unit limit settings to the status quo

Table 16 shows the change in volumes used in each step to reach the auction volumes available under current regulations[24] compared to the auction volumes that would result from the Commission's updated recommendations for 2025-2029. Only the limits on NZUs available by auction (including cost containment reserve volume) are set in regulations, but this table contains the information used to calculate the auction volumes.

Table 16 Differences between calculations for new unit limit recommendations (2025–2029) and status quo (2024–2028)

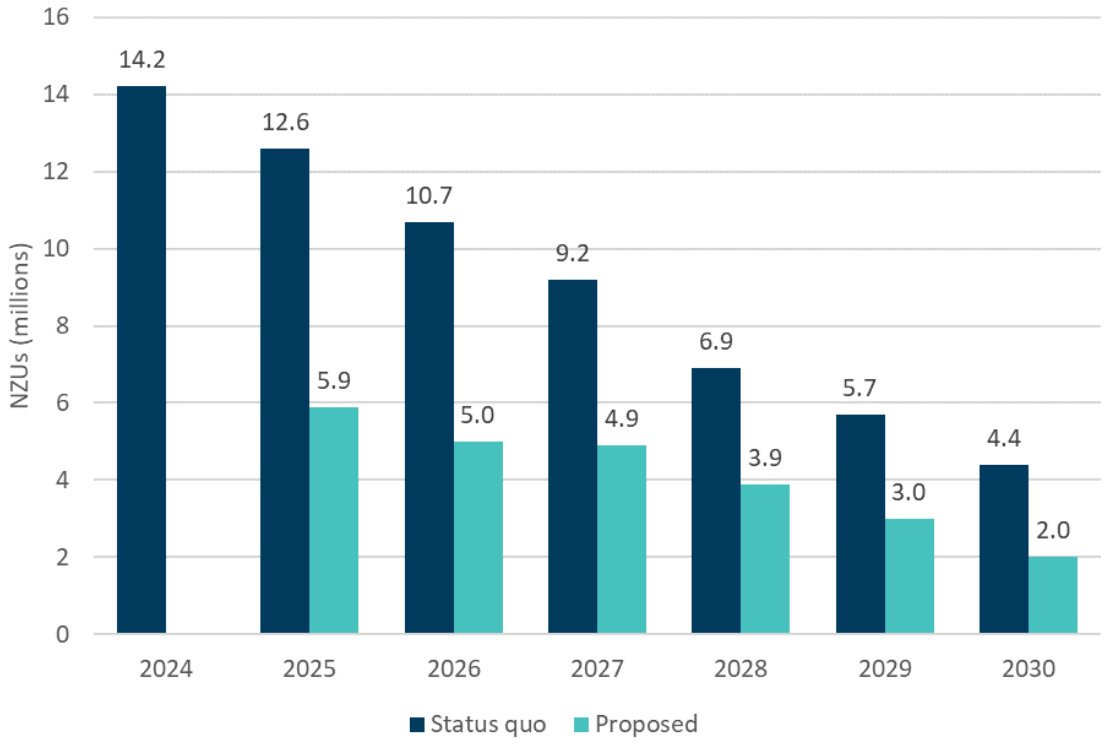
		Updated recommendations[25]					For visibility
		2025	**2026**	**2027**	**2028**	**2029**	**2030**
Step 1.	Align with emissions reduction targets	-3.0	-2.3	-2.1	-1.4	-1.3	-1.6
Step 2.	Allocate volume to non-NZ ETS sectors	-1.1	-1.0	-0.9	-0.9	-0.9	-0.9
	Allocate volume to NZ ETS sectors (NZ ETS cap)	-1.9	-1.3	-1.1	-0.4	-0.4	-0.7
Step 3.	Technical adjustments	-0.6	-0.6	-0.6	-0.6	-0.6	-0.5
Step 4.	Industrial free allocation	-0.2	-0.2	-1.0	-0.9	-1.0	-0.9
Step 5a.	Surplus reduction	5.5	5.1	4.7	4.1	3.9	3.2
Step 5b.	Discrepancy adjustment	-0.0	-0.0	-0.0	-0.0	-0.0	0.0
Step 6.	Approved overseas units	0.0	0.0	0.0	0.0	0.0	0.0
Step 7.	**NZU auction volumes**	**-6.7**	**-5.7**	**-4.3**	**-3.0**	**-2.7**	-2.4

[24] The current unit limit regulations are set out in Schedule 3 of the *Climate Change (Auctions, Limits, and Price Controls for Units) Regulations 2020* available on the New Zealand Legislation website: www.legislation.govt.nz/regulation/public/2020.

[25] Year 2029 is not covered by the current regulations. The difference shown in this column is the difference between this year's proposed auction volumes and the auction volume that would result from extending our 2023 NZ ETS settings advice out a further year.

Figure 6 shows the auction volumes resulting from current regulations compared to our updated proposed auction volumes.

Figure 6 Auction volumes resulting from current regulations versus the updated proposed auction volumes



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