Adrift: What future does the Emissions Trading Scheme have?

August 2026

Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

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Contents

Pause for reflection 7

He wā mō te āta whakaaro 9

Introduction 11

History and context of New Zealand's Emissions Trading Scheme 13

Forestry rules in the NZ ETS and the risks they create 21

Current supply and demand issues in the NZ ETS 36

Modelled future(s) of the NZ ETS: What might the NZ ETS achieve? 39

The NZ ETS and New Zealand's climate targets 52

Domestic costs and risks from the current NZ ETS 55

Considerations for managing future NZ ETS-driven risk 60

Recommendations 68

References 73

Bladder fern, *Cystopteris tasmanica*

Pause for reflection

Just after this report was finalised, images of Europe on fire started to appear in our media. As the weeks passed, it just got worse and worse. Having lived in France for the best part of two decades, the horror was not just something far away. I have run thousands of kilometres of trails in and around Paris – the Île-de-France, as it is known. Despite sheltering 12 million inhabitants, it is filled with green spaces, many of them old royal hunting domains. It is a remarkable place with a heritage that spans back to Neolithic times.

To see 2,000 ha of the Fontainebleau forest, 30 km south of Paris, burning seemed apocalyptic. This is a forest I have run through many times. The area of the blaze is very sandy country that used to be heath. It now supports stands of Scots pines. Scots pines are not native to France – they were introduced in the eighteenth century.

Much larger areas of forest have been burning to the west of Bordeaux and in the vicinity of Madrid. Successive heatwaves have broken all records. This is climate change exacting a devastating toll. And fire is just one of the risks climate change poses to the standing stock of carbon we add to annually instead of reducing our gross emissions.

The images have re-aroused in me the unease I felt while talking to East Coast hill-country farmers watching neighbouring parcels of land disappear under permanent carbon forestry, almost all of it pine. I have listened to farmers wonder aloud about whether volunteer rural fire brigades will be there to defend unmanaged forests planted by distant owners on behalf of equally distant emitters. As a rural New Zealander, this is the sort of thing that keeps you awake at night.

I also feel some sense of responsibility. As a climate minister in the 1990s, I was one of those who argued strongly for a net approach to climate mitigation. It seemed to make perfect sense. It's what the atmosphere saw that mattered. A molecule of CO_2 captured in a tree was thought to be as good as a molecule not emitted.

Given that we didn't have cheap, easily available technologies to solve our carbon emissions back then, tree planting seemed an economical and responsible thing to do while we waited for the technologies that techno-optimists assured us would emerge. And they have. Thirty years on, those technologies are available (thanks largely to China) on a scale and at prices unimaginable back then.

But their rollout has been slow, mostly because our attempts to price carbon through an ETS have been blunted by ongoing tree planting. Allowing forestry into our ETS from its inception has enabled us to kick the can down the road and pass liabilities to future generations. We didn't think hard enough about what maintaining these forests over decades and maybe centuries could mean.

What has happened has happened. The question we need to ask ourselves is whether the ETS is any longer the right place for forestry given the scale of land use change we are driving.

Simon Upton

Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

Bladder fern, *Cystopteris tasmanica*

He wā mō te āta whakaaro

I muri tata i te otinga o tēnei pūrongo, i puta mai ētahi pikitia o Ūropi, e toro nei te ahi i runga i ōna whenua, i ō tātou pāhotanga i konei. Nō te takanga o ngā wiki, ka hē kē atu te āhua o ngā ahi. I noho au i Wīwī mō tōna rua tekau tau, nā reira ki ahau ehara tēnei mataku i te raruraru i te tawhiti noa iho. Kua oma au i te hia mano kiromita i ngā ara omaoma huri noa i te tāone nui o Parī – te Île-de-France, tōna ingoa i reira. Ahakoa 12 miriona te hunga noho i reira, he nui tonu ōna ngahere, ko ētahi he ngahere whaiwhai kararehe nō ngā kīngi, kuīni o mua. He wāhi whakamīharo, ko ōna taonga me ōna kōrero tuku iho ka hoki ki te tīmatanga mai o te ao kōhatu.

I taku kitenga i te 2,000 heketea o te ngahere o Fontainebleau e kā ana, 30 kiromita ki te tonga o Pārihi, ko taku whakaaro ko te mutunga pea tēnei o tērā ao. He ngahere tēnei e hia kē nei aku omanga i roto. He onepū te whenua i raro, he raorao pātītī i mua. Ināianei, he maha ngā paina Kotimana i reira. Ehara ngā paina Kotimana i te paina taketake o Wīwī – i kawea kētia mai i tāwāhi i te rautau tekau mā waru.

Kua kā hoki ētahi atu wāhi ngahere ki te hauāuru o Bordeaux, ki te takiwā hoki o Mātiri i Peina. Kua hinga katoa ngā rekoata i ngā whiunga wera pūputu o te tau. Ko te panonitanga āhuarangi tēnei e whiu nei i te tangata me te kino o te pānga. Kia mahara, ko te ahi tētahi mōrea kotahi anake o te huhua o ngā mōrea o te panonitanga āhuarangi ki te pūranga waro e tāpiritia nei e tātou ia tau, me tō tātou wareware ki te whakaheke i ō tātou puhanga waro tōpū.

Nō taku kitenga i ngā pikitia rā ka oho ake anō aku āwangawanga i aku kōrerotanga ki ngā kaiahuwhenua o Te Tai Rāwhiti i Aotearoa, i ngā pāmu hiwi o reira, e mātaki ana ki ngā whenua i ō rātou taha e horomia ana i raro i te mahi whakatō ngahere waro, ko te nuinga, he paina. Kua rongo au i ngā kaiahuwhenua e pātai ā-waha ana mehemea ka kaha ngā kaipatu ahi tūao o te tuawhenua ki te wawao i ngā ngahere kāore i te whakahaeretia, nā ngā rāngatira i tawhiti i whakatō, mō ētahi kaituku waro i tawhiti. Hei tangata o te tuawhenua o Aotearoa, koia ēnei ngā āwangawanga whakararu i tōu moe i te pō.

Kei te noho haepapa hoki au i roto i taku ngākau. He minita āhuarangi ahau i ngā tau mai i 1990, ā, ko ahau tētahi i kauhwhau tikanga kia tū he pūnaha moni noa iho hei kaupare i te panonitanga āhuarangi. He tino tika ki te whakaaro o te tini i taua wā. Ko te mea whai kiko ko ngā mea puta ki te rangi i te mutunga. He rāpoi ngota CO_2 i mau ki tētahi rākau he rite tonu te hua ki tētahi rāpoi ngota kāore i tukua ki te rangi.

Kāore ō tatou hangarau ngāwari te utu, tino wātea hoki ki te tangata hei whakatika i ā tātou tukunga waro i taua wā, ko te whakatō rākau, ki te titiro i aua wā, te ara tika ā-ōhanga, ā-haepapa mō mātou, i a mātou e tatari ana ki ngā hangarau ka puta, me te kī mai o ngā tāngata whakapono ki te hangarau, meāke ka puta. Ināianei kua puta mai. Toru tekau tau i muri mai, kua wātea mai aua hangarau (me whakamoemiti ki a Haina, mō te nuinga), te tini noa, te ngāwari hoki o te utu, kore rawa e whakaponotia i mua.

Engari he pōrori tonu te putanga mai, mō te nuinga, nā te mea ko ā tātou ngananga ki te whakarite utu mō te waro kua whakapuhukitia e ngā mahi whakatō rākau, e haere tonu nei. Nā te whakaae kia uru mai te mahi whakatō ngahere ki tō tātou ETS, mai i tōna tīmatanga, ngāwari noa tā tātou whana i te raruraru ki ngā whakatupuranga o āpōpō. Kāore tātou i kaha rawa ki te whakaaro mō te tikanga o te tautiaki i ēnei ngahere i roto i ngā ngahuru tau, me ngā rau tau pea.

Kua pā mai ngā āhuatanga kua pā. Ko te pātai pea mā tātou ināianei, mehemea he tika tonu kia noho tonu te mahi ngahere ki te ETS, ina tirohia te rahi o ngā panonitanga whakamahinga whenua e kōkiritia nei e tātou.

Simon Upton

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Te Kaitiaki Taiao a Te Whare Pāremata

Rough filmy fern, *Hymenophyllum scabrum*

1 Introduction

This report is a call to action. The New Zealand Emissions Trading Scheme (NZ ETS) is essentially rudderless. It has broken its policy moorings and is heading for the rocks. It is at risk of being swamped by unit supply. Yet the Government does not have the levers to effectively manage that supply nor to steer the NZ ETS towards achieving New Zealand's climate targets.

These issues have been apparent for some time, but the need to address them is becoming increasingly urgent. The scale and complexity of what is at stake, however, makes it very difficult to even commence a conversation let alone propose solutions. That has to change, and change soon, if New Zealand is to avoid outright policy failure leading to dashed expectations and a costly upheaval. Avoiding the problem won't make it go away. It will simply make it harder and more costly to solve.

The NZ ETS was only the second greenhouse gas emissions cap-and-trade scheme to be established globally and the first to attempt to cover, progressively, all sectors and all gases.

The history of the NZ ETS has been punctuated by constant review, amendment and deferral as policy makers sought to refine the scheme to match the challenges it faced or adjust it to respond to political priorities. The scheme had barely been launched in 2008 before changes were made to soften its financial impact and adjust the extent of free allocations. Linkages to the international Kyoto market led to a large influx of international units depressing prices and necessitating further modifications. Subsequent changes were designed to assert greater control over the supply and demand of units with the introduction of an auctioning mechanism and a 'soft' cap to help bring down net emissions in alignment with domestic emissions budgets.

Despite – or possibly because of – these numerous changes, tensions exist within the design of the scheme. They essentially stem from an enduring murkiness at the heart of the scheme's purpose: Is it designed to reduce gross emissions, or is it merely a device to demonstrate net emissions reductions? The role of forestry and the continuing reluctance to include agricultural emissions in the scheme feature prominently in these tensions. This raises the higher-level question: How closely should the NZ ETS be linked with New Zealand's emissions reduction targets, either domestic or international?

Following on from my predecessor, I have on repeated occasions questioned whether the NZ ETS, as designed, is capable of playing a central role in helping to achieve New Zealand's climate targets. I have, in particular, drawn attention to risks that unlimited recourse to forestry units in the NZ ETS present now and into the future, calling into question whether, as a policy instrument, the NZ ETS even has a future in its current form. My earlier analysis can be found in a variety of office of the Parliamentary Commissioner for the Environment (PCE) documents,

including *Farms, forests and fossil fuels: The next great landscape transformation? (2019),*[1] submissions on the Government's emissions reduction plans (2024),[2] and a chapter in Parliamentary Commissioner Environment's in-depth report into forestry, *Alt-F Reset: Examining the drivers of forestry in New Zealand (2025).*[3]

None of my previous pieces of work were focused solely on the operation of the NZ ETS. Rather, they commented on the consequences of the NZ ETS's design for a variety of economic and environmental outcomes. Building on those earlier commentaries, this report focuses explicitly on the NZ ETS and its purpose and design.

The note's purpose is to put the NZ ETS front and centre, making it easier for parliamentarians and other policy makers to examine the issues facing the NZ ETS and to start a more informed conversation about its future: Can the NZ ETS continue on its current trajectory? If it does, what risks does that entail? What are some of the options for, and the implications of, changes to its design?

Competing views on the answers to these questions have led to the numerous legislative and regulatory revisions made to date. Strong contrasting beliefs remain about how the scheme should be configured to meet New Zealand's emissions reduction targets and, in particular, the role of forestry within the NZ ETS. That is not surprising. Many people share a sense of urgency about the need to combat climate change. Others may be less motivated to tackle the problem but need a tidy policy tool to communicate to trading partners and customers. Others again have strong financial interests in the scheme either because they want to manage the costs of their regulatory obligations to pay for their emissions, or because those with forestry interests have invested money on the understanding that carbon sequestration will yield a financial return.

This report is not 'anti-forestry'. Forestry was a successful and important industry long before the NZ ETS was created and it likely will be long after its demise. But the note's findings will be confronting to many with interests in forestry because forestry has become entangled in a policy not of its making. It has been relied upon to avoid making emissions reductions elsewhere. The way we treat forestry in the NZ ETS has created a number of risks and resulted in a scheme that is out of control. It will not meet anyone's goals. Forestry has a role to play in climate mitigation. Without the use of forestry, we would have no chance of meeting current or future climate targets. But in my view, forestry's role should be outside the NZ ETS.

The report begins by describing the context that has led the NZ ETS to take on the shape that it has today, to help readers understand why we have ended up where we have. It then looks at the risks that the current policy design creates and looks into the future, using some new modelling commissioned for this note, to assess how some of these risks might evolve. The report concludes by examining what we could change, including climate roles for forestry outside the NZ ETS, and calls for decision makers to establish a process to look at those options in greater detail.

1 PCE, 2019.

2 PCE, 2024.

3 PCE, 2025.

Green Bay kiokio, *Blechnum triangularifolium*

2 History and context of New Zealand's Emissions Trading Scheme

Basic design features

The NZ ETS is touted as the premier policy in New Zealand's climate mitigation toolbox. It was designed to put a price on carbon to encourage people to emit less and enable New Zealand to meet its climate targets. It was set up in 2008 under the Climate Change Response Act 2002 (CCRA), New Zealand's principal climate change law.[1] The purpose of the CCRA is to help meet New Zealand's international climate obligations, including under the Paris Agreement. The CCRA also sets out New Zealand's domestic 2050 target and associated emissions budgets. The purpose of the NZ ETS under the CCRA is to contribute to meeting all three of these – our international commitments, the domestic 2050 target and domestic emissions budgets.[2]

The NZ ETS helps reduce emissions by:

- requiring businesses to measure and report on their greenhouse gas emissions
- requiring businesses to surrender one 'emissions unit' (known as a New Zealand Unit or NZU for short) to the Government for each tonne of carbon dioxide equivalent (CO_2e) emissions they emit
- controlling the number of NZUs available to emitters (i.e. controlling the supply of units in the scheme) to maintain a carbon price that disincentives emissions
- incentivising afforestation as a way to offset emissions.

Businesses and people that participate in the NZ ETS can buy and sell units from each other. The price for units is determined by the market. In theory, this price signal allows businesses to make economically efficient choices about how to reduce emissions.

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1 The legislative basis for the NZ ETS is set out in the CCRA. The CCRA is 600 pages and has a whole part (Part 4) dedicated to running the NZ ETS (167 pages) and another whole part (Part 5) covering sector-specific forestry provisions (135 pages). Together they represent half the length of the CCRA. There is also secondary legislation, such as the Climate Change (Forestry) Regulations 2022, which runs to 125 pages.

2 CCRA, s 3(1)(b). While s 30GC(2)(a) of the CCRA was amended in December 2025 to remove the requirement for NZ ETS settings to accord with New Zealand's nationally determined contribution (NDC), the purpose of the NZ ETS was not changed.

Businesses in the following sectors must participate in the NZ ETS:

- Liquid fossil fuels (mainly petrol, diesel and aviation fuel used in domestic transport)
- Stationary energy (mainly fossil fuels used for heat and electricity generation)
- Industrial processes (such as making steel or aluminium)
- Waste (operating landfills)
- Synthetic gases (fluorinated gases used as refrigerants or in electrical switchgear).[3]

For most energy-related emissions, the point of obligation (i.e. the business that is required to measure and report its emissions and surrender units to cover its emissions) is set high in the supply chain. For example, fuel importers are participants in the NZ ETS with surrender obligations, not individual petrol stations or vehicle owners. The fuel importer will purchase enough units to cover the emissions from the burning of the fuel and then pass this cost down the supply chain so that all users 'feel' the price signal and reduce demand, hence reducing emissions. Major fuel users can opt in and take on surrender obligations themselves. For other sectors the point of obligation is at the point of emissions (unless designated otherwise).

Forestry's participation in the scheme is for the most part voluntary (although there are exceptions). How forestry works in the NZ ETS will be covered in more detail later.

Six greenhouse gases are covered by the NZ ETS:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Sulphur hexafluoride (SF_6)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs).

3 CCRA, sch 3.

All gases are accounted for in the same way, using CO_2e as the standard unit.[4] This allows the scheme to use a standard unit per tonne (NZU) for all the gases, even though each contributes a different amount of warming per tonne of gas. Small importers of synthetic greenhouse gases (mostly fluorocarbons used as refrigerants in appliances and cars) pay a levy instead of being required to participate in the NZ ETS.[5]

Despite the initial design intention of, and legislative provision for, the NZ ETS to cover "all sectors, all gases", this was never fully implemented.[6] The scheme has never placed a compliance obligation on biological gases emitted from agriculture despite their very large contribution to New Zealand's greenhouse gas profile. In CO_2e terms, the NZ ETS covers fewer than half of New Zealand's gross emissions. In 2024, it covered just 47% of emissions because of agriculture's exclusion.[7] The deadline for agriculture's entry was deferred repeatedly, then cancelled after intense sectoral lobbying. As a consequence, the scheme does not cover the majority of New Zealand's biogenic methane or nitrous oxide emissions despite contributing approximately 42% and 8% respectively of New Zealand's overall gross emissions profile (when expressed as CO_2e).[8] There is an active debate about whether it is fair or sensible to include short-lived gases like methane in the same NZ ETS as long-lived gases. However, even if agricultural methane is excluded, the NZ ETS still only covers around 80% of emissions of long-lived gases.[9]

How a 'cap-and-trade' ETS works

An emissions trading scheme (ETS) is an entirely artificial construct, created by legislation, that seeks to engage market mechanisms to reduce the amount of a pollutant being emitted.

The NZ ETS has features that are unique and diverge from how cap-and-trade schemes normally operate. For that reason, it is useful to briefly sketch the 'standard' model to provide a point of comparison.

In its simplest and purest form, an ETS works by creating a strictly limited number of 'permits to emit' (known as a 'hard' cap). The actual number of emissions permits available within the scheme is related to a particular emissions reduction goal. Over time, a regulator can reduce the number of available permits to emit by progressively lowering the 'hard' cap. In this way such a scheme is able to reduce gross emissions over time.

While the legislator may, as a matter of policy, decide to allocate some permits administratively, others may be auctioned. Once in circulation, permits are then tradeable in the open market, with participants setting the price by their willingness to pay and emit rather than reduce emissions.

An ETS can also be used to manage net emissions. A more complex ETS design might allow permits from units from activities that reduce or remove emissions to circulate in the market alongside emission permits. Such removals are usually justified on the basis that a tonne of carbon sequestered (say in a tree) offsets the climate impact of a tonne of carbon emitted

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4 CO_2e, in relation to greenhouse gases, equates to the amount of CO_2 (in tonnes) that would produce the same global warming impacts as a tonne of the gas in question over a 100-year period, calculated in accordance with international climate change obligations. Global warming potential over 100 years (GWP100) values from the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) are used (IPCC, 2015).

5 CCRA, Part 7, 'Synthetic greenhouse gas levy'.

6 Richter and Chambers, 2014, p.58.

7 Expressed as CO_2e (MfE, 2026c, p.4). The aptness of the use of the GWP100 metric to calculate the CO_2e of methane is subject to debate, with some scholars proposing an alternative GWP* metric, which more closely models the atmospheric longevity of methane (a flow pollutant). However, the ability of GWP* to function as a metric (as opposed to a model) is questioned in the academic literature. Arguments exist on both sides, which will not be covered in detail here.

8 MfE, 2026b, p.151.

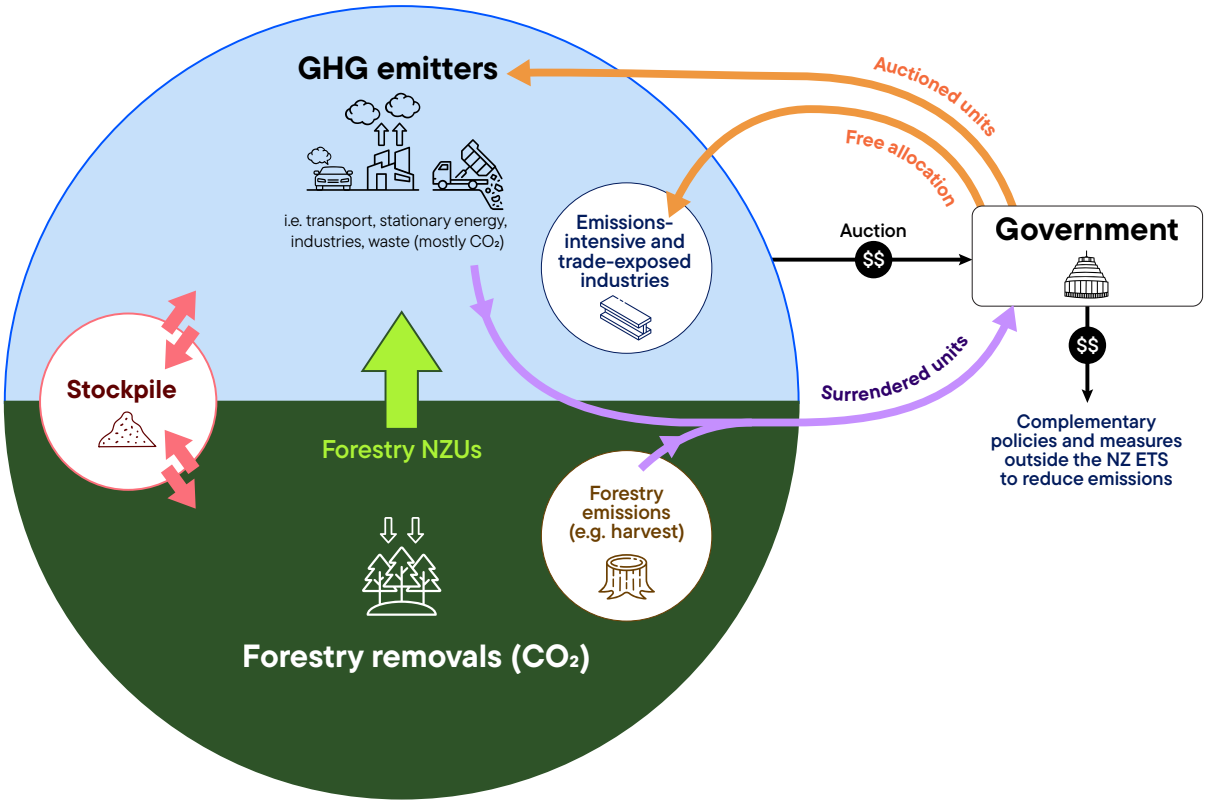
9 Calculations drew from He Pou a Rangi – Climate Change Commission's (CCC) 2026 NZ ETS settings advice, which details emissions inside and outside the NZ ETS (CCC, 2026a). This spreadsheet is available on the CCC website (www.climatecommission.govt.nz/assets/ETS-advice/2026/Supporting-spreadsheet-2026-NZ-ETS-settings-advice.xlsx). The calculations assume ~17% of agricultural emissions are long lived (i.e. N_2O and a smaller amount of CO_2), based on the 2026 New Zealand Greenhouse Gas Inventory (MfE, 2026b, p.151), which details 15.3% from agricultural soils (N_2O), 1.1% from urea application, and 0.6% from liming (both CO_2).

into the atmosphere.[10] This more complex design approach allows the setting of net emissions reduction goals as well. Provided that permits to emit do not exceed the cap, the ETS can still achieve the desired level of emissions reductions. In theory at least, the regulator could control the levels of either, or both, gross and net emissions. To control both gross and net emissions, the use of offsets and removals would need to be strictly limited, down to a given level.

But New Zealand's ETS is different

The original design of the NZ ETS took a different approach to other schemes as it focused primarily on net emission reductions. Not only did it include forestry, but the creation and use of forestry units is essentially unlimited. New Zealand is unique internationally in its treatment of forestry removals.[11] In other schemes that include 'offsets', they might represent either removals or reductions in gross emissions, and they come from sectors whose emissions are not covered by the ETS. The NZ ETS is the only such scheme in which forestry removals and emissions are both included.[12] Forests can generate NZUs for landowners as carbon is sequestered in trees, but landowners will have to surrender NZUs if carbon from the trees is lost.

The general design of the NZ ETS is shown in Figure 2.1.



Source: Parliamentary Commissioner for the Environment

Figure 2.1: Design of the New Zealand Emissions Trading Scheme.

10 The actual warming impact of the two may not align. For example, the albedo effect of some forests may negate the cooling impact of their carbon sequestration (Hasler et al., 2024, p.1).

11 The only other jurisdiction to similarly permit unconstrained carbon offsetting via afforestation is Kazakhstan, where the domestic ETS is at an earlier stage of implementation with an average carbon price of US$1 (Astana International Financial Centre, 2025).

12 "Uniquely to the NZ ETS, the forestry sector has both surrender obligations and the opportunity to earn units for emissions removals" (International Carbon Action Partnership, 2025, p.1).

The uncapped inclusion of forestry can be traced to the circumstances of the NZ ETS's design. In anticipation of a global carbon market operating under the Kyoto Protocol, the NZ ETS was designed so that NZ ETS participants could participate directly in trading of units from international offsetting arrangements (e.g. Clean Development Mechanism projects) and earn and trade removal units for land use, land-use change and forestry (LULUCF) activities. To take full advantage of those international rules and mechanisms, the NZ ETS as created in 2008 had no limit on the quantity of reduction and removal units that could be used, including from forestry.[13] Had the international carbon market envisioned by Kyoto developed as anticipated, forestry units would have been available to meet potentially unlimited international demand. However, that international market never eventuated as theory had hoped, with the result that the only demand for forestry units was from a much smaller domestic market.

By deciding to have no 'hard' cap on the number of forestry units that could be generated, the Government lost control over the supply of units in the NZ ETS and, as a consequence, had little influence over how any climate targets would be met. Up until 2014, there was also a flood of low cost international units entering and being surrendered in the NZ ETS by participants, including foresters, to meet their NZ ETS obligations.[14] The NZ ETS ended up allowing more international units to be purchased than New Zealand needed for its Kyoto commitment period targets. The surplus needed to be cancelled at the end of Kyoto commitment period 2, representing an unnecessary economic cost.[15]

13 Forestry removals could earn NZUs for use in the NZ ETS or these could be converted to Kyoto Protocol Units that could be traded internationally (MfE, 2007b, p.2).

14 Up until 2014, foresters had a repetitive arbitrage opportunity where they were able to register their forest in the NZ ETS and earn NZUs backdated to the start of the mandatory emissions reporting period, deregister by meeting their surrender obligations with international units, and then re-register and be issued with a fresh set of NZUs backdated again to the start of the mandatory emissions reporting period. They could then repeat this process multiple times. The Climate Change Response (Unit Restriction) Amendment Act 2014 closed this loophole.

15 MfE, 2023.

From 2008 to 2019, the Government opted to control the maximum price of a unit through the offer of a 'fixed-price option' set at $25 per tonne.[16] Companies could pay the Government directly to meet their surrender obligations rather than buy credits on the open market. Until 2017, non-forestry participants in the NZ ETS were additionally only required to surrender one unit for every two tonnes of CO_2e emissions.[17] This essentially set the maximum price any emitter needed to pay at $12.50 – and further uncoupled the NZ ETS from actual gross emissions reductions.

Unsurprisingly, these settings (coupled with some other design features of the NZ ETS) led to perverse consequences.[18] The carbon price dived below $5 per tonne and a large stockpile of NZUs accumulated in private accounts that could be used in future years.[19] With such a large stockpile, there was little or no incentive for any participants to reduce their gross emissions and only limited incentive to reduce their net emissions.[20] It was cheaper to keep emitting and buy cheap units from overseas or the stockpile.

In an attempt to gain some control over the supply side of the NZ ETS, in the mid- to late-2010s the Government made some major design changes. It banned the use of international units (from 31 May 2015), discontinued the one-for-two surrender discount (phased down over a three-year period, from 2017 to 2019), and in 2021 removed the fixed price option and started instead to auction government-issued NZUs at a level designed to erect an effective carbon price and to manage the NZU stockpile down over time.[21,22]

The quantity of units available for auction has, since 2021, been informed by technical advice from He Pou a Rangi – Climate Change Commission (CCC). To arrive at an appropriate number of NZUs to auction in a given year, the CCC relies on an intricate multi-step methodology. Importantly, the CCC considers the number of NZUs already present in the stockpile, and the number of units the Government expects to give away 'free of charge' to emissions-intensive and trade-exposed (EITE) industrial participants.

The total NZU volume to be auctioned is split across four quarterly auctions. Unsold units are carried over to later auctions within the same calendar year but do not transfer across years.[23] In this way, annual NZU volumes unsold after a December auction are effectively 'lost' from the scheme.[24] Auctions use price control mechanisms to prevent auctions clearing below prices on the secondary market, and a cost containment reserve to release additional units if demand raises prices sharply when bidding at auctions exceeds certain price thresholds.

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16 In 2020, a transitional $35 fixed price for an NZU was available, prior to the commencement of auctioning in March 2021.

17 The 50% unit cost increased to 67% from 1 January 2017, then 83% on 1 January 2018, with all sectors in the NZ ETS paying the full market price from 1 January 2019 (Bennett, 2016).

18 These included excluding agriculture from the NZ ETS, and keeping free allocations for so-called emissions-intensive and trade-exposed (EITE) industries at 90% rather than phasing them down as originally planned (the phase down was restarted in 2021). For more information see the Environmental Protection Authority (EPA) website (www.epa.govt.nz/industry-areas/emissions-trading-scheme).

19 CCC, 2024a.

20 The surplus has decreased in the CCC's most recent 2026 advice on NZ ETS unit limits and price control settings, to 29.7 million NZUs (from 50 million NZUs in December 2024). This decrease is primarily due to recent auctions failing to clear. Updated forestry projections from the Ministry for Primary Industries – Manatū Ahu Matua (MPI), which include estimates by year of planting of forests not likely to be harvested, have additionally narrowed the uncertainty range associated with the surplus estimate (CCC, 2026a, p.25 and p.64).

21 Bridges, 2013.

22 The fixed price option for present and future emissions was removed when auctioning began on 17 March 2021. For surrenders due in 2019, the $25 fixed price option remained available, and for surrenders due in 2020, a $35 fixed price option was included to assist the transition. See the Climate Change Response (Emissions Trading Reform) Amendment Act 2020, s 155, which amended s 178C of the CCRA.

23 From 1 January 2026, unsold units that roll over to the next auction are only sold if that auction first clears its newly offered volume. The change was made through the Climate Change (Auctions, Limits, and Price Controls for Units) Amendment Regulations 2025, reg 8, which amended reg 30 of the Climate Change (Auctions, Limits, and Price Controls for Units) Regulations 2020.

24 They are almost lost – the annual (re)calibration process takes into consideration the lost auction units, since the objective every year is to reach a designated zero surplus stockpile point in 2030.

By auctioning NZUs, the Government essentially introduced a 'soft' cap to the NZ ETS. It is 'soft' because there is no cap on gross emissions (given the unlimited supply of forestry units). The Government can control the number of NZUs it makes available for auction, however there is no quantitative limit on foresters registering in the scheme (and the number of units foresters might earn). Participants can bank units indefinitely with no control on when those units might enter the market from the existing stockpile.[25] This is where the design stands in 2026.

Beyond this basic overview, the NZ ETS has been the subject of a steady stream of changes. The CCRA has attracted 16 Amendment Acts over its 22-year lifespan. The result is a hybrid regulatory-economic instrument that is still immature, but at the same time, very complex. There remains considerable confusion and contention about how the NZ ETS should function. Many experts agree that further substantive changes are needed – even if they don't agree on what they are.[26] Public submissions on a review of just some aspects of the NZ ETS settings instigated by the Labour-led Government in 2023 detail a litany of issues – some fundamental to the stability of the NZ ETS itself. The review was abandoned by the succeeding government later in the same year, but the problems have not gone away.

Almost 30 years after New Zealand signed up to the Kyoto Protocol, many questions about the country's climate policy remain. Assuming we aim to meet our international obligations, how much do we want to do domestically? How much of a focus do we want on reducing gross emissions as opposed to net? And what role do we want the NZ ETS to play in this as opposed to complementary policies? The answers to these questions have large implications for what sectors the NZ ETS should cover and how much use of forestry units should be allowed.[27]

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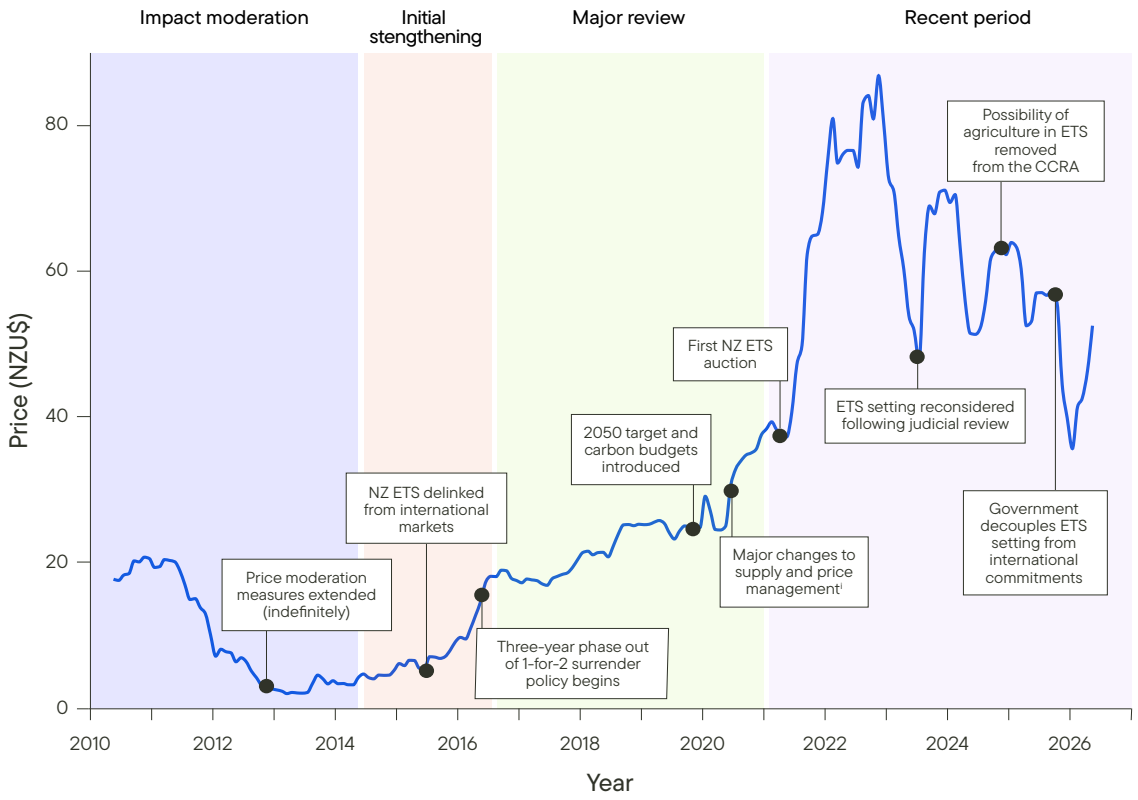
25 The Government can adjust auction volumes as an indirect control to take into account the anticipated supply of units from forestry and the stockpile. The Government reduced future auction volumes in 2024 (Watts, 2024) and limited NZ ETS afforestation on certain classes of land (McClay and Watts, 2024). It is yet to be seen how constraining those decisions will be.

26 Articles with experts expressing differing opinions include 'Five things wrong with the NZ ETS' (Hood, 2023), 'CCC warns of critical ETS oversupply' (Farmers Weekly, 2024), and 'Forestry groups welcome Emissions Trading Scheme reset' (Steele, 2024).

27 There were two consultations: A review of the NZ ETS consultation and the redesign of the NZ ETS permanent forest category consultation (Henare and Shaw, 2023). The Parliamentary Commissioner for the Environment lodged a submission covering both consultations, highlighting the need to consider the issues raised in each together (PCE, 2023b).

To conclude, it should be noted that, over the course of its life, the design of the NZ ETS has not been static. It has undergone some significant overhauls in the face of supply and demand crises. The result of these changes is reflected in the carbon price trajectory illustrated in Figure 2.2.



[i] Auctioning introduced, increased industrial free allocation phase out, forestry accounting rules changed.

Source: Based on data from Theecanmole (2026) and policy information from Leining (2026)

Figure 2.2: NZU price and timeline of major changes to the NZ ETS from 2008 to today.

Black shield fern, *Polystichum neozelandicum ssp. zerophyllum*

3 Forestry rules in the NZ ETS and the risks they create

How forestry is treated in the NZ ETS

The NZ ETS allows a tonne of fossil carbon released into the atmosphere to be traded for a tonne of carbon sequestered in trees.[1] The scheme issues NZUs that reflect this one-to-one equivalence in mass. Hence, for a forest registered in the NZ ETS, the forest owner is issued with an NZU for every additional tonne of carbon dioxide they sequester in their forest. The owner may choose to trade (sell) these NZUs, but the forest land must remain registered in the NZ ETS. Where the forest land is deregistered and/or deforested, the owner must repay back units equal to those earned (including any units sold). Harvesting the trees (other than those formally registered as permanent) is allowed provided that the forest is replanted. If a forest is deregistered or deforested, then credits received for the carbon stored in the trees must be surrendered.

The use of forestry removals, as allowed by the NZ ETS rules, means that some carbon dioxide emitting businesses today are effectively paying foresters to store their emissions in forests **permanently**. While trees can be replanted and replaced, the forests need to remain because the carbon dioxide they are offsetting stays in the atmosphere, contributing to warming for centuries to millennia. In terms of human lifespans, that amounts to a need for sequestration in perpetuity.[2] If businesses wish to continue to emit fossil carbon year after year rather than reducing the emissions themselves, afforestation will have to continue.

The rules for forestry in the NZ ETS are complicated, and that brings further challenges for managing supply and demand. Some of the key rules are set out below.

Pre-1990 and post-1989 forests

In line with international climate accounting established under the Kyoto Protocol, the NZ ETS treats forests planted before 1 January 1990 (pre-1990) and forests planted after (post-1989) differently.

Pre-1990 forests cannot earn NZUs for sequestration, but if the land is deforested (and not replanted elsewhere) it must be registered in the NZ ETS and NZUs surrendered for the lost carbon. Owners of pre-1990 forests were eligible to apply for an NZU allocation

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1 The carbon in the entire tree – including branches, trunk and roots – is included, as is the carbon in coarse woody debris. The carbon stored in the soil is not.

2 A small fraction of CO_2 molecules will take tens of thousands of years to be removed from the atmosphere (MIT Climate Portal, 2023).

up to November 2011.[3] This was to compensate for the loss of option value and other economic consequences of the NZ ETS for pre-1990 forest land.[4] Rotational harvesting of pre-1990 forest land is allowed, as is planting a new forest elsewhere to absorb the amount of carbon stored in any deforested pre-1990 land.[5]

In contrast, the participation of post-1989 forests (exotic or indigenous) in the NZ ETS is voluntary. If the owner registers the forest in the NZ ETS (provided it meets the eligibility criteria) NZUs can be earned for the carbon sequestered in the trees.[6] Post-1989 forests can be deregistered from the NZ ETS at any time, provided the credits earned are paid back.

The voluntary nature of registering and deregistering from the NZ ETS, and the variability of harvest times and deforestation intentions, make predicting the supply and demand of forestry credits difficult to do with any reliability.

Accounting – standard (rotational) vs permanent

Forests in the NZ ETS can currently be registered as either standard forestry or permanent forestry.

Standard forestry refers to forests that are managed as regular rotation clear-fell crops. For example, pine forests are typically harvested at around 28 years old. Instead of the forester needing to account for the large swings of carbon stored in the forests as they cycle through each rotation, standard forestry now uses averaging accounting to smooth out how much carbon is assumed to be stored in the forest in the long run across multiple growth and harvest cycles (Figure 3.1). This accounting approach makes it simpler for foresters to manage their carbon stocks through rotations by dispensing with the need for the alternating issue and surrender of units.

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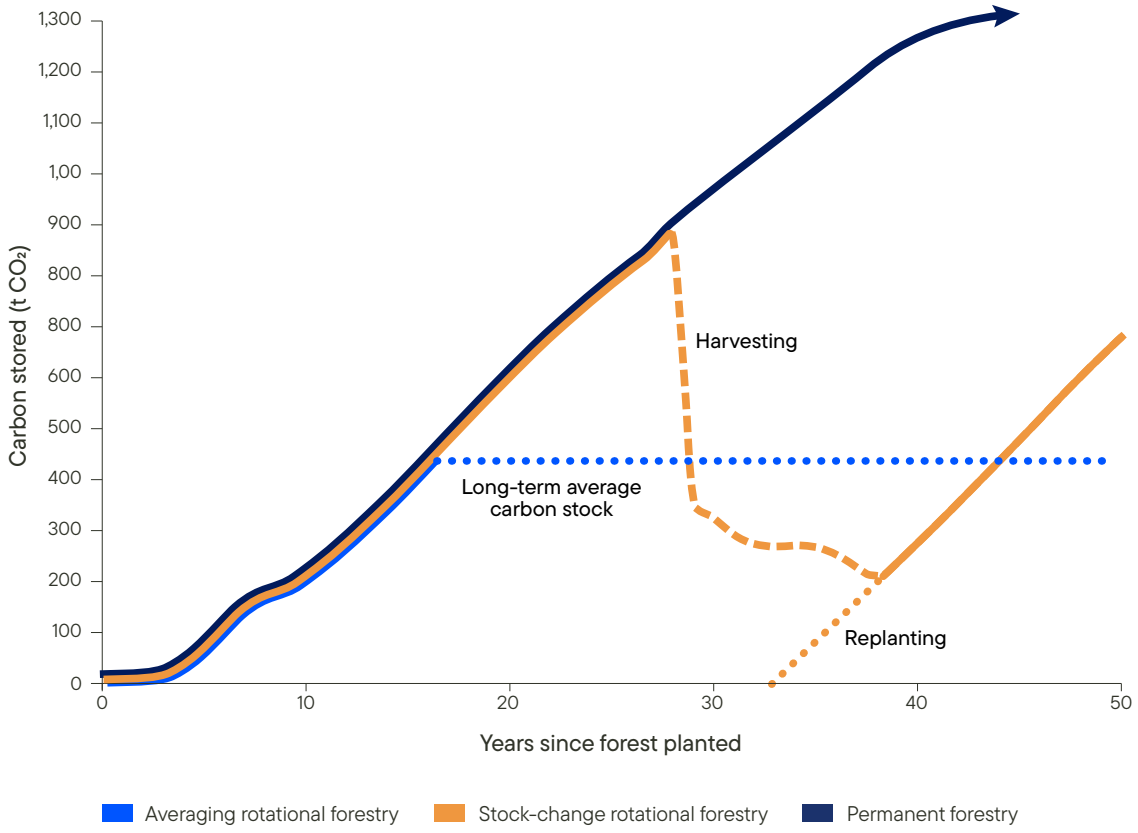
3 This was 60 NZUs per hectare if land was acquired prior to November 2002. The Government forecast that it would issue 55 million NZUs to pre-1990 forest land (Controller and Auditor-General, 2011). In the end, the Government issued 47.8 million NZUs (EPA, 2026a). This spreadsheet is available on the EPA website (www.epa.govt.nz/assets/FileAPI/Uploads/Documents/Emissions-Trading-Scheme/Reports/Unit-movement/ETS-Unit-Movement-Report-JUNE-2026.xlsx).

4 MfE (2007a, p.3) details some of the stakeholder responses to the proposed compensation.

5 MPI, 2026c.

6 The NZ ETS defines forested land as land that is one hectare in size and at least 30 m wide (on average). The land must have trees on it that are capable of reaching 5 m in height and creating a canopy over more than 30% of this area.



Source: Adapted from Leining (2026, p.19)

Figure 3.1: The total amount of carbon stored in a given area of standard rotational pine forest changes over time as it establishes, grows, is clear-fell harvested and then replanted again (the 'saw-tooth' shape').

- **Rotational forests on stock-change accounting earn credits as the forest grows (solid orange line) but have to repay credits when they harvest (dashed orange line), but only for the carbon lost. They start earning credits again once the replanted forest is gaining carbon again (second solid orange line).**
- **Forests using averaging accounting earn up to the average only (blue line) but face no liabilities on harvest providing they replant and do not deforest.**
- **Permanent carbon forests continue to earn as the trees grow (dark line). They cannot harvest and will only face liabilities if they deforest (or exit the scheme after 50 years).**

The **permanent forestry** accounting category (introduced in 2023) refers to forests that are registered in the scheme but are only intended to have limited harvesting.[7] These forests cannot be clear-felled and at least 30% of the canopy must remain at all times. Native or exotic trees are included and the carbon is accounted for under a stock-change approach, whereby units are issued as the forest grows and not averaged out. In this case, carbon units must be surrendered if the forest loses carbon at any stage (we will return to the stock-change approach in more detail below).[8]

7 The permanent forestry approach built on and replaced the Permanent Forest Sink Initiative (PFSI), which ran from 2006 to 2023.

8 Unless an exemption like the Temporary Adverse Events Suspension (TAES) rule applies – see Climate Change (Forestry) Regulations 2022, Subpart 8, 'Temporary adverse events'.

Another key difference between standard and NZ ETS permanent forests is that NZ ETS permanent forests cannot be removed for 50 years.[9] This is a curious definition of permanence. Fifty years bears no relationship to the length of time carbon must remain stored in the tree to offset carbon dioxide (some of which remains in the atmosphere over millennia).[10] Some foresters have pointed out that multiple rotations of clear-fell forests are already much older than 50 years.

NZ ETS permanent forests have the potential to store very large amounts of carbon. A typical rotationally harvested pine forest would earn between 205 and 410 tonnes of carbon per hectare when using the averaging approach.[11] If those same pine trees were in an NZ ETS permanent forest, at 50 years of age the forest could hold between 1,028 and 1,347 tonnes of carbon per hectare.[12] In contrast, a 50-year old native forest would only hold around 323 tonnes at 50 years and would not reach the levels of carbon that pine trees sequester for many more decades or centuries.[13]

The standard and permanent accounting methods have very different effects on afforestation incentives. For foresters looking to grow more trees for resource production (wood or fibre), entering a forest in the NZ ETS as a standard forest (using averaging accounting) will allow revenue to be earned over the first 16 years or so of growth. This revenue can help finance forestry operations in the short term when revenue from harvesting is not yet available. In this case, a prudent forester would still need to be considering supply and demand forecasts for whatever resources they intend to grow over the long term (multiple rotations) as well as how they manage any future carbon liability they might have.

For a landowner wishing to establish a forest who has little or no desire to harvest physical resources (wood or fibre) from the trees, the permanent forestry category provides the potential to accrue carbon units (and hence income) over a much longer period. This is a very different proposition. Entry to the NZ ETS could represent the bulk, or even all, of the income from the land for the long term. The returns will vary greatly depending on the type of forest that is established, the location of the forest, the price of land and the carbon price.[14] The amount of carbon stored will eventually peak and may even begin to fall. At this point the forest owner's revenue will cease.

Accounting – stock change vs averaging

Forestry accounting gets even more complicated because post-1989 forests registered before 1 January 2023 in the NZ ETS used stock-change accounting. If those forests have stayed registered in the NZ ETS, they continue to use stock-change accounting.[15] Stock-change accounting allows foresters to earn NZUs as the trees grow throughout their full rotation, but most of the credits earned must be repaid when the forest is harvested (the 'saw-tooth' shape in Figure 3). Once the next rotation of trees is replanted, the forester can earn NZUs once the carbon stock in the forest starts increasing again.

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9 If, after 50 years, the 'permanent' forest is deforested, the NZUs earned for carbon stored in the tree need to be paid back as it would for other NZ ETS forestry types (MPI, 2026b).

10 Fifty years was not chosen because of any climate-related reason – rather, 50 years was used as Māori land provisions under Te Ture Whenua Maori Act 1993 limited long-term leases to 52 years. Picking a longer timeframe (e.g. 75 years or 100 years) would prohibit participation of that Māori land (Te Uru Rākau – New Zealand Forest Service, 2018, p.38).

11 Carbon sequestration in radiata pine varies by region. The Canterbury and West Coast regions of the South Island have the lowest rates and Gisborne in the North Island has the highest. See Climate Change (Forestry) Regulations 2022, Schedule 4, Table 1, 'Carbon stock per hectare for *Pinus radiata* by region'.

12 Climate Change (Forestry) Regulations 2022, Schedule 4, Table 1, 'Carbon stock per hectare for *Pinus radiata* by region'.

13 Climate Change (Forestry) Regulations 2022, Schedule 4, Table 2, 'Carbon stock per hectare for Douglas fir, exotic softwoods, exotic hardwoods and indigenous forest'. It is worth noting the current NZ ETS look-up tables on which this number is based mean this is likely an underestimate, and does not take into account the many different types of native forests. Work is underway, contracted by MPI, to improve the tables. But the point that there is a large mismatch between carbon sequestration in pine versus native forests remains valid.

14 Administrative charges, including entry fees and annual charges for participating in the NZ ETS, also erode carbon farming revenue. These fees have been subject to considerable change, including a recent review, which reduced service fees and charges for forestry from the 1 July 2026 (McClay, 2024; MPI, 2026d).

15 For forests registered between 1 January 2019 and 31 December 2022, there was a one-off opportunity in 2023 to choose to remain on stock change or move to averaging.

Many of the forests still on stock-change accounting were planted for their timber resource and their owners will most likely continue to operate them as rotational forests with regular harvesting and replanting cycles. However, they do not have to. They could decide – depending on carbon prices, timber prices, and harvesting and transport costs – that it is more financially advantageous not to harvest the trees at the normal 'commercial' time, turning the forest into a *de facto* permanent forest. By forgoing harvest, they continue to capture carbon revenues as the trees grow past the usual harvesting age of 28 years.

Under current NZ ETS rules, there is nothing to stop this happening and nothing to require the forest owner to register the forest as a permanent forest. Unlike forests registered in the NZ ETS as 'permanent', these stock-change forests do not have to comply with the same rules as a formally registered permanent forest (i.e. they do not need to remain in permanent forestry for 50 years, and following any clearing there is no need for more than 30% of tree crown cover to remain in each hectare of forest).

The differential rules between stock-change and averaging accounting and how they apply creates further complications in estimating future supply and demand of forestry units in the NZ ETS. As we will see later, any attempts to model the NZ ETS rely on assumptions about how many rotational forests currently on stock-change accounting choose to be *de facto* permanent. This can greatly affect estimates of the amount of land that might be converted to forestry under the NZ ETS as well as projections of the future supply and demand of NZUs.

How much and what kind of forestry is the NZ ETS incentivising?

Pricing the carbon stored in forests both discourages the removal of existing forests and encourages the planting of new ones.[16] Any assessment of how much afforestation the NZ ETS is incentivising needs to consider what land-use change might have occurred in the absence of the NZ ETS. Making such an assessment is challenging because many other drivers are influencing land-use changes over time. Without the NZ ETS, the total forest estate may have shrunk. For example, the huge number of planted forests established in the 1990s might have been harvested and the land used for other purposes instead of being replanted in pines. Conversely, the forest estate might have expanded if increased demand for wood and fibre drove afforestation in areas previously considered economically unviable for forestry.[17]

In 2024, forests covered 10.3 million hectares (38.1% of New Zealand's total land area) compared with a total forested area of 9.4 million hectares in 1990, representing a 9.6% increase (894,000 hectares) over 34 years.[18] Most of these (8 million hectares) are native forests located on Crown and private land as well as whenua Māori. The remaining 2.3 million hectares have been planted, of which 1.8 million hectares are 'production forests', mostly in *Pinus radiata*. Since 1990, the size of the exotic forestry estate has changed from 1.3 million hectares to 1.8 million hectares – a 38% increase.[19]

The NZ ETS can take credit for much of this increase, certainly in recent years. Immediately prior to the creation of the NZ ETS there was a brief bout of deforestation as landowners looked to avoid pre-1990 obligations. Since the NZ ETS began in 2008, there has been a strong positive correlation between the price of carbon and the rate of exotic afforestation.[20] In recent years, afforestation has been at near historically high rates (see Figure 4). The establishment of new exotic forests has dominated this afforestation effort, with native forests forming a small proportion of the overall increase.

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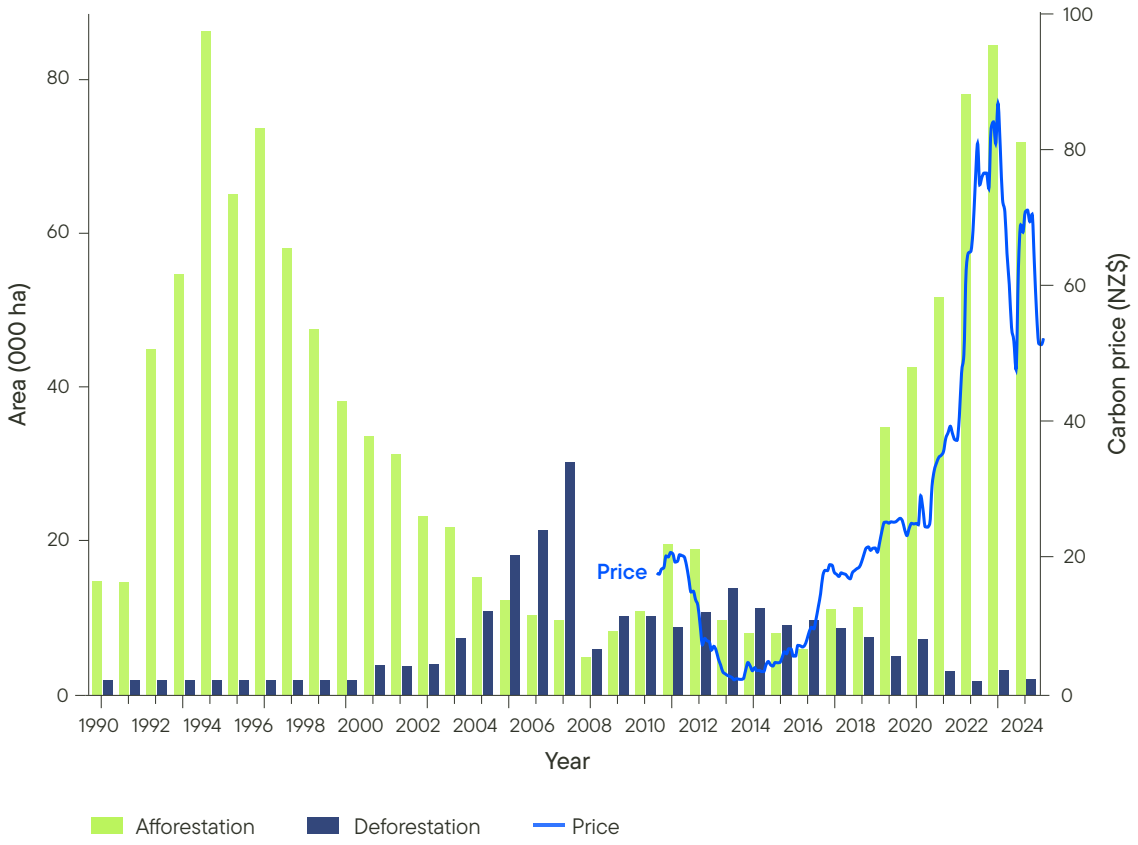
16 The NZ ETS also encourages landowners to store more carbon in existing forests, but only in those that can receive further credit for these gains (i.e. post-1989 forests). Pre-1990 forest owners are not incentivised to increase (or even maintain) existing carbon stores in their forests.

17 The area of older, pre-1990 natural forests might have shrunk further without the carbon liability of deforestation. Natural forests are mostly areas of existing native forests, but can include areas where exotic species have self-sown and are managed as a forest.

18 MfE, 2026b, p.276.

19 2025 National Exotic Forest Description (NZFFA et al., 2025). The spreadsheet is available on the MPI website (www.mpi.govt.nz/forestry/forest-industry-and-workforce/forestry-wood-processing-data/new-zealand-forest-data).

20 Similarly, there has been a downturn in the amount of deforestation occurring. There was a large pulse of deforestation just prior to the start of the NZ ETS as forest owners deforested to avoid potential future carbon liabilities (MfE, 2026b, pp.280–281).



Source: Data from the New Zealand Greenhouse Gas Inventory (MfE, 2026b, pp.277–281), NZU prices from Theecanmole (2026)

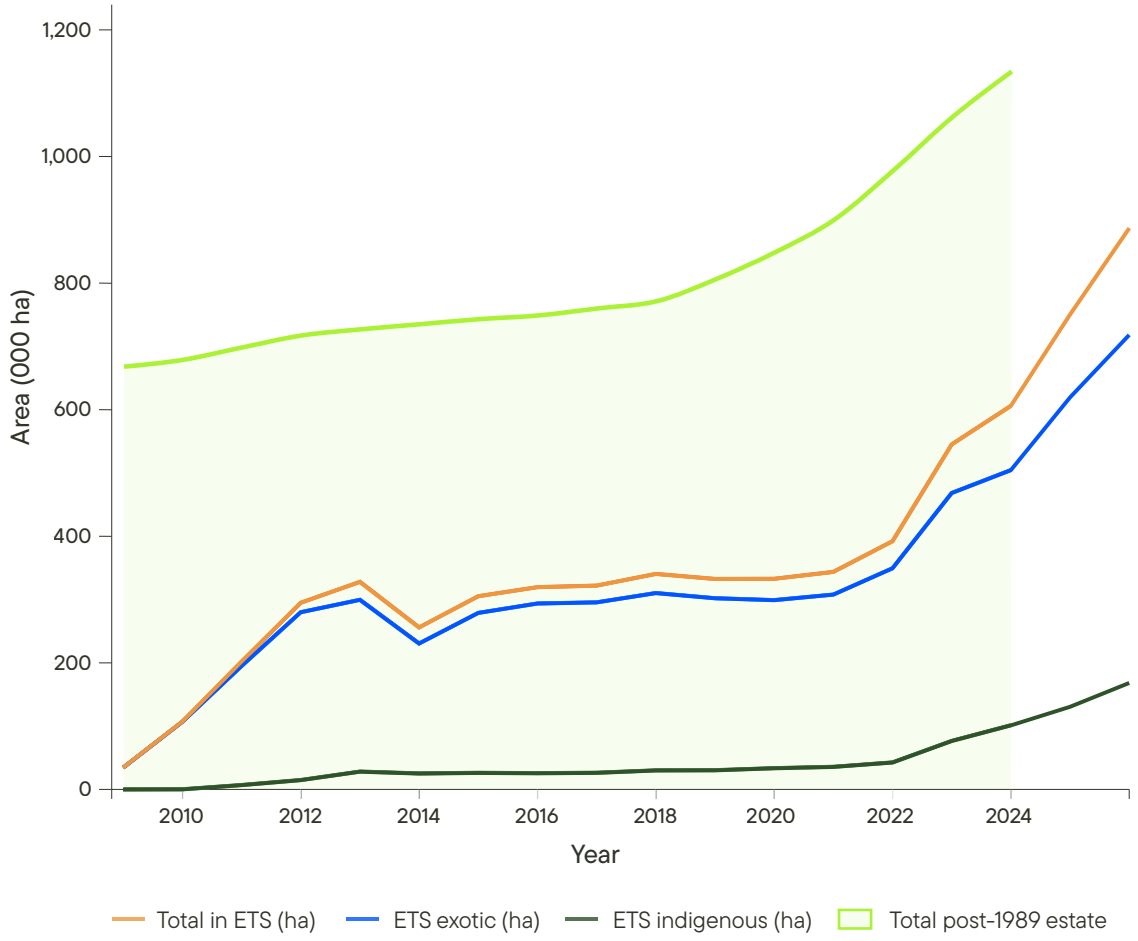
Figure 3.2: Afforestation rates over the last 30 plus years have fluctuated greatly. Afforestation in the 1990s was driven primarily by the commercial returns from the trees' timber and fibre. Rates since the NZ ETS began have also varied, often in reaction to Government announcements about the NZ ETS. The planting boom over the last five years or so correlates with a high NZ ETS carbon price driving afforestation.

Not all post-1989 forests are registered in the NZ ETS. The voluntary nature of participation for post-1989 forests has meant that the amount of forestry in the scheme reflects commercial decisions. The actual amount registered has varied considerably. The New Zealand Greenhouse Gas Inventory shows 40% of the total planted forest estate is classed as post-1989 forest.[21] At present, about three quarters of the post-1989 exotic-planted forest (720,000 hectares) was registered in the NZ ETS in June 2026.[22] The proportion of the post-1989 planted forest estate registered in the NZ ETS has risen over recent years (Figure 5). The vast majority of forests in the NZ ETS are exotic trees: 70% is *Pinus radiata* and 11% is predominately Douglas fir.[23] Notable is the increase in native forests registered in the NZ ETS in recent years – now 19% of all NZ ETS registered forests.

21 MfE, 2026b, p.277.

22 There are some caveats to when using NZ ETS data and Greenhouse Gas Inventory data together to create a unified understanding. The Greenhouse Gas Inventory data are always slightly out of date, being published two years after the most recent data the inventory includes. In comparison, NZ ETS data are more recent. There are also slight definitional discrepancies between the two sources for post-1989 forest land, as well as differences in the level of granularity that can be observed and reported. They can be used together to give a sense of broad trends (MPI, 2026a). The spreadsheet is available on the MPI website (https://www.mpi.govt.nz/dmsdocument/70981-Detailed-statistics-on-post-1989-forest-land-registered-in-the-ETS).

23 MPI, 2026a. The spreadsheet is available on the MPI website (https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.mpi.govt.nz%2Fdmsdocument%2F70981-Detailed-statistics-on-post-1989-forest-land-registered-in-the-ETS&wdOrigin=BROWSELINK).



Source: Data from Te Uru Rākau – New Zealand Forest Service (MPI, pers. comm., 18 June 2026) and the New Zealand Green House Gas Inventory (MfE, 2026d)

Figure 3.3: Amount of exotic and native post-1989 forest registered in the NZ ETS each year since the scheme's inception. There has been a sharp increase since 2022. Not all forests established since 1989 have chosen to enter the scheme, although an increasing proportion has over time. The amount can vary because entry and departure are voluntary. Note: there is a two-year lag in total forest area data from the GHG inventory. The total post-1989 forest estate has likely increased further from afforestation in 2025 and 2026.

Amount of permanent forestry formally registered in the NZ ETS

As of June 2026, there were 140,000 hectares of permanent post-1989 forests in the NZ ETS, or 16% of all NZ ETS registered forests. The majority (84,000 hectares) are native forests. Of the remaining 55,000 hectares, over 40,000 hectares are *Pinus radiata*.[24] The amount of permanent forestry registered in the NZ ETS has increased, firstly as a result of the Permanent Forest Sink Initiative (PFSI), and again from 2023 when the NZ ETS permanent forest category was established.[25] In 2023, 1,100 hectares were registered in the NZ ETS as permanent forests (mostly transitioned from the PFSI), making up less than 1% of all NZ ETS registered forests.

The Ministry for Primary Industries – Manatū Ahu Matua (MPI) has commissioned surveys since 2012 and research in 2018 and 2024 to examine the deforestation and later afforestation intentions of foresters.[26]

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24 MPI, 2026a.

25 MPI, 2026b.

26 Manley, 2018, 2024b. Prior to MPI commissioning these surveys they were commissioned by the Ministry for Agriculture and Forestry, starting in 2006.

Prior to the 2020 survey, the focus was on the intentions of foresters to deforest production forests, with decisions sensitive to relative returns for conversions to sheep and beef farming and dairy farming. Some consideration of carbon price was included in these analyses – with lower levels of deforestation anticipated for higher future carbon prices in the 2018 survey.[27]

By the 2021 survey, intentions had demonstrably switched from deforestation to afforestation, with the survey recording new entrants into forestry directly motivated by the carbon price.[28] The changing incentive structure of the NZ ETS has also resulted in a structural shift from production forestry towards carbon forestry. This shift is reflected in the increase in forests managed as permanent as a percentage of exotic forests planted. In the 2021 survey, foresters intended to manage 16% of planted exotic forestry as permanent in 2022.[29] In the latest 2024 iteration of the survey, which looks at intentions for 2025, 20% of exotic forests planted are intended to be managed as permanent.[30] The Government's 2025 projections show the proportion of new forestry plantings managed as permanent rising to 34% by 2026.[31]

The number of forests being managed as permanent is greater than the proportion formally registered in the NZ ETS as permanent because it includes both forests registered as permanent and stock-change forests that forgo harvesting. As noted earlier, forests registered in the NZ ETS prior to 2023, which use the stock-change accounting method, are permitted to become *de facto* permanent without any formal registration or declaration.

27 Manley, 2019, p.8.

28 Manley, 2022, p.10.

29 Manley, 2022, p.8. Permanent forest as defined in the intentions survey is forest not intended for clear-fell harvest. Note that this does not necessarily mean that growers who adopt permanent forestry in the survey will choose the NZ ETS permanent forestry option (Manley, 2022, p.5).

30 Manley, 2025, p.8.

31 MfE spreadsheet 'New Zealand Emissions Trading Scheme Market Model' – distributed on request (MfE, 2026a).

Risks created by NZ ETS forestry rules

The use of forestry in the NZ ETS creates a number of risks. This section revisits some of the risks I have raised in previous documents.[32]

Is permanent really permanent?

First and foremost, since 2019, I have questioned the long-held belief in the equivalence between a tonne of carbon emitted by burning fossil fuels and a tonne of carbon stored in trees. This is the fundamental premise underpinning the Kyoto Protocol and the NZ ETS. As an accounting exercise, it appears attractive. In the real world, it is flawed.

Any forests used to offset carbon emissions need to exist in perpetuity. However, threats to forestry permanence come from fire, disease, insect outbreaks and extreme weather events. Threats also come from human mismanagement or changing management incentives. For this reason, forestry removals are referred to as 'temporary carbon offsets' in the international carbon literature.[33]

The prudence of this definition can be illustrated using New Zealand examples. Significant forest fire events since 2019 include the Pigeon Valley wildfire in Nelson and the Pōrangahau fire in Hawke's Bay. Combined, it is estimated that these fires burnt through over 2,500 hectares of forest.[34] The trees in these forests could have held as much as ~700,000 tonnes of carbon.[35] It remains unclear how much of this was released back into the atmosphere by the fire itself. While 700,000 tonnes of carbon is relatively minor in the scale of global wildfire events, this represents 17–35% of the buffer the Government currently estimates it has between meeting or not meeting its second emissions budget.[36]

If the risk to forestry permanence from fire, disease, insect outbreaks and extreme weather events was static, that would be one thing. But the risk posed by each of these threats is evolving with the warming climate.

A meta-analysis of attribution studies, which included 50 articles examining the impact of climate change on wildfire risk, found 90% of examined fires were made more severe as a result of climate change.[37] The annual area of tree cover destroyed by wildfires globally is now double what it was two decades ago,[38] and fire has recently dethroned agriculture as the leading cause of tropical primary forest loss (accounting for around 50%).[39]

Outside of wildfires, other abiotic factors, such as drought and heat events, are becoming more extreme under changing climatic conditions.[40] A 2026 study of silver fir found that extreme climatic events explained a major part of the species' mortality.[41]

Climate change is also implicated in worsening the severity of biological risks to forests. In several instances, increases in tree insect and disease occurrence have been linked to local changes in climate. Warmer temperatures can enable insect populations to develop faster, reduce winter

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32 These risks have also been explored in more detail in *Alt-F Reset: Examining the drivers of forestry in New Zealand* (PCE, 2025).

33 Cullenward et al., 2023, p.1086.

34 Dudfield, 2019; Cook, 2025.

35 Based on the carbon stored in 16-year-old forest in the default tables of carbon stock per hectare for post-1989 *Pinus radiata* forest. Specifically, the 2,300 ha burnt in Pigeon Vally was multiplied by a value of 260 t CO_2/ha – the look up table value for Nelson. This was added to the 250 ha burnt in the Pōrangahau fire after this had been multiplied by a value of 398 t CO_2/ha– the look up table value for Hawke's Bay).

36 The current buffer is estimated to be between 2–4 megatonnes (Mt) of CO_2e (central estimate, with existing measures and with additional measures) (MfE, 2025b).

37 McSweeney and Tandon, 2026.

38 Kirk and Gutiérrez, 2026.

39 World Resources Institute, 2025.

40 IPCC, 2021, p.15 (para B.2).

41 Carletti et al., 2026, p.1.

mortality, and allow range expansion into higher latitudes and elevations.[42] In Canada, major work mapping the current and future climate niches of more than 4,000 forest pests and diseases (including invasive species not yet present) found evidence of increasing habitat suitability for some of the most damaging pests.[43] Given that pests and diseases are already responsible for damaging about 15 million hectares of forest annually in Canada (about 4% of its total forest estate), the future implications of a rise in impact from these pests are serious.[44]

Droughts can weaken trees' defences to pests too. In central Europe, drought-induced outbreaks of bark beetle have caused catastrophic forestry losses, transforming the forestry sector of the Czech Republic from an off-setter to a generator of greenhouse gas emissions from 2018 to 2021.[45] Germany also suffered from bark beetle-induced tree mortality, which spread through spruce monocultures, causing Germany to lose around 500,000 hectares of forest.[46] New Zealand cannot assume it is immune to any risk from insects or disease.

In some jurisdictions, insurance systems have been created that require ETS participants to contribute a specific percentage of carbon credits earned through afforestation to a so-called 'buffer pool'. In California, a portion of this buffer was intended to insure against losses due to wildfires. Despite the intention that this insurance system would cover wildfire risk for a period of 100 years, the fire protection portion of the buffer was exhausted in less than a decade.[47] Worse still, an apparent failure to acknowledge the increasing risk of wildfire suggests that "California's forest buffer pool is likely to experience mounting losses that far exceed its design criteria in the years and decades to come".[48] Importantly, California has limited forest offsets to 6% of the available traded units for the period 2026–2030.[49] New Zealand is running the same risks with no such limitations.

The Californian example paints a bleak picture, one that is occurring elsewhere too. Canada has recorded massive wildfires in recent years, driving forests towards becoming a carbon source rather than a sink.[50] While New Zealand is climatically different, fire risk is increasing.[51] Rather than using insurance or buffer pools, the design of the NZ ETS requires lost carbon to be regrown if a forest is temporarily damaged.[52] As long as foresters replant after an event, no liability for loss exists, thereby lessening the need for insurance. To help ensure that NZ ETS accounting does not disincentivise replanting, a Temporary Adverse Event Suspension (TAES) rule was introduced in 2023.[53] It is fraught with moral hazard (see Box 3.1). The Climate Change Response Amendment Bill introduced in July this year proposes additional administrative flexibility for forest re-establishment after significant disruptions.[54]

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42 Qiao et al., 2026, p.5.

43 Pedlar et al., 2025, p.4. An interactive tool based on this work is available on the Government of Canada website (https://cfs.cloud.nrcan.gc.ca/bmfid/).

44 Natural Resources Canada, 2023, p.43.

45 Cienciala and Melichar, 2024, p.2.

46 This occurred during the same time period as the outbreak in the Czech Republic (2018–2021). Germany is now unlikely to meet its carbon sequestration target for land (Greenfield, 2026).

47 The fire protection portion of the buffer was about one-fifth of the entire buffer (Badgley et al., 2022).

48 Badgley et al., 2022, p.10.

49 California Air Resources Board, no date.

50 There is a risk of continued wildfire disturbance turning Canadian forests from a carbon sink to a carbon source (Byrne et al., 2024; Curasi et al., 2026).

51 The average fire season length is extending and, in some locations, the number of days with 'very high' or 'extreme' fire risk will increase by up to 400% by 2040 (ESNZ, no date).

52 The Government has a Temporary Adverse Event Suspension (TAES) rule to help foresters delay liabilities while their forest regrows.

53 The TAES rule was introduced through the Climate Change Response (Emissions Trading Reform) Amendment Act 2020.

54 MCERT, 2026b.

Box 3.1: Temporary Adverse Event Suspension rule

In a nutshell, a Temporary Adverse Event Suspension (TAES) relieves the owner of a post-1989 NZ ETS forest of the requirement to surrender any NZUs to compensate for the loss of carbon due to an adverse event that temporarily damages their forest, provided that certain steps are taken to ensure recovery. Carbon liabilities and entitlements within affected areas are paused until the carbon stocks return to the level stored prior to the adverse event.[55] Only then can the forest owner recommence earning forest units. If a forest is affected by repeated adverse events, the accounting pause may be reset after each event.

This change was introduced to help incentivise afforestation by removing some of the need for participants to privately insure against adverse events. The scheme effectively amplifies moral hazard since foresters have reduced incentive to minimise the risk of carbon loss, something insurers would certainly not ignore.

The TAES rule effectively transfers risk to the Crown. However, the Crown has a general equivalent of the TAES rule in its nationally determined contribution (NDC) accounting (and emissions budgets) through natural disturbances provisions that limit this risk when it comes to meeting climate targets. Whether New Zealand would face international criticism if it ever tried to use the provisions is an open question.

The extent to which the TAES mechanism will impact on the functioning of the NZ ETS itself or the wider ability of the Crown to meet international commitments and reporting requirements remains to be seen.[56] No full assessment of the Crown's financial exposure was made during the development of the TAES mechanism.[57] Claims covering ~270 hectares in total, have been made to date under this new mechanism.[58] The impacts of recent storms, such as those in 2023 (cyclones Hale and Gabrielle), may not be fully recorded through the TAES mechanism yet, as applications only needed to be made and approved before the mandatory emissions return for the affected land – which was 2026 for the majority of participants.[59] However, over 650,000 hectares of post-1989 NZ ETS forests were eligible to apply for a TAES and many more adverse events can be expected as climate change intensifies.[60] The tale of the Californian forestry insurance scheme outlined earlier in this report provides an example of just how hard these liabilities are to manage.

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55 Land that is so badly damaged that forest re-establishment is no longer possible is permanently retired from the NZ ETS.

56 A 2019 regulatory impact statement about NZ ETS forestry changes stated that introducing the TAES would "create a small increase to potential Crown risk. That is because a temporary adverse event would be internationally recorded as a minor temporary decrease in forestry's contribution to international climate change targets, but there would be no associated reduction in NZU allocations" (MPI, 2019, p.87). All else being equal, the Crown may need to find reductions equal to the forgone removals elsewhere. Initially, MPI recommended that standard stock-change forests should not be eligible for a TAES as they create a higher fiscal risk to the Crown than forests under averaging. However, following pushback from the forestry industry, it was decided that all post-1989 forests registered in the NZ ETS would be eligible for a TAES. A 2020 addendum to the 2019 document noted a range of significant data constraints (including uncertainty about participant decisions and behaviour, and the number and scale of adverse events in any given year) that limited the ability to fully assess the impact of extending the TAES to all post-1989 forests (MPI, 2020).

57 Nor was there any apparent assessment of how the frequency or intensity of adverse events might change in the future (MPI, 2020).

58 MPI, pers. comm., 5 August 2026.

59 MPI, pers. comm., 21 March 2024.

60 MPI, pers. comm., 29 November 2024.

Even if forest owners wanted to insure their forests, insurance is reportedly becoming more expensive and harder to obtain. Between 2023 and 2026, the area of commercial forest insured for fire dropped 40% from around 500,000 hectares to around 300,000 hectares.[61] At the same time, New Zealand's capacity to fight forest fires is also reportedly diminishing.[62] Both those trends combined mean that in the future there will likely be more reliance on the TAES and an increased risk of liability being passed on to the Crown, as well as – indirectly – to those in rural communities living near forests at risk of fire.

Over long timeframes, there is an increasing likelihood of forest damage or destruction leading to carbon loss on a repeated basis. There is a risk that companies focused on carbon revenue (e.g. the owners of permanent forests) will be liquidated in the face of losses, leaving the liability for replanting with the Crown.

Forestry losses from adverse events will also have negative implications for New Zealand's ability to meet its emissions budgets and international targets if large amounts of sequestered carbon are re-emitted into the atmosphere. The CCC has highlighted uncertainties regarding the impact of major weather events, such as Cyclone Gabrielle, on large areas of forestry and what that could mean for emission budgets.[63]

61 NZFOA and NZFFA, 2026.

62 NZFOA and NZFFA, 2026.

63 CCC, 2024b, p.94.

Land locked away permanently

As noted earlier, once emitted, carbon dioxide stays in the atmosphere effectively forever in terms of human timespans. That means, to offset the warming from already emitted carbon dioxide, forests need to be retained in perpetuity.[64] Furthermore, future emissions must be offset with further trees to achieve and maintain net zero. Consequently, until gross long-lived greenhouse gas emissions reach zero there will be an ongoing requirement to offset them by establishing and maintaining an ever-increasing area of forest (or a change of existing rotational forests to permanent).

New Zealand has significant areas of land that were inappropriately cleared historically and are unsuitable for pastoral agriculture. If the NZ ETS incentivised permanent reforestation to restore these land areas to a natural state, then the requirement for permanence could be seen as a benefit, rather than a risk.

However, for exotic NZ ETS forests on land that has other potential uses, the NZ ETS framework severely restricts any option value the planted land may have for future generations. One of the great productive advantages of New Zealand agriculture since the 1980s is the ability for land uses to change in response to market conditions. The NZ ETS will reduce this flexibility as it will lock up increasing areas of land from alternative uses. Delaying gross emissions reductions also imposes a burden on future generations, who must pay for both more afforestation (or, potentially costly, rapid gross emissions reductions) and the ongoing maintenance of the expanding forest estate.

NZ ETS forests, once established, cannot be forgotten about. They require management if their resilience and, importantly, their carbon stores are to be maintained. Given the timeframes involved in offsetting carbon dioxide emissions, the NZ ETS itself will be forced to remain in perpetuity, with no clear economic incentives for afforestation other than the necessity for future generations to prevent emissions from deforestation.

In short, a policy instrument that is viewed as offering the lowest cost abatement today might not prove to be the lowest cost in the future.

NZ ETS market signals influencing land-use change

Much of the planting of exotic NZ ETS forests is likely to occur on agricultural land. At carbon prices of $40 per tonne, both rotational and permanent exotic forests generate greater economic returns per hectare than sheep and beef farms for most land-use classes.[65,66] The carbon price at which the economic transition occurs varies depending on meat, wool and timber prices, as well as the characteristics of the land, such as distance from timber mills or ports. Government projections anticipate that around 700,000 hectares of land will be converted to forestry by 2050, based on the carbon price pathway outlined in the Government's baseline scenario.[67] This equates to about 15% of sheep and beef land in New Zealand today.[68] This land-use change has both social and economic repercussions for rural communities. Whether that social and economic change is palatable is ultimately a political choice.

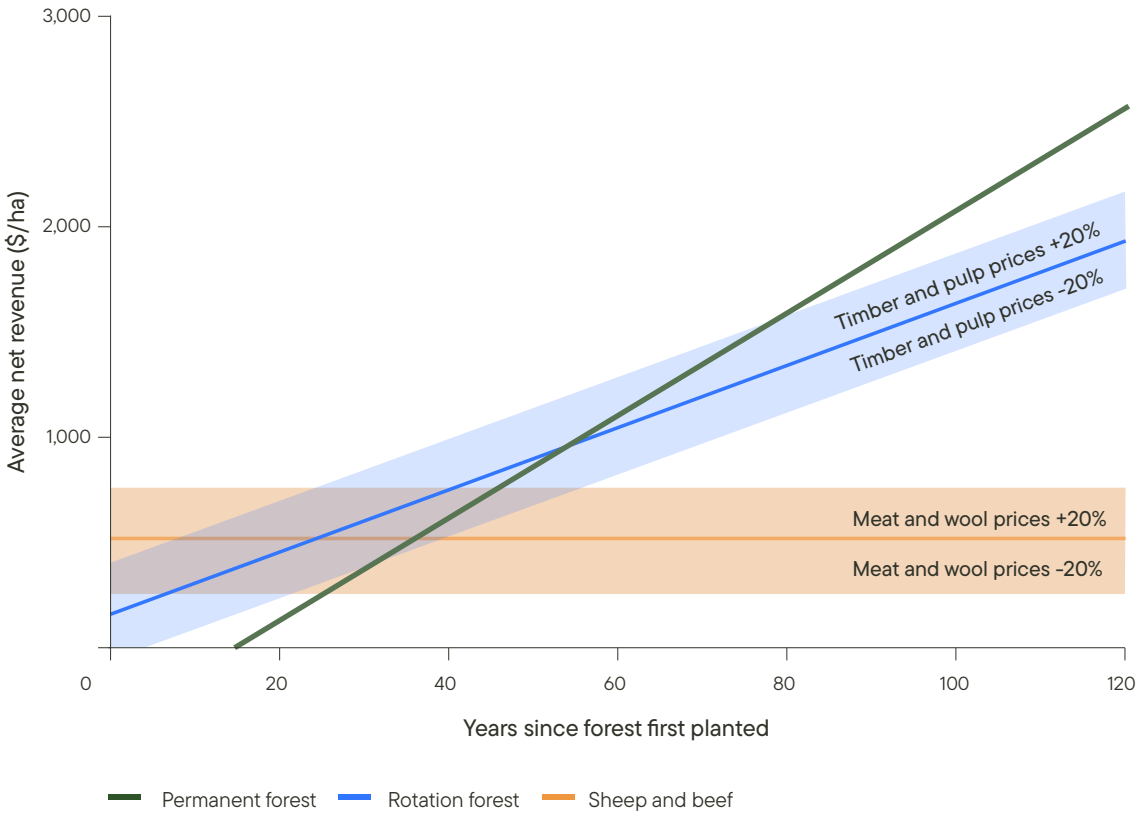
64 Issues with permanence and equivalence are being raised (e.g. Cullenward et al., 2023; Allen et al., 2024).

65 Concept Consulting, 2026, pp.30–32.

66 MPI, 2022, pp.17–18.

67 MfE, 2026d, p.71.

68 PCE, 2024, p.11.



Source: Based on Figure 19 from Concept Consulting (2026, p.31)

Figure 4.1: Economics of rotational and permanent exotic forestry vs sheep and beef farming for a changing NZ ETS price and various commodity prices.[69] At a carbon price of just over $20, rotational pine forestry is the most profitable land use. At above approximately $55, permanent carbon forestry becomes the most profitable.

Social and economic impacts

There is a divisive debate in rural communities about the role of exotic forestry. While concern extends to all types of exotic plantation forestry, there is particular concern around permanent carbon forestry.

Many rural communities, particularly those dominated by sheep and beef farming where forestry is the main competing land use, worry about the role afforestation will play in the survival of their communities. Competing narratives exist about the consequences of farm-to-forest conversion. The farming sector argues that sheep and beef farming indirectly employs an estimated total of 92,000 people nationally, significantly more than the 35,000 people employed by production forestry.[70] It further argues that afforestation removes more jobs than it provides, with only sporadic employment from planting to harvest.[71] Production foresters dispute the numbers and argue that, on a per-hectare basis, forestry adds both more full-time equivalents (FTEs) employment and value-add dollars than sheep and beef across the value chain.[72] Some also claim that rural

69 The graph shows the economics for an average farm or forest. The productivity, and consequently profitability, between different farms and between different forests can vary considerably.

70 Meredith Connell, 2023, p.14.

71 Meredith Connell, 2023, p.13.

72 Forestry generates a total of $4.6 million and 38 FTEs per 1,000 ha compared with $1.7 million and 17 FTEs per 1,000 ha for sheep and beef farming. However, on a total basis, sheep and beef farming generates both more employment and value-add because it uses more than four times more land (PwC, 2020, p.5).

communities have changed a lot in recent years anyway. What is clear, is that permanent carbon forestry provides less employment than either production forestry or sheep and beef farming.[73]

Export value is another sticking point in the ongoing land-use change debate. Unlike sheep and beef farms or forests grown for timber, current rules mean that carbon forests cannot generate export revenue other than through the voluntary carbon market. They also do not retain the option value of alternative future land uses.[74] The argument then goes that as productive land is lost to permanent carbon forestry, the options to support New Zealand's future economic prosperity will be reduced.

The risks associated with forestry, who is asked to bear them, and where any benefits fall certainly mould the way communities feel about the industry. The term 'social licence to operate' has featured strongly in the discourse around exotic forestry practices following the devastation caused by extreme weather events in recent years. Post-harvest erosion, land mobilisation, and downstream damage caused by sediment and woody debris during storms have placed clear-fell regimes under the spotlight.

Part of the problem lies with the way the NZ ETS incentivises forestry with little effective control over the quantity or location of the land-use change it drives. To address concerns raised by the agriculture sector, the Government has attempted to place restrictions on farm-to-forestry conversions (see Box 3.2).

Box 3.2: Restrictions of farm-to-forestry conversions

In response to concerns from some agriculture groups, the Government recently changed the CCRA to limit exotic forestry conversions on Land Use Capability (LUC) class 1–6 farmland that can be registered in the NZ ETS.[75] Landowners may register a maximum of 25% of their LUC class 1–6 land on an individual farm as exotic forestry in the NZ ETS. An additional national limit of 15,000 hectares of LUC class 6 land can be registered as exotic forestry each year – allocated via a ballot process.

The imposed restrictions are not expected to change levels of afforestation (just its location), though there is some uncertainty about this prediction.[76] The focus on preserving productive land means the location of afforestation may move around the landscape slightly, although the magnitude of this change is constrained. Currently, the majority of exotic afforestation occurs on LUC class 6 and 7 land anyway.[77] A ballot to afforest up to 15,000 hectares of LUC class 6 land nationwide, in conjunction with the ability for each farm to afforest 25% of their LUC class 1–6 land along with an unlimited amount of their LUC class 7 land, means the regulations impose a complex bureaucratic system with limited effect.[78]

One likely consequence of the scheme will be to drive more afforestation onto land classified as LUC class 7 and 8. This land is generally less suitable for commercial production forestry. As a result, the change could lead to the creation of more permanent pine carbon forests with their attendant risks to management and maintenance once the income from carbon runs out. The aforementioned increasing projections of permanent forestry are consistent with this hypothesis.

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73 Noting that continuous cover production forestry involves low-intensity harvest and is distinct from permanent unharvested carbon forestry. Detailed analyses of the number of FTEs supported by alternative management regimes are lacking.

74 The global voluntary carbon market is expected to grow from $2 billion in 2022 to $100 billion in 2030 (Morgan Stanley, 2023).

75 Climate Change Response (Emissions Trading Scheme – Forestry Conversion) Amendment Act 2025.

76 MfE, 2026d, p.69.

77 MPI, 2026a. Statistics on hectares registered for each LUC class.

78 "...it is likely that the LUC class 6 per year limits would not be fully subscribed in the near-term" (MPI and MfE, 2024, p.42, para 148).

4

Rawlings strap fern, *Notogrammitis rawlingsii*

Current supply and demand issues in the NZ ETS

As currently designed, the Government provides the NZ ETS with three main sources of new NZUs:

- Auctioned units.
- Units freely allocated to emissions-intensive and trade-exposed (EITE) industries.
- Forestry units for sequestered carbon.

The market is also supplied by the large stockpile of units held by NZ ETS participants and private account holders. The stockpile was estimated to be 121.2 million units as of May 2026,[1] of which approximately 29.7 million units – equivalent to about one year of emissions covered by the NZ ETS – were considered 'surplus' (i.e. not needed to cover surrender obligations).[2]

Free allocation

The supply of freely allocated NZUs to EITE industries follows a set formula for eligible industries based on output (which, while it varies, is relatively predictable barring major industrial closures). The EITE scheme was introduced at the start of the NZ ETS as a mechanism to compensate trade-exposed industries that faced a carbon price that their overseas competitors didn't. In 2024, the Government gave out 5 million NZUs as 'free allocation' to eligible EITE industries.[3] The percentage of NZUs allocated to cover each firm's emissions is slowly decreasing from its initial level of 90% (for high-intensity industries) and 60% (for medium-intensity industries). Between 2021 and 2030 the rate of phase-out is 1% a year, increasing to 2% per year for 2031–2040, and 3% per year for 2041–2050.[4] At that rate, the free allocation of units will still be 30% in 2050 for high emissions-intensity firms.

The Climate Change Response Amendment Bill introduced in July this year proposes removing the baseline and eligibility reviews of free allocation.[5] If passed, this could result in more EITE units in the system than would otherwise be the case under the status quo.

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1 EPA, 2026b. This spreadsheet available on the EPA website (www.epa.govt.nz/industry-areas/emissions-trading-scheme/market-information/privately-held-units).

2 CCC, 2026a, p.64.

3 International Carbon Action Partnership, 2025.

4 The EITE allocation phase-out rate has been a political football. It was deferred indefinitely in 2012. The Climate Change Response (Emissions Trading Reform) Amendment Act 2020, s 84, restarted the phase-out rate.

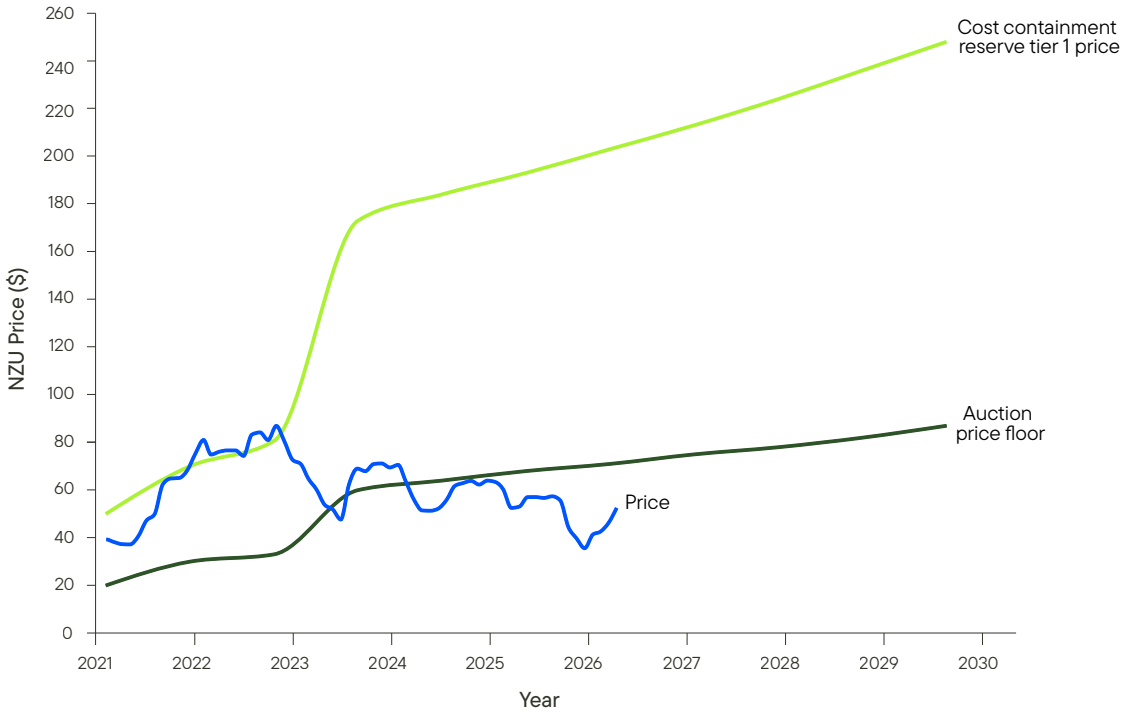
5 MCERT, 2026b.

Given how many of our key trade competitors now have carbon pricing or other effective emissions reduction policies, the case for New Zealand's EITE scheme to continue is getting weaker. The European Union is also implementing a carbon border adjustment mechanism (CBAM) that could see increased tariffs on imports from countries that do not have an equivalent cost of carbon compared to the carbon price in the European Union. The carbon price in the European Union at the time of writing was approximately four times higher than New Zealand's.[6] Policies adopted by trading partners, such as the European Union's CBAM, may even see New Zealand companies punished for receiving EITE free allocation.

Auction supply

Taking into account advice from the CCC, the Government can influence supply by varying the number of NZUs it auctions. That number is arrived at in part by predicting how many forestry units might become available, taking into account the number of EITE units the Government will hand out, and reducing auction supply to encourage use of the surplus stockpile. It is a complicated and highly inexact process but has significant consequences for the carbon price and forestry.

Auctioning as a source of supply was only introduced into the NZ ETS in 2021.[7] The first few auctions cleared with sufficient bids above the confidential reserve price. However, since March 2023 all the auctions have failed to clear, bar two, which partially cleared in March and December 2024. That indicates a market expectation that there is sufficient supply from both the current stockpile and forestry units in the market to meet current and near-future demand. Unsurprisingly, the carbon price on the secondary market has been well below the publicly available auction floor price (Figure 4.3).



Source: Based on NZU price data from Theecanmole (2026), auction floor and cost containment reserve data from MfE (2026e)

Figure 4.2: NZU price relative to the price control settings.

6 In early December 2025, the carbon price in the European Union ETS was ~€82 (~NZ$166) compared to the NZU price of ~NZ$40 (but it mostly traded just below NZ$60 throughout much of 2025) (Energy Instrat, 2026).

7 Auctioning was added through the Climate Change Response (Emissions Trading Reform) Amendment Act 2020.

The most recent decision by the Government to set the base number of NZUs to be auctioned envisages a decline from 4.3 million NZUs in 2027 to 1.1 million in 2031.[8] The number can be expected to continue to fall beyond 2031. Extrapolating the current trajectory would see the Government auctioning almost no units by 2034. In other words, from sometime in the mid-2030s onwards the Government will have little or no influence over unit supply (and therefore price) in the NZ ETS – assuming the structure of the scheme is not changed. Neither will the Government be in a position to benefit from any auction proceeds beyond that point.

Forestry units

As noted above, the higher NZ ETS price since 2021 has led to afforestation. Research indicates that an NZU price of around $35–$40 would be sufficient to generate an appropriate rate of return on a new *Pinus radiata* forest that was planted under a production timber regime and harvested at 28 years.[9] The carbon price since 2021 has ranged between $35 and $85.[10]

There is a lag time of about 5–8 years after planting before a forest begins to sequester meaningful quantities of carbon.[11] After that time, sequestration accelerates, as will the number of carbon credits (NZUs) those forests will earn. That means that forests planted recently will start to flood the NZ ETS market with units in the 2030s and 2040s.

Based on the auction volume decline outlined above, from the mid-2030s forestry will become the primary source of units in the NZ ETS, although with auctions currently failing to clear, forestry is arguably already or soon will be the largest source of supply. The supply of those units will depend entirely on the actions foresters take – or choose not to take – in respect of NZ ETS registered forests. Those choices include how much they want to plant, their harvesting intentions, and when to register or deregister forests from the scheme. It is very difficult to predict with any certainty how those future choices will flow through into NZ ETS unit supply and price.

The challenges with matching supply and demand for units in the NZ ETS means that there are likely to be periods of under- and over-supply.

8 If the units in the cost containment reserve are included, the maximum number of units available to auction are 10.2 million NZUs in 2027 and 4.6 million in 2031 (MCERT, 2026a).

9 MPI, 2022, pp.17–18.

10 Theecanmole, 2026.

11 Climate Change (Forestry) Regulations 2022, Schedule 4, Table 1, 'Carbon stock per hectare for *Pinus radiata* by region'.

Puketi hare's-foot fern, *Davallia tasmanii ssp. cristata*

5

Modelled future(s) of the NZ ETS: What might the NZ ETS achieve?

To help understand where the current NZ ETS structure is taking New Zealand, and where any changes might lead us, we commissioned Concept Consulting to undertake some NZ ETS scenario modelling. The key results are presented below. The full modelling report can be found on PCE's website.[1]

The modelling used Concept Consulting's proprietary Emissions-Economy NZ (ENZ) model. It is the same whole-economy model originally developed for the CCC to inform New Zealand's recommended emissions budgets and used by the Ministry for the Environment – Manatū Mō Te Taiao – now the Ministry for Cities, Environment, Regions and Transport (MCERT) – in developing New Zealand's emissions reduction plans. As with most modelling, the results presented are projections (assuming rational behaviour) of what *might* happen, not predictions of what *will* happen.

As one of the objectives of commissioning the modelling was to assess the impact of the NZ ETS on meeting New Zealand's 2050 target, the model used 'target accounting', which differs slightly from NZ ETS accounting.[2]

Most of the modelling results presented by the Government are up to 2050 – the headline year for New Zealand's domestic and international targets. However, meeting those targets also requires that net zero (or better) is sustained in the years beyond 2050. The modelling commissioned by PCE therefore extends to 2075.

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1 Concept Consulting, 2026. The Concept Consulting report is available on the PCE website (www.pce.parliament.nz).

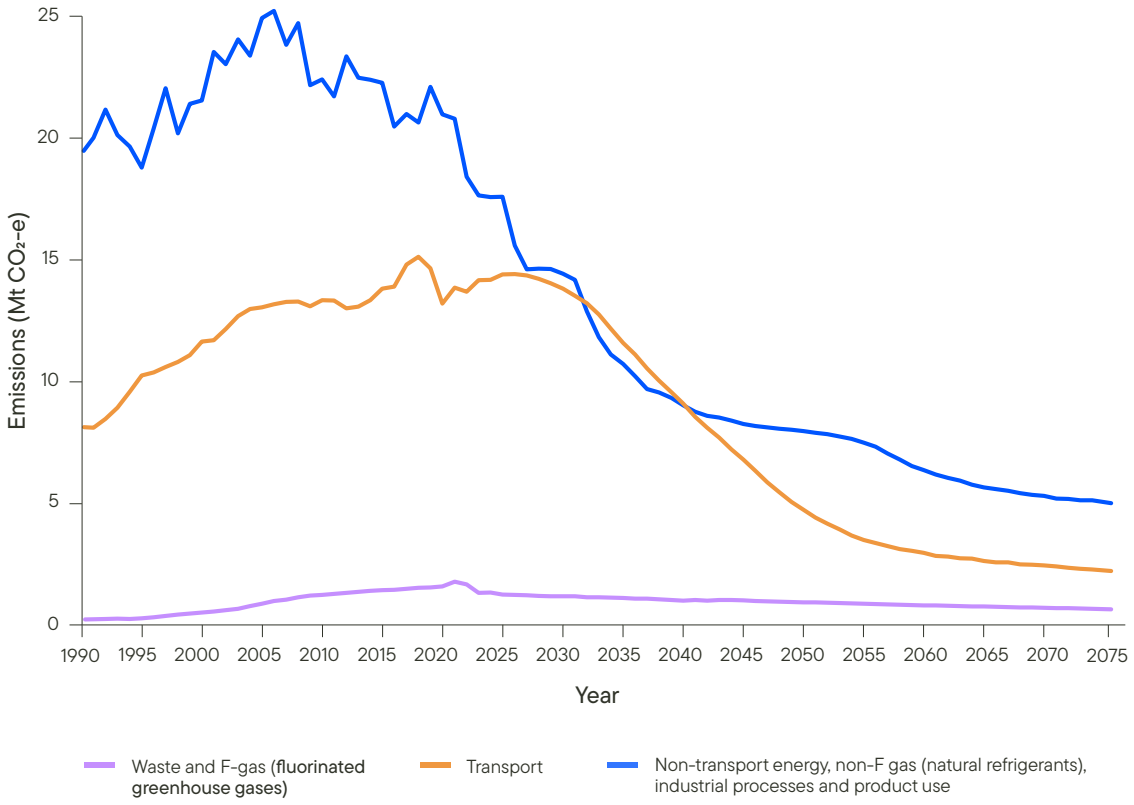
2 Target accounting includes all gross emissions, and a specific subset of emissions and removals from the LULUCF sector: It only includes emissions from deforestation and removals from newly established forests up until their long-term carbon stocks; it also only counts emissions or removals caused by changes to business-as-usual forest management for pre-1990 forests. Storage of carbon in harvested wood products (not reflected in the NZ ETS) is also captured in target accounting. In the ENZ model, target accounting uses the appropriate long-term carbon stock average age for production forests (~23 years) but allows permanent forests to keep sequestering carbon past 23 years.

‘Baked-in’ NZ ETS effects

Before looking at how prices in the NZ ETS could reasonably evolve under current settings, it is useful to understand what impacts may have already been ‘baked-in’ because of past choices and actions. The modelling can do that by assuming future carbon prices are zero.

The modelling shows that, even when carbon prices are set to zero, there would still be material volumes of NZUs supplied from already committed forestry and EITE allocation.[3] There would also still be some reductions in gross emissions (see Figure 5.1) because of business-as-usual improvements, such as:

- the general increased uptake of electric vehicles
- greater reliance on renewable energy (albeit at lesser rates and extents than a future with higher carbon prices)
- the policy-mandated switch from coal-fired industrial boilers (noting that this modelling was completed before the Government announced its intention to remove this ban)
- New Zealand’s declining gas reserves and associated rising gas prices causing switching.[4]



Source: Based on Figure 11 from Concept Consulting (2026, p.26)

Figure 5.1: Modelled decrease of NZ ETS covered non-forestry emissions for zero carbon price scenario. The emissions reductions are mostly due to assumed business-as-usual uptake of technology regardless of the NZ ETS.

With no carbon price, afforestation would drop significantly to about 4,000 hectares per year,[5] a large drop from 2020–2025 rates of between 34,000 and 70,000 hectares per year. Ongoing afforestation would be driven by market prices for timber and other wood products.

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3 Assuming there is no deforestation due to the high costs of forestry to pasture conversion.

4 Concept Consulting, 2026, p.21.

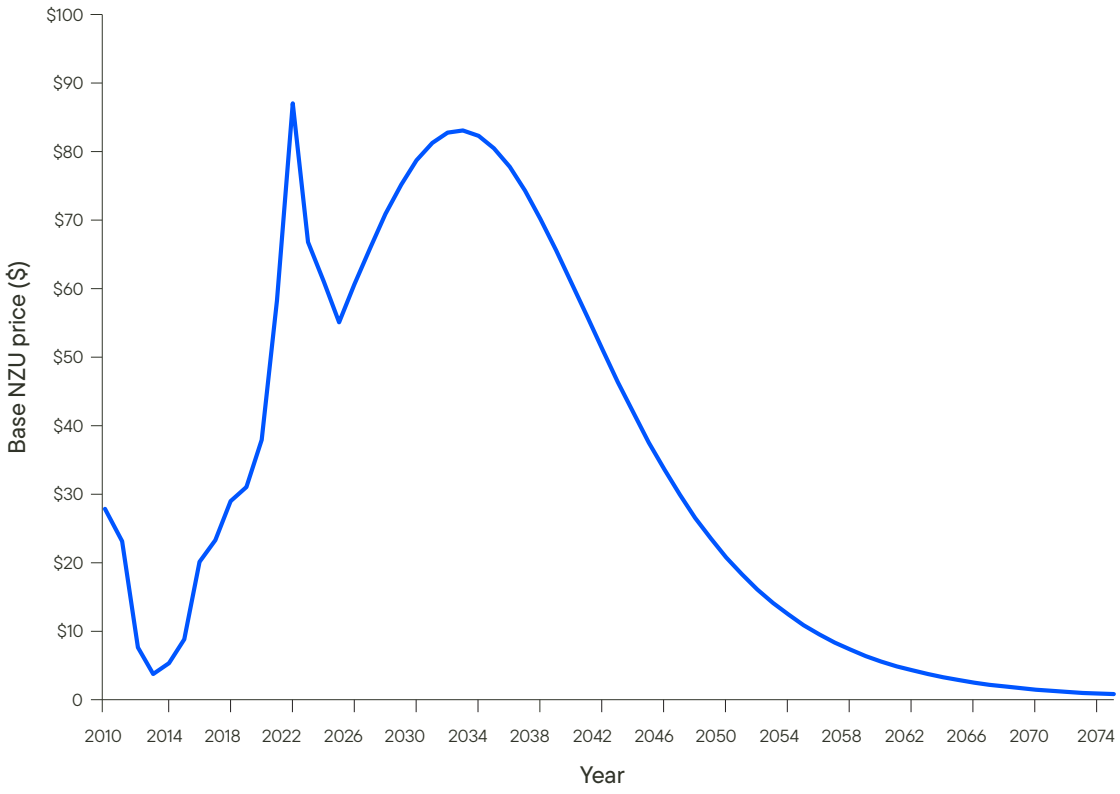
5 Concept Consulting, 2026, p.25.

The modelling assumed large-scale deforestation would be unlikely even at a zero carbon price due to the costs of land-conversion. About 90% of NZ ETS registered forest is on LUC class 6–8 land and would only be suitable for sheep and beef farming post-deforestation. At a zero carbon price and a 6% cost of capital, land-based profit would need to exceed $1,200 per hectare for sheep and beef farming.[6] This means present sheep and beef farm profitability would need to increase around two-fold to make land-use change viable. How the relative economics of conversion change in the future is uncertain.

Current architecture

If the NZ ETS continues with its current design, the model shows the following results.

After an initial rise, the **carbon price is projected to drop steadily** from the mid-2030s to approach zero by 2075 (Figure 5.2). The price would initially rise because the 'already guaranteed' supply of NZUs (from the stockpile, already-planted and NZ-ETS-registered forests, and EITE industrial allocation) is projected to be inadequate to meet demand out to the early 2030s without some additional NZU supply – either from extra forestry units from stock-change switching to *de facto* permanent or the release of additional auction volumes. From the mid-2030s the price would drop because of both increased supply and decreased demand. Forests planted prior to the mid-2030s continue to grow and would begin to deliver substantial quantities of NZUs. The very slow phase-down of EITE industrial allocation will continue to deliver a significant quantity of free NZUs. As discussed above, demand for NZUs is likely to reduce as emissions fall.



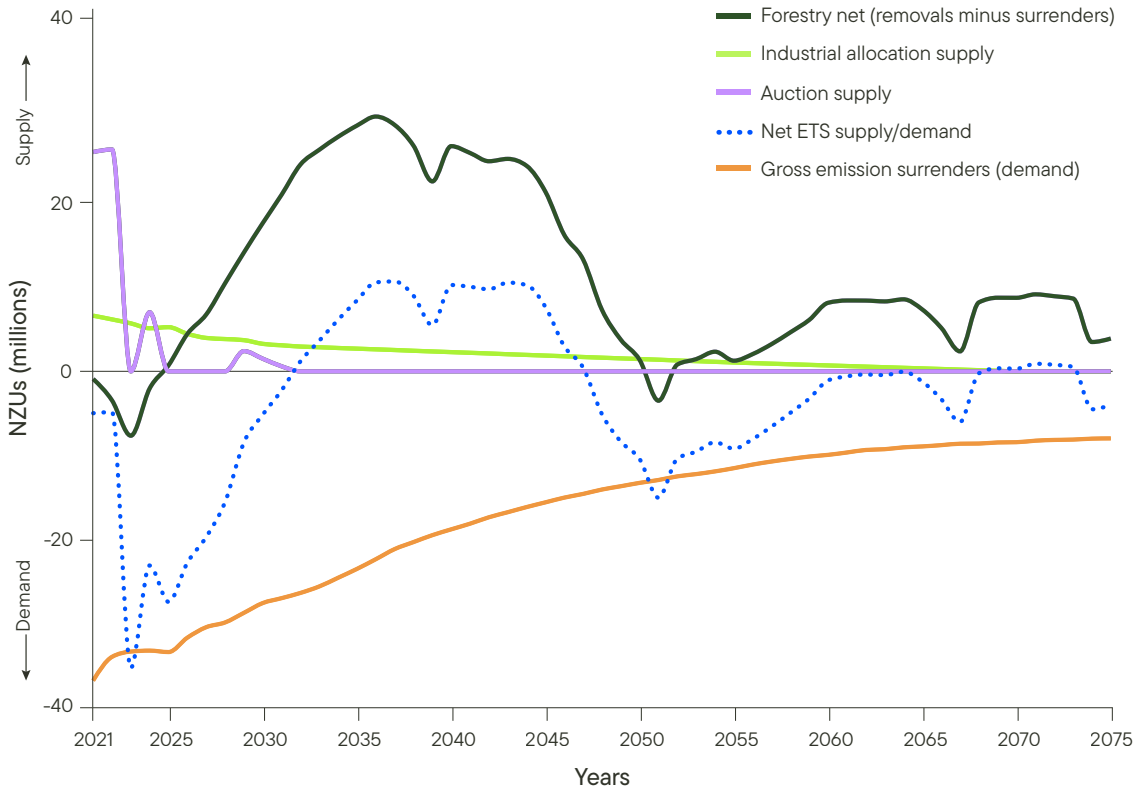
Based on Figure 3 from Concept Consulting (2026, p.20)

Figure 5.2: Base NZ ETS price projection assuming continuation of existing policy settings (real 2025 dollars).

6 Concept Consulting, 2026, p.14.

Gross emissions would reduce but only marginally faster than if the carbon price was set to zero in the NZ ETS. In 2050, gross emissions would be about 4% (1.9 megatonnes (Mt) CO_2e) lower, and by 2075 around 3% (1.4 Mt CO_2e) lower than in a zero carbon price scenario.[7] This is because low carbon prices in the NZ ETS are only sufficient to drive very small reductions above and beyond those expected to occur anyway as a result of improvements in technology and behaviour changes (mentioned above).

Auctioning becomes redundant in the early 2030s due to an oversupply of units that lasts until around 2050 (see Figure 5.3). Consequently, any proceeds the Government earns from auctioning units would dry up in the medium term. In the shorter term there may be some revenue if, as the carbon price rises into the early 2030s, some of the Government's auctions begin to clear. This supply of auctioned units in the near term would help alleviate an undersupply of forestry units until more recently planted forests begin to deliver higher quantities of NZUs as they mature.



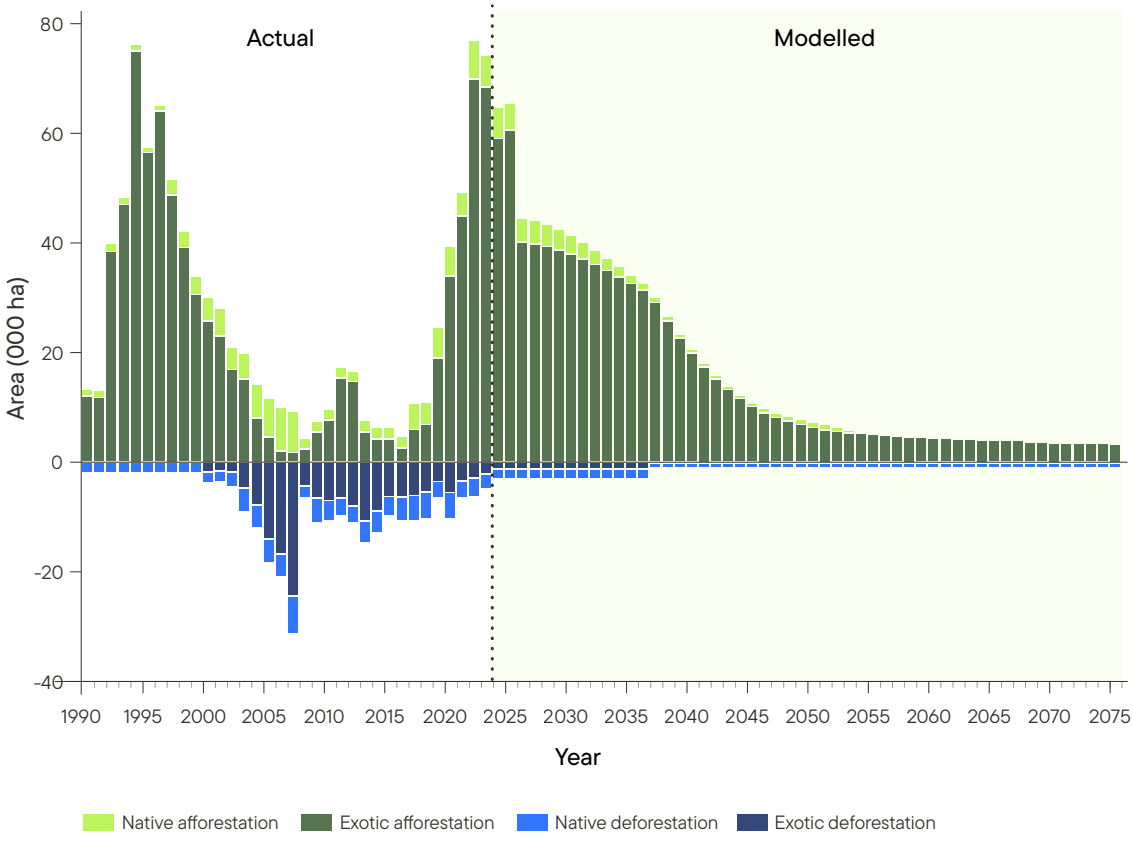
Source: Based on Figure 5 from Concept Consulting (2026, p.23)

Figure 5.3: Supply and demand for NZUs in the modelled base scenario. The ETS is projected to be undersupplied until about 2030 and then oversupplied until around 2050. It is then estimated to start to near equilibrium after a period of slight undersupply through the 2050s-caused by the next major production forestry harvest cycle. Supply built up again from the afforestation triggered by high NZU prices in the 2030s, is expected to buffer against a shortfall during this time. Unit supply from forestry is the dominant determinant as can be seen by the similar trend between net forestry line (dark green) and the net supply/demand (blue-dotted line).

7 In 2050, 47,800 kt CO_2e with current NZ ETS settings versus 49,700 kt CO_2e with a zero price; and in 2075, 42,900 kt CO_2e with current NZ ETS settings versus 44,300 kt CO_2e with a zero price (Concept Consulting, 2026, pp.20–26).

Significant ongoing new afforestation is projected, albeit at rates lower than seen between 2019 and 2025 (Figure 5.4). Between 2025 and 2050 approximately 690,000 hectares of trees could be added to the current exotic forestry estate of 1.8 million hectares.[8] If we look out to 2075, this would increase by a further 100,000 hectares to 790,000 hectares.[9]

The rates of new afforestation decline as the carbon price declines in the model. However, even at low carbon prices, some afforestation is projected to occur due to other drivers, including timber revenues, policy requirements ,and non-price factors, such as landowner preferences or diversification strategies.[10] From the present through to 2075, there will be significant variation – up and down – of unit supply from forestry. This is due to the significant variation in volumes of afforestation since 1990 and future variation in the timing of harvesting of plantation forests, if they are harvested at all (see Box 5.1).[11]



Source: Based on Figure 7 from Concept Consulting (2026, p.23)

Figure 5.4: Projected afforestation and deforestation for the base scenario compared to actual historical rates.

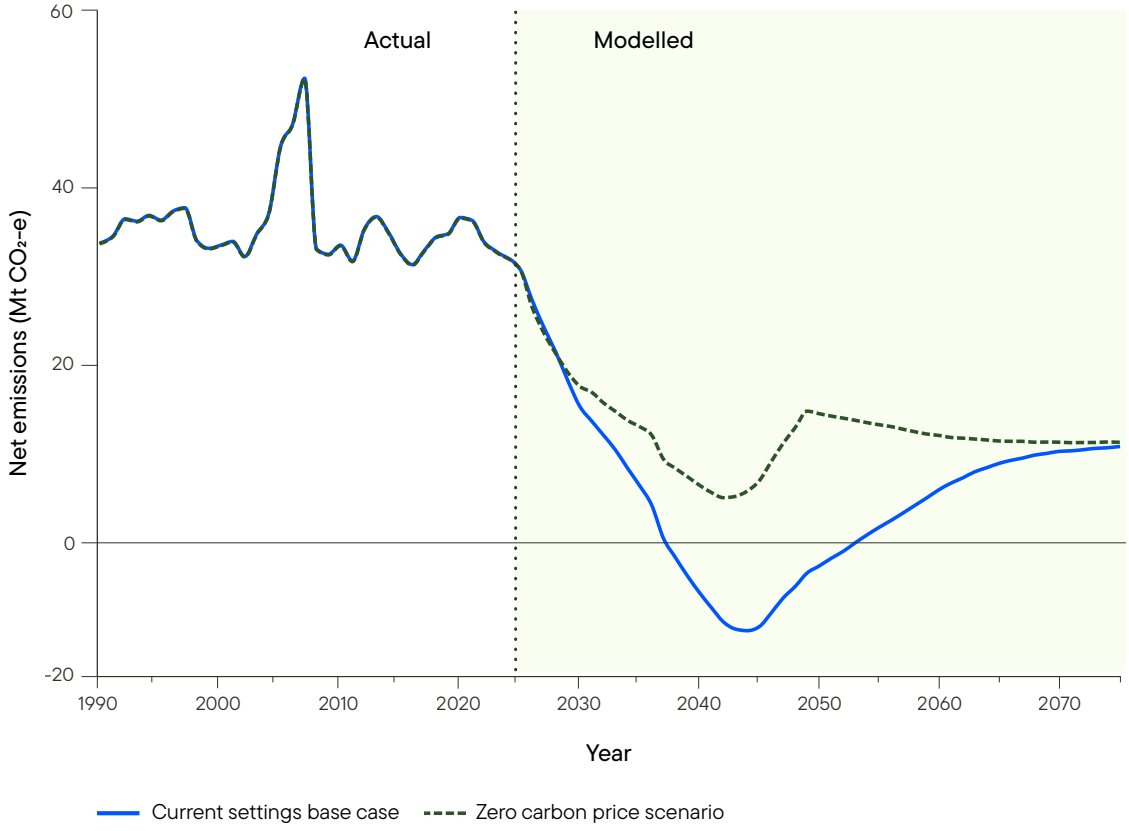
8 NZFFA et al., 2025, p.1.

9 Concept Consulting, 2026, pp.22–23.

10 Concept Consulting, 2026, p.12.

11 Concept Consulting, 2026, p.23.

New Zealand's domestic **2050 target would be met initially but will not be sustained as** required by law. The modelling shows that New Zealand's net emissions would drop below zero around 2040, meeting the first leg of the 2050 domestic target of net zero early. However, net emissions are projected to only stay below zero until the mid-2050s (see Figure 5.5). That means that the second leg of the domestic target – that net zero is maintained "for each subsequent calendar year"[12] would not be met. An increase in net emissions is expected to occur because trees planted earlier are harvested for their timber, carbon sequestration in permanent forests planted earlier slows as the trees grow more slowly, and the falling carbon price would not be able to incentivise sufficient planting to keep the country below net zero in the longer run. This outcome arises because the NZ ETS does not cover all emissions: agricultural emissions are exempt and industrial allocation is given to EITE emitters free of charge.



Source: Based on Figure 14 from Concept Consulting (2026, p.28)

Figure 5.5: Modelled net emissions of long-lived gases plus non-biogenic methane (using target accounting) under current NZ ETS settings (base scenario) and the zero price scenario.

12 CCRA, s 5Q(1)(a).

Box 5.1: Sensitivity of afforestation rates

The level of afforestation that will be driven by the NZ ETS depends both on the carbon price and decisions foresters on stock-change accounting make about when to harvest or not.

As illustrated by the analysis above, gross emissions reductions are not very sensitive to the carbon prices expected in the NZ ETS from now to 2075. By contrast, forestry is significantly more sensitive. Concept Consulting's analysis shows that at carbon prices above $40 per tonne rotational forestry is more profitable, on average, than sheep and beef farming. That 'threshold' carbon price varies in the range of $25 per tonne to $60 per tonne depending on the relative commodity prices for forestry products compared to sheep and beef products. Permanent forestry becomes – on average – the optimal land use, with NZ ETS prices above $60 per tonne.[13]

In the 'current settings' scenario the net zero 2050 target is achieved but not sustained. As a result, current afforestation projections do not deliver sufficient forestry to meet net zero targets. We asked Concept Consulting to model how much afforestation in total would be needed for the country to sustain net zero out to 2075. With the same price path as in the current settings scenario, 1.12 million hectares of new forest were needed – about a 50% increase in the current planted forest estate.[14]

We then compared this to other hypothetical scenarios with higher carbon prices (using the CCC's demonstration price path) to see what difference that makes to the amount of afforestation needed. We then compared this to other hypothetical scenarios with higher carbon prices (using the CCC's demonstration price path) to see what difference that makes to the amount of afforestation needed. At sustained prices above $200 per tonne of carbon, the relative economics of production and permanent exotic forests in the model sees almost all existing forestry registered under stock-change accounting switching to permanent.

While permanent pine forestry comes with many downsides, it stores much more carbon per hectare, so less afforestation is required. Sustaining net zero out to 2075 with a higher carbon price could require only 40,000 hectares of new forest from what is already planted by the end of 2026. Fixing the amount of stock-change forestry that converts to permanent at the more reasonable levels currently expected by government projections means that the country would still need 748,000 hectares of afforestation.[15]

The biggest uncertainty in projecting afforestation rates, and whether or not New Zealand will meet its net emissions reduction targets, is the ability of foresters using stock-change accounting to delay their harvest long enough for their forests to become de facto permanent forests. There is no requirement for foresters to formally notify government of a decision to delay harvest. They could in any case decide to harvest later beyond the 'commercially optimal timber age' of ~28 years. However, the Government cannot predict with any certainty how delayed harvest might play out.

At sustained prices above $200 per tonne of carbon, the relative economics of production and permanent exotic forests in the model sees almost all existing forestry registered under stock-change accounting switching to permanent. While permanent pine forestry comes with many downsides, it stores much more carbon per hectare, so less afforestation is required. This hypothetical exercise illustrates three things. First, continuing to rely mostly on afforestation to meet emissions targets will result in large areas of the country converting to forestry. Secondly, higher carbon prices mean that there is likely to be greater focus on reducing gross emissions, so the amount of forestry needed is significantly reduced. Finally, higher prices require a way of managing how much stock-change forestry becomes *de facto* permanent forest.

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13 Concept Consulting, 2026, p.31.

14 Concept Consulting, 2026, pp.33–35, scenario C.3.

15 The model assumes 20% of production forestry would switch to permanent at current levels (Concept Consulting, 2026, p.19, scenario C.2).

Restricted forestry scenarios

What is clear from the modelling results presented above is that the low price driven by forestry's inclusion in the NZ ETS is not incentivising a sufficient reduction in gross emissions, or levels of sustained afforestation, to meet the 2050 net zero target much beyond 2050.

Box 5.1 above explores the additional afforestation required to maintain net zero post-2050. Another approach explored in this modelling was whether a higher price could help reduce gross emissions, enabling the target to be met. Restricting the amount of afforestation in the NZ ETS would be one way to achieve that, as would increasing demand in the NZ ETS.

Forestry restrictions only

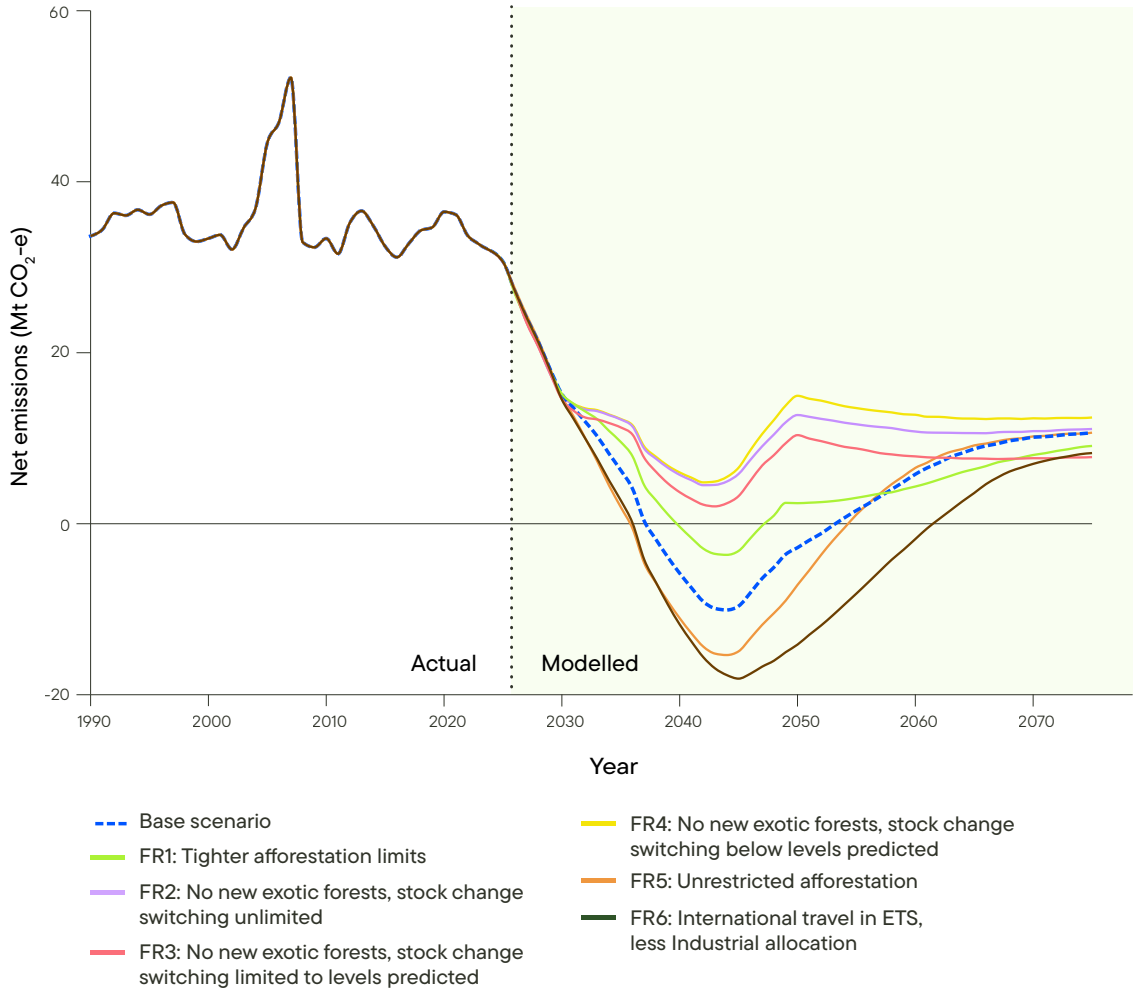
As a starting point, Concept Consulting, using the same modelling methodology presented in the 'Current architecture' section above, looked at several 'forestry restricted' (FR) scenarios. In order from less to more restrictive, the scenarios modelled were:

- FR1: tighter limits on afforestation than the current LUC restrictions
- FR2: no new exotic forests allowed to register, but existing stock-change forests can switch to permanent without limits
- FR3: no new exotic forests allowed to register, switching to permanent forestry restricted to the levels currently predicted[16]
- FR4: no new exotic forests allowed to register, with even more limited switching to permanent.[17]

16 The model assumes 20% of production forestry would switch to permanent at current levels (Concept Consulting, 2026, p.19, scenario B.5).

17 FR1 is scenario B.2, FR2 is scenario B.3, FR3 is scenario B.5, and FR4 is scenario B.4 in Concept Consulting's report (Concept Consulting, 2026, pp.26–30).

All of these scenarios saw a higher carbon price and larger drops in gross emissions. However, all but one still saw carbon prices eventually start to fall, mirroring the price forecasts in the base case. As shown in Figure 13 none of those scenarios resulted in the net zero target being sustained either. None of the scenarios except the least restrictive (FR1) even met the first leg of the net zero target by 2050.



Source: Based on Figure 14 from Concept Consulting (2026, p.28)

Figure 5.6: Modelled net emissions of long-lived gases plus non-biogenic methane (using target accounting) for scenarios restricting forestry to varying degrees. Only some scenarios met the first leg of the 2050 target, none maintained the 2050 target over the longer term.

Concept Consulting also looked at whether having no restrictions on forestry (e.g. removing the LUC restrictions) or including international aviation emissions in the NZ ETS and reducing free industrial allocation would allow the 2050 target to be met sustainably. Unrestricted afforestation (FR5) resulted in outcomes very similar to the 'current settings' scenario (see Figure 5.6). Bringing international aviation into the scheme and reducing industrial allocation (FR6) was helpful in delaying the eventual breaching of the net zero target after 2050 but was not sufficient to prevent it (see Figure 5.6).[18] This scenario was included to demonstrate the likely impact of reforms that impact on the demand for units in the NZ ETS (rather than the supply).

That then raises the question: What might be changed if the NZ ETS is to ensure that the 2050 net zero target is met?

18 FR5 is scenario B.1, and FR6 is scenario B.6 in Concept Consulting's report (Concept Consulting, 2026, pp.26–30).

Forestry restrictions and other supply interventions

To answer that, Concept Consulting needed to take a new approach. Rather than aim for the model to achieve equilibrium between supply and demand in the NZ ETS, the model was reconfigured to aim for the 2050 target to be met and sustained in all subsequent years.[19]

At a high level, the modelling found that, to achieve the 2050 target, a higher carbon price was needed (1) to drive greater emissions reductions and (2) to incentivise a large proportion of existing stock-change forestry to switch to permanent management in order to make up for significantly reduced afforestation due to the restrictions described below. No solution to the model was able to generate a carbon price sufficiently robust to simultaneously meet and sustain the 2050 net zero target and achieve equilibrium in the NZ ETS. This is because the NZ ETS doesn't cover emissions of all long-lived gases (it excludes agriculture and industrial allocation). To achieve a sufficient price and balance supply and demand, any surplus of forestry units would need to be bought back by the Government and any undersupply met by auctioning units.

Within the suite of scenarios that aimed to meet and sustain the 2050 net zero target, several examined the impact of continuing to allow existing NZ ETS forests but banning new forestry registrations.[20] The modelling found that it is not possible to have forestry in the NZ ETS and still have a sufficiently high carbon price to meet the target without also generating a large surplus of forestry units. In all of the 'forestry in the NZ ETS' scenarios, having a carbon price sufficiently high (in the range of $115 to $250 per tonne) also resulted in a significant surplus of units. To ensure the NZ ETS remained under control, the Government might have to buy back the surplus. At the prevailing NZ ETS price, that would cost in the order of $30–60 billion over the period to 2075 (i.e. on average between $0.7 billion and $1.5 billion per year) – an expensive reckoning by most standards.[21]

Two scenarios looked at keeping forestry in the NZ ETS but decoupling the price foresters earned from the NZ ETS price faced by those with fossil fuel surrender obligations:[22]

1. Allowing the price of forestry units to vary but be discounted to 50% of the NZ ETS carbon price faced by fossil fuel emitters still generated a significant, but slightly smaller, surplus of units. Buying that back would still require some tens of billions of dollars to 2075.
2. Fixing the price of forestry NZUs at $30 per tonne and allowing the carbon price for fossil fuel surrenders to rise to around $100 per tonne generated a small surplus, which would require a more feasible $3 billion buy-back out to 2075.

Two more radical scenarios looked at removing almost all forestry from the NZ ETS. Neither allowed any existing or new exotic forest to earn NZUs in the NZ ETS from now onwards.[23] One scenario had native forests remaining in the NZ ETS; the other did not (i.e. no forestry at all in the NZ ETS). Both scenarios required auctioning to provide supply, generating fiscal benefits for the Government. However, both risked high (and potentially untenable) carbon prices while also generating very high, and politically hard to defend, levels of auction proceeds. For either to be politically saleable, the Government would likely have to put in place additional measures to manage the price down. However, that could be self-defeating and negatively impact the ability to meet and sustain net zero.

The final scenario tested the impact of an NZ ETS without any forestry and with the price controlled so it followed the CCC's demonstration pathway.[24] Meeting the 2050 targets would require 370,000 hectares of new permanent forest to be planted outside the NZ ETS if no existing production forest were converted to permanent forest. The cost of that could be more than offset by the projected auction proceeds.

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19 More detail on Concept Consulting's various modelling methodologies – ETS equilibrium mode; Forest-targeting mode; and Emissions-targeting price mode – is available in their report (Concept Consulting, 2026).

20 Concept Consulting, 2026, pp.36–41, scenarios D.1, D.2 and D.3.

21 The cost might be worth it if the Government was able to sell them offshore as part of the Internationally Transferred Mitigation Outcome (ITMO) mechanism created under Article 6.2 of the Paris Agreement.

22 Concept Consulting, 2026, pp.36–41, scenarios D.6 and D.7.

23 Concept Consulting, 2026, pp.36–41, scenarios D.4 and D.5.

24 Concept Consulting's scenario D.8 has a steadily rising carbon price to around $180/t in 2040, $250/t in 2050 and $450/t in 2075 (Concept Consulting, 2026, pp.36–41).

To summarise the modelling results on forestry restrictions:

- If forestry is to remain in the NZ ETS and the NZ ETS is to be used to meet and sustain the 2050 target in a manner that is fiscally affordable for the Government, the NZU price foresters receive would need to be decoupled from the price faced by fossil fuel emitters. The price would need to be high enough to encourage afforestation but significantly lower than the price paid by fossil fuel emitters.
- Removing all forestry from the NZ ETS, or confining the NZ ETS to only native forestry, would require policies to moderate the price to be workable and still achieve the targets. Such policies would require careful design. Without any forestry in the NZ ETS, some afforestation outside the NZ ETS would be required, but the cost of that could be covered by NZ ETS auction proceeds.

It almost goes without saying that greater restrictions on forestry in the NZ ETS would be controversial. Removing all forestry from the NZ ETS would be even more so. Changing the rules in such a way could significantly increase New Zealand's perceived sovereign risk for those holding existing investments and for parties considering new investments. Any changes would also have distributional impacts, especially for Māori as they own a significant share of post-1989 forests registered in the NZ ETS and would almost certainly raise potential Treaty of Waitangi considerations. However, the opposite also holds. If the Government were to reform the NZ ETS in a way that increases the likely future carbon price, there is no reason for that windfall gain to be granted to existing forestry interests.

None of the scenarios explored represent a perfect solution. No such solution exists. But they do provide insights into how a combination of restrictions on forestry and both supply and demand side measures in the NZ ETS can improve its effectiveness in meeting climate goals.

Substantial change in modelling results due to afforestation in past year

A penultimate but critical comment concerns the fact that between the time PCE commissioned Concept Consulting's modelling and its completion, a further year of afforestation intentions were effectively locked in, while estimates of 2025 afforestation were also revised upward. This changed the results significantly.

When the model was originally calibrated using estimates from the 2023 afforestation intentions survey, anticipated afforestation was lower, which caused the projected NZ ETS price to peak at $95 per NZU in 2033. Using the higher updated afforestation estimates published in 2025, the modelled price peak was around $85. Using the new afforestation data also meant that around 27 million extra NZUs could be added to the stockpile by 2075.

It is a salutary reminder of how much harder the task of managing the risks will be the longer serious reform of the NZ ETS is delayed.

NZ ETS forestry participant behaviour

Before moving onto the next section, it is worth confronting a criticism of the modelling of forestry in the NZ ETS that is likely to be made by some: Why would foresters continue to plant if it would cause an oversupply of forestry units and the NZ ETS price to crash?

While the model assumes that higher carbon prices lead to increased afforestation, some afforestation is projected to occur even at lower prices in response to other drivers, including timber revenues, policy requirements, and non-price factors such as landowner preferences or diversification strategies.

For production foresters who are planting forests for timber and other fibre revenue, carbon revenue is an additional benefit. There are still advantages for their forests to be registered in the NZ ETS to earn carbon credits even when prices are low. One advantage is a cashflow stream while the trees grow and foresters wait for income from the fibre. In fact, lower future carbon prices may even work in favour of some production foresters (particularly those on stock-change accounting) as they can lease out or sell credits (if they can find a buyer, which may be difficult when the NZ ETS is oversupplied) and in the future buy back the units needed to cover their liabilities at predicted lower prices.

The economics are completely different for permanent carbon foresters, who are primarily concerned with revenue that is determined by the carbon price. They are likely to reduce their afforestation activity when NZU prices fall.

The model also anticipates that land, once afforested, is unlikely to convert back to alternative uses, even after carbon prices fall. This is because converting land back to pasture is prohibitively expensive based on the profitability of most sheep and beef farm systems.[25] In conjunction, these assumptions lead to scenarios in which the NZU supply from forestry outstrips demand, even when price incentives appear insufficient.

It is worth noting that there is a complex interplay of factors that affect NZ ETS-driven afforestation rates. Any prediction of how foresters will behave (whether it is a model projection or a critique of a model projection) is likely to be based on the twin assumptions that forestry participants have 'perfect' foresight of the future NZ ETS prices and will act rationally in response. Neither is likely to be true (but alternatives are equally difficult to model).

Current afforestation behaviour suggests foresters are not looking too far forward at NZ ETS prices. The predicted oversupply of forestry units in the 2040s and 2050s has been apparent for some time. Despite that, there have been continued high levels of NZ ETS afforestation and registration. The average discount rates of 6–7% used by private operators to value forests means that their

25 While the economics could be more favourable for dairy farming, land is less likely to be suitable given that only approximately 10% of NZ ETS registered forest is on LUC class 1–5 land.

carbon price forecasts do not need to look that far ahead.[26] It is likely that even short periods of 'good' NZU prices are sufficient to tip the financial incentive in favour of afforestation, especially if that comes at a time when cashflow for a forest is low.

Even into the 2040s the model is still predicting prices above $30. At that price, it is assumed foresters still have a financial incentive to plant, especially if they do not care, or believe, that the lower prices the model projects for the 2050s onward will eventuate.

The more difficult aspect to model is not afforestation itself but the carbon price that provides the incentive to plant. As set out in the Concept Consulting report, "Any projected prices should be interpreted as the prices required to achieve specified outcomes, rather than short-term market forecasts".[27] How volatile the price is in reality will depend on sentiment, speculation, the credibility of policy and, crucially, the reaction of market participants to changes in the stockpile. Rises and falls in the stockpile could – depending on the time horizons of participants – result in corresponding falls and rises in the price. The modelling in this paper runs until 2075 and solves the price path for a certain target stockpile as at that date. If participants assume the NZ ETS will be around forever, they might be prepared to accept a larger stockpile at that date. Likewise, participants might balk at a growing stockpile much earlier. Market sentiment (Keynes' famous 'animal spirits') is impossible to predict. Either way, it does not seem reasonable to assume that the NZ ETS will last forever.

It is possible, and some would say probable, that as forestry starts to generate a surplus of units in the 2030s the carbon price falls faster than predicted in the model, and foresters will simply stop planting or registering their forests in the NZ ETS. That is certainly the intuitive response as prices fall. As the CCC has pointed out, the resulting "absence of a long-term price signal for afforestation could contribute to a possible decline in planting rates as it becomes understood by market participants".[28] As a consequence, the modelling results presented above may not come to pass. While the model illustrates a likely long-term average price path, prices are likely to be far more volatile in reality. Crucially, there is a risk that the 2050 target may not be met at all (let alone early but temporarily, as the model predicts).

We simply do not know as there is no real way of knowing exactly how foresters are going behave and how that will affect the flow of forestry units in the NZ ETS. That uncertainty is a serious problem in itself, especially if the Government wishes to use the NZ ETS to deliver on specific targets. Even if the Government had the levers to manage forestry supply (which it currently does not), how will it know if more sequestration or gross emissions reductions are required if forestry will not deliver sufficient units? How will it know it needs to put the brakes on forestry units if there is too much supply?

The problem is exacerbated by two factors. There is a five to eight-year lag in new afforestation delivering significant sequestration, and hence units into the NZ ETS. If we think we need more units in ten years, we need to start planting now. Conversely, decisions to plant now may start delivering units when there is a future oversupply. The second factor is the long-term nature of forestry – a forest will continue to deliver a significant quantity of units over many years. Once the tap is turned on, the flow of units continues whether we need them or not.

Stepping back, the implications are two-fold. Firstly, this underlines the point that it will be nigh on impossible for the NZ ETS as currently designed to deliver any particular emissions reduction target at any given time. Secondly, there is likely to be continued uncertainty and volatility within the NZ ETS itself. The response from participants will likely be to build a risk premium into their calculations, raising the cost of running the scheme.

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26 Manley, 2024a.

27 Concept Consulting, 2026, p.11.

28 CCC, 2023, p.60.

6

Hanging hard fern, *Blechnum membranaceum*

The NZ ETS and New Zealand's climate targets

As noted at the beginning of this report, one of the statutory purposes of the NZ ETS is to assist in meeting New Zealand's domestic and international climate targets. However, a primary risk of the NZ ETS in its current form is the degree to which it is able to contribute to New Zealand meeting those targets.

Domestic (2050) target

One of the key findings from the modelling was that almost any scenario that included forestry (both existing and new exotic NZ ETS forests) could initially meet net zero but would not sustain the 2050 target much beyond 2050. To avoid that, the NZ ETS will need to be modified significantly, with either a focus on the role of forestry in reducing supply or on increasing the coverage of the scheme to increase demand.[1]

However, the modelling also showed that without forestry, net zero would not be met at all (see Figure 5.6) and that the NZ ETS's effect on reducing gross emissions is small. That suggests that there is a need for 'complementary' measures outside the NZ ETS, both to encourage greater reductions of gross emissions (especially for emissions outside the NZ ETS,[2] and those covered by EITE 'free allocation') and to encourage afforestation to meet the target. Potential complementary measures are discussed later.

Not meeting the 2050 target is not just a modelling artefact. The Government's projections about the achievement of its emissions budgets, which are stepping stones towards the 2050 target, show that they are at risk of not being met.

- While the Government's central estimate for emissions budget 2 (EB2 2026–2030) shows it being met, the high estimate of emissions in EB2 is well outside the budget.[3] More than half the planned reductions for EB2 are at significant risk of not being achieved.[4]

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1 This could be done by bringing in agriculture or reducing the free allocation of units to EITE industries.

2 Based on using the CO_2e, approximately half our emissions are from agriculture, and these do not have surrender obligations (MfE, 2025b).

3 The Budget for EB2 is a maximum of 305 Mt CO_2e. With existing measures the low, central and high estimates are 287 Mt CO_2e, 303 Mt CO_2e and 328 Mt CO_2e, respectively. Adding in announced but not yet implemented measures leads to only marginal improvement: the low, central and high estimates are 286 Mt CO_2e, 301 Mt CO_2e and 327 Mt CO_2e respectively (MfE, 2025b).

4 CCC, 2026b, p.9.

- For EB3 (2031–2035), not even the central estimate meets the budget.[5] The risk of not meeting EB3 has increased in the past year, with most areas of anticipated emissions reductions now at significant risk of not being achieved.[6]

It is clear more needs to be done, and soon, with both the NZ ETS and complementary measures if budgets and targets are to be met. This view has been reinforced by the CCC, which has said that "the time available to correct course is now short" and that "New Zealand needs to more than double the current pace of decarbonisation to meet the second and third emissions budgets and the 2050 target."[7] Reform of the NZ ETS is even more a priority if, as has been the trend over the last three years, climate policies outside the NZ ETS are discontinued.[8]

This is not a problem that New Zealand can plant its way out of. As the CCC has pointed out, "there is no capacity for additional forestry planting within the second emissions budget to address any shortfalls or provide buffers. This is due to the low level of carbon absorbed by trees in the initial years following planting, along with the immediate emissions increases from changing land uses."[9] And, with forestry expected to contribute just over 49% of emissions reductions in the third budget period, the "reliance on one sector increases the vulnerability of achieving [that] budget."[10]

International commitments

In addition to its legislated domestic 2050 target and emissions budgets, New Zealand also has an international climate commitment through its announced nationally determined contribution (NDC) under the Paris Agreement. New Zealand is currently off track to meeting its NDC through domestic action alone.

New Zealand's first NDC is a 50% reduction of net emissions below our gross 2005 level by 2030. This target corresponds to a provisional emissions budget of 579 Mt CO_2e over the period 2021 to 2030. Most recent estimates have New Zealand missing that target by 85–86 Mt CO_2e.[11]

New Zealand's second NDC, covering the period from 2031–2035, is to reduce net greenhouse gas emissions to 51–55% below gross 2005 levels by 2035. This target provisionally equates to reducing emissions to between 38.98 and 42.44 Mt CO_2e by 2035. New Zealand is currently projected to miss NDC2 by between 13 and 33 Mt CO_2e.[12]

The modelling commissioned for this report did not specifically assess the NZ ETS's contribution to meeting New Zealand's NDC. But the fact we are off track for both NDC1 and NDC2 by some considerable margin suggests greater domestic action is needed than the NZ ETS and other measures are currently delivering.

It is fair to say that without forestry New Zealand would be even further off track from its NDC. However, as noted earlier, the reliance on forestry comes with risks because the forests themselves are not permanent. If forests are lost to natural events, New Zealand could potentially use the international accounting provisions for natural disturbances. But that is a paper solution. The atmosphere would still be warmed by the loss of the forest. Such a choice may, rightly, attract criticism. If the forests are lost through foresters choosing to deforest, New Zealand will face a choice about how to make up the sudden shortfall.

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5 The Budget for EB3 is a maximum of 240 Mt CO_2e. With existing measures the low, central and high estimates are 229 Mt CO_2e, 259 Mt CO_2e and 300 Mt CO_2e respectively. Adding in announced but not yet implemented measures leads to only marginal improvement: the low, central and high estimates are 234 Mt CO_2e, 249 Mt CO_2e and 272 Mt CO_2e respectively (MfE, 2025b).

6 CCC, 2026b, p.11.

7 CCC, 2026b, pp.6 and 12.

8 These include the coal boiler ban, the Government Investment in Decarbonising Industry scheme and the Clean Car Discount scheme (Daalder, 2026; New Zealand Gazette, 2023; MBIE, 2023).

9 CCC, 2026b, p.10.

10 CCC, 2026b, p.11.

11 New Zealand Treasury, 2026, pp.6–7.

12 With only currently implemented policies the range is 23–33 Mt CO_2e. Adding announced policy lowers the range to 13–23 Mt CO_2e (New Zealand Treasury, 2026, pp.7–8).

There is a potential cost, either real or reputational, in that choice. The United Nations Framework Convention on Climate Change (UNFCCC), most recently through the Paris Agreement, contains mechanisms for countries to meet parts of their international commitments (NDCs) through purchasing offshore mitigation from other countries.[13] Treasury has estimated the cost of purchasing international units to meet New Zealand's NDC at around $4.5 billion for NDC1 and an additional $0.6 to $1.6 billion for NDC2.[14]

The UNFCCC targets are non-binding. If New Zealand does not meet its international targets through domestic action, the Government faces the choice between spending money to buy offshore mitigation or absorbing the reputational cost of not meeting the commitment (or of revising that commitment downwards). The choice future New Zealand governments will make is an open question, but in my view it is unlikely that any will agree to significant offshore purchases.

Perhaps a more tangible international cost from New Zealand not meeting its climate targets and commitments might come from provisions in New Zealand's free-trade agreements and other trade-related costs. Free-trade agreements New Zealand has entered into with the European Union and the United Kingdom contain provisions aimed at creating costs and liabilities if the parties resile from their international climate (and other environmental) commitments. That would allow one party to implement trade restrictions or other measures against the other. These would be a direct economic loss to New Zealand. The likelihood of those free-trade agreement provisions being enforced is, again, an open question, but it remains a contingent liability that cannot be ignored.

The best way to minimise these international risks is through increasing domestic action. That suggests improving the effectiveness of the NZ ETS and increasing policy measures deployed outside of the NZ ETS.

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13 The theory behind this is that from the perspective of controlling atmospheric warming, it does not matter where in the world an emissions reduction occurs. Countries who can afford to (and want to) can pay other countries to reduce emissions using Article 6 of the Paris Agreement and crediting mechanisms set out in the Paris Agreement. This offshore mitigation is expected to be primarily gross emissions reductions, although some projects may involve sequestration/offsetting if they meet strict requirements.

14 New Zealand Treasury, 2026, pp.11–12.

7

Kermadec rasp fern, *Blechnum kermadecense*

Domestic costs and risks from the current NZ ETS

The discussion and modelling results above have hinted at a number of systemic risks created by the NZ ETS in its current form. Those risks are likely to manifest themselves in costs to both the Crown and the New Zealand economy that cannot be lightly discounted. They are discussed below.

Increasing liabilities for the Crown

The ever-increasing size of the forestry estate driven by the NZ ETS, and the need for those forests to be maintained indefinitely, create liabilities for the Crown.

NZ ETS rules require forest owners to pay back any carbon credits earned should they deforest permanently or if the carbon in the forest is lost due to fire, disease or some other adverse event (where the TAES mechanism doesn't apply). So in theory, the risks lie with forestry owners. But this assumes that forest owners will actually meet those obligations or that, in the case of permanent forestry, the forest owner will still even be in existence.

If forest owners do not meet their liabilities, that obligation will fall to the Crown. In the short term, it will mean the Crown will have to replant the forest itself, or cover the lost carbon in one or all of three ways: requiring additional gross emissions reductions, purchasing offshore mitigation, or absorbing the reputational hit associated with not meeting its targets. In the longer term, the Crown will have to pick up permanent management responsibilities for forests planted to avoid emissions reductions decades earlier. This bill is passed to future generations.

The increase in permanent forestry in the NZ ETS accentuates this risk. Permanent forests have a higher carbon sequestration capacity than production forests, so the potential carbon loss liability associated with their destruction is much greater. Carbon forests are also made riskier by their single revenue source. If the money from carbon runs out because the carbon price falls or because the trees stop growing, there will be no income to support the management of these forests. Without the carbon revenue it may be easier simply to abandon the land.

Even if foresters can meet their carbon liabilities, the expanding permanent exotic forest estate is a growing source of fire risk, which will in turn be exacerbated by climate change. If these fires get out of control, they pose a general risk to people and property at large. Large pines trees, especially in old single age-class forests, are at greater risk of falling over, causing both direct damage and increasing the risk of land slips and downstream damage. All of these broader costs are unlikely to be covered by foresters' insurance (if they have any). Any excess loss will be picked up by local communities and the Crown. Anecdotally, we have already heard that voluntary fire brigades in some rural communities are asking why they should attend fires in unmanaged permanent pine forests.

An increasingly ineffective policy tool

If the NZ ETS ends up no longer helping to meet New Zealand's targets, it would be imposing a cost without meeting its objectives.

ETSs are not meant to last forever. An ETS that is a strict 'cap-and-trade' scheme is designed to see the availability of allowable units slowly shrink to zero, at which point all gross emissions covered by the scheme would be eliminated.

New Zealand's ETS is different. By allowing unlimited forestry offsets, the Government has implicitly promised that the NZ ETS will be maintained indefinitely. Yet, it is becoming increasingly ineffective. The Crown will bear the cost of any policies it has to introduce outside the NZ ETS to make up for reductions in emissions that aren't happening in sectors covered by the NZ ETS. As noted above, later in the 2030s the NZ ETS might become a cost to the Crown when it has to pay to offset ongoing emissions from the EITE sectors. Costs could also come in the form of liabilities from any increased forest loss. Any auction proceeds the Government might have hoped to use to defray those costs will have disappeared by the mid-2030s.

The NZ ETS will be needed to enable emitters to continue to buy units from foresters in order to maintain in perpetuity a 'net zero' balance of accounts. Even once all gross emissions have been eliminated, the NZ ETS will need to continue to ensure that forest carbon will be managed, maintained and restored. If the administrative charges foresters registered in the NZ ETS pay do not recover all the costs of maintaining the NZ ETS, that burden will also fall on taxpayers.[1]

All of this imposes enduring costs on future generations for little benefit. Future generations might legitimately find themselves asking why we ever entangled ourselves with this ETS at all.

1 A range of fees charged by MPI to NZ ETS forestry participants has recently been reviewed and the fees decreased. For example, the annual charge was reduced from $14.90/ha to $10.28/ha for post-1989 forest land in the NZ ETS (MPI, 2026d).

The myth of lowest cost abatement

Some claim that the NZ ETS is designed to incentivise the lowest cost abatement. In other words, the NZ ETS will incentivise those facing a carbon price to find the least costly way of reducing emissions. In practice, current NZ ETS settings mean that the lowest cost abatement is usually more afforestation. Several issues raised in this report suggest that under current settings the carbon price does not reflect the true cost of abatement. We cannot be sure the current NZU price is reflective of the true cost of abatement for any particular target, because there are no levers in the NZ ETS that can deliver a particular target in the long term once auctioning runs out. The NZ ETS price does not reflect the following contingencies:

- The NZ ETS doesn't cover the whole economy. If the Government chooses to exempt certain sectors, it must either use taxpayer funds to subsidise action outside the NZ ETS or increase the price on sectors inside the NZ ETS.
- The NZ ETS might achieve net zero before 2050, but crucially, our modelling suggests that it won't be able to maintain net zero much beyond that.
- Allowing unlimited use of forestry units, implicitly underwritten by the Government, means that the risks and externalities associated with forestry (weather events, disease, pests, fire) are not fully priced in.

This is underlined by the Treasury shadow carbon price being higher than the current NZ ETS price.[2]

Furthermore, offsetting emissions is not a one-off cost. Planting only offsets a year's emissions (over their atmospheric lifetime). A further year's emissions require more planting. And the next year, and the next. While the short-term cost of planting trees may seem cheaper than eliminating emissions today, the cost is a recurring one until we eventually pay to eliminate the gross emissions. And even when we do, we will continue to carry the costs and liabilities of maintaining the trees that were planted in lieu of reducing emissions.

Put another way, using forestry to offset carbon emissions could be seen as only paying the interest on your home mortgage. Until principal repayments start to be made, in this case reducing gross emissions, the total interest bill continues to rise. We risk ending up paying much more in interest than the house is worth. Banks generally do not allow long-term interest-only mortgages. Yet the design of the NZ ETS encourages exactly this improvident behaviour when it comes to managing our emissions.

The opportunity to be gained from reducing gross emissions

Using forestry as an offset has long been justified on the basis that it buys the country time to wait for the costs of emissions reduction technologies to fall. The traditional wisdom is that investing later means that the country will need to invest less overall to transition to a low-emissions economy. If that was the case 20 years ago, the evidence to support this view is weakening by the day.

If anything, there is an emerging economic case for taking early action to reduce emissions.[3] The nuance of the argument depends on the circumstances of the business or household in question. The work of Rewiring Aotearoa and the Green Building Council helps inform households and businesses wanting to make cost-effective electrification decisions.[4] Meanwhile, the Sustainable Business Council has clearly set out the economy-wide argument for faster decarbonisation, setting out a path to 2050 that would reduce emissions by 22% while increasing GDP by $33 billion. Crucially, this relies on a 'credible and predictable' carbon price.[5] Briefly, the main themes of their work are as follows.

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2 New Zealand Treasury, 2021.

3 A good summary of this literature is available in *The Growth Story of the 21st Century: The Economics and Opportunity of Climate Action* (Stern, 2025).

4 NZGBC, 2025; Rewiring Aotearoa, 2025.

5 BECA and Sapere, 2026.

1. Investment

Electrification of the economy provides many opportunities to invest in new technology that is already more efficient than existing technology. According to Rewiring Aotearoa the vast majority of electrification possibilities in New Zealand (84% – equivalent to 7.5 Mt CO_2 per annum) already make good economic sense.[6] This number has risen further in the year since that work was published. The fact that most people aren't making these investments suggests that lack of understanding and/or access to finance are barriers. A higher carbon price (and complementary policies like access to finance and efficient regulation) would encourage people to speed up these decisions so they can save money in the longer term. While there is a chance that technologies will improve further, continued delay means that businesses and households are ignoring low-hanging fruits that are already available. Lack of investment in capital goods and poor resource efficiency are perennial issues for New Zealand and have been highlighted as a driver of the country's poor productivity. Electrification of the economy tackles both these issues. There are also opportunities for improving skills (another source of poor productivity) through training and learning by doing while implementing new technologies. Delayed action on electrification only risks increasing New Zealand's productivity gap with other countries.

2. Balance of payments

This is an extension of the argument above, that investment in electrification can reduce ongoing costs to the country. New Zealand's poor balance of payments has for a long time been a source of risk for international investors, pushing up interest rates and acting as a drag on the economy's performance. Replacing fossil fuels with electricity where cost effective (refer to point 1 above) offers the opportunity to reduce a major source of the country's balance of payments deficit. Importing fossil fuels costs the economy around $10 billion per annum.[7] In most cases, electrification will reduce this cost and significantly improve the resilience of the economy to shocks, such as those evidenced by the latest crisis in the Persian Gulf.

3. Innovation

There is a well-established productivity advantage to having 'frontier firms'.[8] These firms are at the forefront of innovation in their industry and command a price premium as a result. The productivity boost comes from these firms finding a distinctive, high-value product or service and 'learning by doing' to continuously improve. Exporting gives them access to increasing returns to scale, which allows them to recover the large investment in new technologies. An upheaval like the transition to a low-emissions global economy throws up opportunities for developing frontier firms. For a small country like New Zealand this is a more realistic possibility in niches, especially where there is an existing advantage. However, it should not be overlooked as a source of wider productivity growth.

4. A healthier, more productive population

The transition to a low-emissions economy offers opportunities that offer co-benefits as well as improved productivity. Examples include:

a. improved health from better air quality (as a result of reduced emissions), greater use of public and active transport, and fewer accidents (e.g. from greater use of rail to transport freight) – altogether this means fewer sick days and longer lives
b. improved energy efficiency, saving businesses and households money
c. improved density of cities, which reduces emissions and improves the returns on all infrastructure investments.

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6 Rewiring Aotearoa, 2025.

7 Trading Economics, 2025.

8 New Zealand Treasury and New Zealand Productivity Commission, 2024.

5. Reduced long-term costs of maintaining the NZ ETS

Finally, as noted earlier, servicing the NZ ETS is not costless. It requires a complex and expensive administrative framework. And it weighs heavily on one of New Zealand's historically strongest sources of productivity growth – flexible land-use change in response to market signals. There is value in removing emissions from the atmosphere, and the NZ ETS price forms part of the market signal. However, any carbon income is always a one-off, while the resulting carbon debt reduces the options for land use permanently. In the case of permanent forests, the deforestation liability will make land-use change in the future difficult, meaning that land is less able to deliver its most productive return. While on some classes of land permanent afforestation may be the best 'use', it still has to be maintained and protected. Offsetting through afforestation should be a last resort, rather than the go-to option.

The best way to realise this opportunity is through a higher carbon price – one that reflects the risks from an over reliance on forestry removals and also incentivises swifter gross emissions reductions. The ideal price signal for reducing gross emissions would be a steadily rising carbon price. As the modelling suggests, we face the opposite – an increase in the short term followed by a sustained decline.

The sooner we set about reducing gross emissions in a careful, measured and serious way, the sooner we will be able to draw a line under future liabilities. The next section looks at the key considerations that need to be addressed to go about doing that.

8

Waterfall fern, *Blechnum colensoi*

Considerations for managing future NZ ETS-driven risk

The modelling results and discussion of risks presented above illustrate the quandary in which the current operation of the NZ ETS places New Zealand.

Should the Government maintain the NZ ETS as currently designed, it will face the following consequences:

- New Zealand might meet its 2050 net target initially but will not be able to continue to meet it as required by law. Its design is also hindering achievement of New Zealand's domestic emissions budgets (especially EB3) and NDC.
- The Government will need to maintain the NZ ETS, even if it has stopped providing meaningful emissions reductions or removals sometime in the late 2030s or early 2040s. By this time the Government would not be getting any proceeds from auctioning.
- The forestry estate will expand with little control over where NZ ETS-driven forestry will be planted or the type of trees that will be planted. It implies a level of land-use change that will bring significant economic and social transition challenges in its wake.
- To avoid a future emissions pulse, the Crown will be required to ensure that the forests used for offsetting maintain their carbon stocks in perpetuity. Either the Government will need to maintain an impotent NZ ETS far into the future to ensure that foresters retain their deforestation liabilities or it will have to take over liability for the carbon in those forests itself. This may occur in any case if foresters find it cheapest to walk away from their commitments. Either way there will be costs to the taxpayer.

Furthermore, the current design of the NZ ETS, without effective levers, cannot achieve other climate objectives. It cannot deliver:

- **a minimal and low-cost contribution to international climate action.** The NZ ETS is overdelivering afforestation at the wrong times. While the target might be met initially, it cannot be maintained. Initial achievement of the target might seem cheap, but significant ongoing costs are created to maintain the forests, and to manage the risk posed by a large carbon forestry estate
- **more ambitious climate targets.** The NZ ETS is unable to deliver a steadily rising carbon price to drive gross emissions reductions because incentivised afforestation suppresses prices. Increasing demand (for example, by including the long-lived emissions of sectors such as agriculture that are currently outside the NZ ETS) would likely drive more afforestation, bringing with it the increased risks outlined above of a large carbon forestry estate

- **strong net emissions targets using forestry.** While the NZ ETS currently delivers prices suitable for foresters, they will over time collapse, risking returns that some foresters, particular those with permanent carbon forests, might be relying on. Large areas of carbon forests create environmental, fiscal and social policy risks for future governments that will need to be addressed. A future government may need to make significant and abrupt policy corrections, generating investment uncertainty for foresters
- **control of the land-use change to forestry driven by the NZ ETS.** Persistently low carbon prices will slow the reduction in gross emissions, meaning a larger forestry estate would need to be planted over time. Given the high costs involved in converting land back from forestry it is unlikely that such shifts in use will be easily reversed.

In short, the NZ ETS, as currently structured, does not work for anyone's climate objectives.

It does, of course, work for the financial and commercial interests of foresters and market intermediaries. The interests of these groups were not part of the objectives that motivated why the NZ ETS was implemented. It would be hard to justify the scheme if those were the only interests being served.

It is clear that some major changes will be needed to ensure the NZ ETS is both sustainable and effective. The brief history of the scheme outlined at the beginning of this report highlighted some major policy shifts that have occurred in its first 15 or so years. These came about as governments of the day encountered issues managing supply and demand in the NZ ETS. As outlined above, new supply and demand concerns will materialise in the 2030s, making another change inevitable.

The following discussion looks at some of the considerations that will need to be taken into account by any review of the NZ ETS aiming to make it a more durable and useful policy instrument.

What is the goal of our climate policy?

Before embarking on any reform of the NZ ETS, we need to clarify what the NZ ETS is intended to achieve. The first question we have to ask is whether – as a country – we are serious about our international obligations. If not, we should revisit our commitments. Successive governments have committed to targets that they had no plan to achieve. As we have seen with the modelling, this is a risk with our domestic 2050 targets as well. If we are serious about meeting these, then we need a plan.

A renewed debate about the goal of the NZ ETS – and indeed the goal of climate policy generally – is overdue. The NZ ETS could focus on reducing gross emissions (which would mean forestry was progressively removed from the scheme entirely) or continue to focus on net emissions (but with controls to better align what the NZ ETS delivers with New Zealand's climate targets), or anywhere in between those two extremes.

The 'gross vs net' discussion could extend beyond the design of the NZ ETS to whether New Zealand should have split targets with 'legs' that focus separately on gross and net emissions reductions. That door has already been partially opened with New Zealand taking a split gas approach to its targets, differentiating between biogenic methane and long-lived greenhouse gases.

Just because New Zealand, like other countries, includes forestry in its international accounting, it does not follow that the NZ ETS has to include forestry. Using the NZ ETS as a net emissions tool was a deliberate choice. Confining the NZ ETS to addressing gross emissions – or at least tilting it back in that direction – would be an equally deliberate choice.

In the 1990s and 2000s, there was a good reason to focus on net emissions – we simply did not have the technologies to affordably reduce gross emissions. This argument no longer holds. Ultimately, any decision about the goal of climate policy is a political one. In my view, as time passes and the cost of low-emissions technologies plummets, the benefits of placing more focus on reducing gross emissions are increasingly hard to ignore.

Potential non-forestry NZ ETS changes

As noted above, the NZ ETS as currently designed is not working for anyone. What changes are needed will depend on what objective decision makers are trying to achieve.

If the objective is primarily to meet and maintain the net zero target, then the scheme must be reformed to increase demand for units to accelerate gross emissions reductions. Providing more supply will not achieve this goal. Increasing the overall level of demand is needed. Examples of possible reforms (they are not mutually exclusive) include:

- bringing international aviation emissions into the scheme
- bringing long-lived agricultural emissions into the scheme
- phasing out of industrial allocations more rapidly.

All of these options would increase the surrender obligations in the NZ ETS over the current settings. A key risk from this increased demand is that it could fuel further forestry supply and its consequent risks. Therefore, measures to increase overall demand would probably still require some measures to manage supply and demand for forestry units.

If the objective is to have a steadily rising carbon price in order to incentivise investment in reducing gross emissions (thereby accelerating the uptake of productivity-improving technology and averting further afforestation), then changes to the way the NZ ETS treats forestry are the best way to do that.

How restrictions on forestry (and other removals) might work

If the Government decided to restrict forestry in the NZ ETS, either by removing it completely or curtailing the use of forestry units, it would need to consider carefully how best to go about that. None of the options are straightforward, and each has its own risks.

Reducing the supply of forestry units

The modelling showed that stopping new forestry registrations but 'grandparenting' existing NZ ETS forests to remain in the NZ ETS would not meet either leg of the 2050 target. The carbon price would rise higher than in the base case, but would be capped by forestry unit supply increasing as stock-change forests switched to become *de facto* permanent forests. As a consequence, gross emissions would only be slightly lower, and auctions would not generate any fiscal benefits. Such an approach would also create a windfall for those forests already registered in the NZ ETS and raise questions of equity for foresters who might have wanted to register but now couldn't.

The most radical way to reduce supply would be to completely remove new and existing forestry from the NZ ETS. The carbon price would rise, driving higher gross emissions reductions from NZ ETS covered sectors, thus reducing the amount of reductions needed outside the NZ ETS and reducing the long-term cost of decarbonisation to the New Zealand economy. Auctions would begin to clear. Meeting the 2050 target would still require significant emissions reductions outside the NZ ETS in the form of both targeted afforestation and gross emissions reductions in sectors not covered in the NZ ETS (such as agriculture). That could be funded from auction proceeds.

However, removing forestry completely would create the biggest impact for those who have already invested in NZ ETS forestry and hold legitimate expectations that those investments will not be interfered with. The Government would likely face strong pushback and possible litigation together with Treaty settlement claims. If the Government decided to meet that pushback by buying out the rights of existing registered foresters, the costs would be huge. Some of that cost could be recouped through auction proceeds. Depending on your viewpoint, a buy-back would be seen either as windfall profits for foresters in the NZ ETS, raising equity concerns, or as compensation for expropriated property rights.

A less radical approach would be to reduce the supply of forestry units entering the scheme, which could be done with the following actions:

- Control the amount of stock-change forestry that can switch to being permanent forest, a key uncertainty revealed by the modelling results. Consideration needs to be given to how that is best controlled or at the very least made more predictable.
- Buy back the NZUs that existing NZ ETS forests are projected to generate over the coming decades. This could ensure a rising carbon price over time, accelerating gross emissions reductions. 'Buy-backs' would likely be costly. To make them affordable, the Government would probably have to cap payments at a relatively low level.

Reform could also target certain forestry types. As indicated in this report, there are increased risks arising from permanent forestry. This includes the *de facto* permanent forests operating under stock-change accounting. Permanent forests take considerable maintenance to ensure that the carbon sequestered is not lost to pests and other adverse natural events. However, at some point the revenue accruing to these forests will cease. Given that the forests need to be maintained in perpetuity it seems inevitable that responsibility for them will eventually end up in the lap of the Crown.

Regulation could help here. Permanent forests should be required to have realistic long-term management plans that demonstrate how the ongoing costs of maintaining the carbon stock of the forest will be funded after the forest stops earning carbon credits. To manage their different risk profiles, the Government should also consider different rules for different types of permanent forests (exotic, native, transition).[1] Ideally, from an environmental perspective, the use of permanent

1 PCE's report, *Alt-F Reset: Examining the drivers of forestry in New Zealand*, examines these in more detail (PCE, 2025).

forests would be restricted to the use of natives growing on erosion-prone (or other marginal) land. To ensure the forest is maintained long term, such projects should be developed with communities and landowners and be part of a productive landscape.

Consideration could also be given to pacing the amount of NZUs any permanent forest earns. For example, the NZUs permanent forests earn could use the averaging approach to earn up to the long-term average for that forest type. Alternatively, any NZUs earned could be held in trust and the interest from that investment paid out as income to the forest owner. Both would provide an incentive for the forest to be managed on an ongoing basis.

Changing the demand for forestry units

Changing demand for forestry units should also be considered. Options include:

- placing a discount on the value of forestry units so more have to be used to offset each tonne of emissions[2]
- progressively limiting the percentage of surrender obligations that can be offset with forestry NZUs – effectively capping their use.[3]

These approaches work by changing the economics of forestry and the returns that foresters would earn. Using them effectively to target particular emissions outcomes would require a clear understanding of the interplay of price, supply and demand in the NZ ETS. It would likely be complicated and require the Government to frequently adjust the settings to avoid over- or under- shooting whatever objectives it is trying to achieve.

2 For example, one forestry NZU is currently worth 1 t of carbon emitted. This could be reduced to 0.8 t of carbon in 2030 and 0.5 t in 2050. Native forests could be exempt from the discount.

3 For example, a firm might only be allowed to use forestry units to cover 50% of its surrender obligations. The percentage allowed could decrease over time.

Other important considerations

The modelling of forestry restrictions undertaken for this report was difficult because the current model used for NZ ETS decision making is best suited to tweaking the existing settings rather than answering questions about larger design choices. To inform any analysis designed to explore significant changes to the design of the NZ ETS, such as the role of forestry, new and improved models will be needed. Given the cost to the economy of getting climate mitigation decisions wrong, it would be an investment that would pay for itself many times over.

As a final point, there has been a lot of debate recently about including other forms of biological carbon sequestration offsetting (e.g. blue carbon, on-farm vegetation or soil carbon). These face two overwhelming problems. The first is that administering offsetting with forests is much more straightforward than any of other forms of sequestration. Any system to manage these other forms would be fiendishly difficult to design and administer. Secondly, and perhaps most importantly, the principal problem afflicting forestry's role in the NZ ETS will be a massive oversupply of units. Adding even more supply would be foolish.

Actions outside the NZ ETS ('complementary measures')

While an ETS, if designed well, can do a lot of the heavy lifting in climate policy, no ETS will ever be able to do it all. For some activities, especially those that have very few mitigation options, even a high price won't induce behaviour change. And even if cost-effective emissions reduction options exist, firms and households might not take them up in a timely manner because of non-price barriers, such as information constraints, sunk investments (e.g. they have just installed a capital-intensive fossil fuel boiler), or lack of capital or access to finance. Carbon prices also have uneven distributional and equity impacts that governments will want to manage by keeping the carbon price controlled.

To manage these issues (many of which are what economists call 'market failures') and still achieve desired emissions reductions, policies outside the ETS (in bureaucratic jargon 'complementary measures') are required. In the New Zealand context, those might include policies that directly reduce emissions such as a coal boiler ban, specific measures to reduce agricultural emissions, or incentive schemes to accelerate gross emissions reductions (such as incentives for electric vehicles and industrial electrification as supported by the former Government Investment in Decarbonising Industry scheme).

When an ETS is not designed well, even more complementary policies will be needed to meet climate goals. As the analysis in this report shows, the NZ ETS is in this boat. One would assume that for those who see the NZ ETS as New Zealand's principal climate tool and doubt the value of complementary policies, NZ ETS reform would be a high priority.

Even if the NZ ETS was functioning effectively, some complementary policies would still be needed to reduce emissions in those sectors not covered by the NZ ETS (or insulated from the NZ ETS price). That includes agriculture and those industries covered by EITE 'free allocations'.

This report is not the place for a detailed discussion about the pros and cons of the wide range of complementary measures New Zealand could consider. However, as this report critiques the role of forestry in the NZ ETS, I want to outline some of the alternative roles forestry might play.

If forestry were to be restricted in the NZ ETS, some degree of ongoing afforestation would still be needed to meet New Zealand's climate objectives, including NDCs, domestic emissions budgets, and the 2050 target. Policies, and most likely some sort of financial incentives, would be needed to encourage afforestation outside the NZ ETS. The advantage of such an approach is that when the Government is purchasing the sequestration, it can work with landowners to decide where and what kind of forest is planted. Such an approach can help get the right tree in the right place. The voluntary market may also play a role with afforestation, particularly for natives, driven mainly by private companies wanting to offset their emissions for corporate reputational purposes.[4]

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4 If this eventuates on any scale, the Government would need to consider how the removals generated would be treated for accounting purposes towards New Zealand's domestic targets and its NDC.

Plantation forestry also contributes wood (as a structural product) and biomass (as an energy source) to support our transition to a zero fossil fuel emissions economy. Policies that look to optimise these opportunities could be considered.

Two relatively novel opportunities for forestry are worthy of slightly more detailed discussion below.

Geological carbon storage

It is worth noting the potential of linking forestry with geological carbon capture and storage (CCS) as a complementary measure. Geological CCS can be used as a way of offsetting hard-to-abate carbon dioxide emissions that prices and other policies and measures might struggle to mitigate. Provided the emissions are stored in suitably capped geological formations, they can avoid the risks of impermanence that biological storage faces.[5] Creating such an industry would take time.

If New Zealand decides it wants a geological CCS industry in the future, investment in its creation would need to start soon. Care would need to be taken with any incentives (market or otherwise) that were created. Geological CCS removals would probably best be kept separate, but complementary with, any NZ ETS-driven removals, especially where oversupply is an issue, as it is in the NZ ETS. While geological CCS has potential, the policy implications and risks are still in the early stages of being considered, so caution is advisable.[6]

Forestry could play a role in geological CCS. Trees, especially *Pinus radiata*, are very good at sequestering carbon. They are just not so good at keeping it permanently sequestered. Trees could be grown to sequester the carbon and then burnt in industrial units that capture the resulting carbon dioxide for storage in geological reservoirs. The energy generated could be used for electricity supply (or industrial heating), providing another source of energy security for New Zealand.

A methane ETS

Another potential role for forestry is to offset agricultural methane emissions outside the NZ ETS. As has already been noted, one of the key problems with allowing forestry in the NZ ETS is the mismatch between the impermanence of forestry relative to the very long life of carbon dioxide in the atmosphere. There is a much better match between the atmospheric life of biogenic methane and rotation pine forests.

Forests remove carbon dioxide from the atmosphere, not methane. Forest offsetting works by creating a cooling effect to compensate for the warming from short-lived emissions such as biogenic methane.

Previous PCE work has shown that the full impact of a steady, ongoing flow of methane on warming could be offset by a one-off planting of plantation forestry.[7] The trees only need to remain as long as the flow of the methane it offsets persists. If methane emissions were to be reduced in future – for example, from successful methane-reducing technologies or from changes in stocking rates – some of the land could be freed up for other uses. In other words, unlike offsetting carbon emissions, offsetting methane emissions through afforestation does not permanently remove future land-use options.

The amount of afforestation required to permanently offset the warming differs for different animals.[8] Planting around 770,000 hectares of new commercial pine forest by 2050 would have a similar effect on warming as reducing gross methane emissions by 10%.[9]

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5 Other technologies, such as incorporating CO_2 into concrete and sinking it deep into the ocean, might also prove suitably permanent.

6 There is some good academic thinking going into this, such as the forthcoming paper titled 'Supply-side carbon management could reconcile industrial leadership with climate ambition' by Allen et al. (in press).

7 PCE, 2018, 2022.

8 Dairy cattle 0.6 ha per head; beef cattle 0.4 ha per head, and sheep 0.08 ha per head (PCE, 2022).

9 PCE, 2022.

Offsetting methane with forestry could be enabled by having a separate ETS for biogenic methane. It would ensure that whatever level of methane emissions we aim to stay within would be allocated to the most efficient producers. It would also mean that the land-based sector of the economy would not be losing land permanently to offset emissions from fossil fuel users.

All of the issues outlined in this section are big and difficult to grapple with. It would be foolhardy to put a stake in the ground and make specific recommendations on any of them without better information, analysis and debate. Setting up that debate is what the next section – Recommendations – aims to do.

9

Southern shore spleenwort, Asplenium scleroprium

Recommendations

Under current settings, the NZ ETS is achieving none of the aims such a scheme could be expected to address. While it might meet the goal of net zero 2050, it probably won't meet the crucial second leg of that goal by maintaining net zero thereafter. In the shorter term, the NZ ETS design is hindering the achievement of New Zealand's statutory emissions budgets and its international NDCs. Significant use of forestry removals will keep the price artificially low, blunting gross emissions reductions. The result will be that more forestry needs to be planted in the long term. Future generations will have to forgo other options for using that land, needing instead to maintain this forestry estate indefinitely. They will have to do so in the face of mounting risks from fires, pests, diseases and extreme weather. Permanent forestry is particularly at risk because the revenue to maintain it will eventually run out, and the liabilities will likely fall on taxpayers.

The NZ ETS as currently designed lacks the levers to manage the supply crisis it will face from oversupply of forestry units or to steer New Zealand towards any of its climate commitments – emissions budgets, its NDC, or the 2050 and beyond net zero target. It is effectively rudderless.

The modelling and analysis in this report show that major changes to the NZ ETS are needed. Small tweaks will not suffice. While some may critique the modelling – no model is a perfect representation of reality or the future – the warnings it sends should not be ignored.

Time is not on our side. We need to act now if we have any hope of using the NZ ETS to manage future emissions budgets, which are stepping stones towards the 2050 target. Waiting longer to address the issues, especially around forestry, will only make them harder and more expensive to solve.

Commit to a major review of the NZ ETS

The challenges posed by the design of the NZ ETS are not of recent origin. They go back to debates held in the 1990s and encompass the responsibilities of all governments over more than two decades. A challenge that casts as long a shadow as climate change exists outside any electoral cycle and requires all political parties to acquaint themselves with the forces that have been set in train. There is nothing to be gained by trying to apportion blame for the risks we now run. We start from where we are.

Any sensible way forward involves acknowledging that there is a problem, committing to addressing that problem, and then developing and implementing actions to solve it. While there will likely be healthy disagreement about the solutions, there is little room for disagreement on the nature of the problem.

Recommendation 1: Secure cross-party agreement that the NZ ETS is in need of major reform.

Recommendation 2: The Minister of Climate Change, supported by opposition climate spokespeople, should direct relevant government agencies, led by the Ministry for Cities, Environment, Regions and Transport (MCERT), to begin policy work and modelling on future options for the NZ ETS.

It is clear from the modelling and other analysis presented in this report that tinkering with the NZ ETS settings will not be sufficient to stave off the risks posed both to the NZ ETS itself and New Zealand's climate mitigation efforts generally. A major reform is necessary. Doing that reform well will take years. Time is needed to gather the information and modelling base. What we have now does not provide the granularity that such a large change requires. More time is needed again to properly diagnose the problems, develop and consider potential solutions and build broad political and stakeholder support for the changes.

A review of the NZ ETS should, at a minimum, include:

- revisiting whether the NZ ETS should focus on gross or net emissions reductions
- questioning the role of forestry and assessing the implications of various restrictions to forestry, including its complete removal from the NZ ETS
- considering increasing the demand side of the NZ ETS by, for example, including long-lived agricultural emissions, international transport emissions, and reducing (or eliminating) free allocation to EITE firms
- identifying those sectoral reductions that are not best achieved through the NZ ETS (e.g. agricultural methane) and spelling out what policies outside the NZ ETS might be needed to target those emissions – this should include exploring the merits of a separate NZ ETS to manage biogenic methane emissions
- improving the models on which changes to the NZ ETS are assessed.

I am not calling for a commitment to any particular solution. I am calling for a serious and informed debate.

There will inevitably be debate about the solutions and pushback from those who perceive they might be worse off because of them. That is normal in a democracy. There will be attempts by those who want to resist changes to prevent a debate commencing. But it is a debate we cannot afford to avoid. The problems we face are too serious to permit that. That is why my recommendations specifically call for commitment from all parties to support a major review of the goals of climate policy and the NZ ETS.

Be clear about the goals of climate policy

Any successful reform of the NZ ETS must start with clarity about what New Zealand's climate strategy is and what is needed to achieve it.

The NZ ETS is just a tool – one of many New Zealand could use. The NZ ETS's design should be driven by New Zealand's climate strategy and policy, not vice versa.

When I reviewed how the Government developed the first Emissions Reduction Plan (ERP1), I concluded that there are some key framing questions that should be asked when each Government sets emissions reduction plans.[1] Those questions are:

- To what extent does the Government wish to rely on neutral, economy-wide policy tools like pricing emissions, as distinct from a raft of more selective interventions tailored to particular sectors, players and groups of consumers?
- What distributional consequences are of particular concern? What is the Government prepared to do to outflank them?
- Where should the fiscal burden fall?
- What should the balance be between gross and net emissions reductions, and to what extent should those reductions be achieved domestically or offshore?
- To what extent should the focus be on emissions reduction in the near term (i.e. within the upcoming emissions budget period) as against laying the foundations for future reductions?

Addressing those high-level questions can serve as a framework to help resolve some of the key trade-offs that alternative policies raise and help resolve how the NZ ETS can be designed to contribute to achieving the desired climate strategy. Addressing the questions needs to be an ongoing process because trade-offs will become apparent as new technologies cause the structure of the economy to adjust. This is a complex, economy-wide challenge that does not lend itself to a single policy that we can 'set and forget'.

Recommendation 3: There should be a renewed engagement focused on winning cross-party agreement on the broad strokes of what a climate strategy should look like, if not its detail. It should be guided by the questions set out in my review of ERP1.

Call a temporary halt to buy time

Any review of the NZ ETS (and discussion about climate strategy) will take time. We cannot let the problem get worse in the meantime. That would simply make any cure even harder and more expensive to implement. As noted earlier, new forestry data became available part way through our modelling exercise. The afforestation that occurred in that single additional year materially affected the results, showing that the problem was getting worse. If afforestation continues at high rates, every year's delay will make potential solutions more difficult to implement. The following recommendations aim to 'freeze' the situation as best we can to buy breathing space to take the time needed to discuss the problem and to develop, agree and implement workable solutions.

Recommendation 4: Place a temporary moratorium on new NZ ETS forestry registrations until the major review has been completed and decisions made on its recommendations.

Recommendation 5: Change the NZ ETS forestry rules for stock-change forests to prevent them from becoming *de facto* permanent forests.

1 PCE, 2023a.

Recommendation 6: Change the NZ ETS rules for permanent forests to limit their use to native afforestation on erosion-prone and marginal land.

Recommendation 7: Rule out any new types of biological offsetting in the NZ ETS, at least until the review has been completed and decisions made on its recommendations.

These changes might make achievement of both EB3 and EB4 more challenging and therefore require additional measures, including afforestation outside the NZ ETS, to meet those budgets. Doing so in a controlled manner is preferable to using the NZ ETS to drive it. Using the NZ ETS could cause issues further down the track given the lag time between when forestry planted today starts to deliver significant units, and the fact that once the tap is turned on it cannot easily be turned off.

Reimagine forestry's role in climate mitigation policy

As noted above, finding a balance between reducing gross and net emissions is a crucial part of any climate strategy. This is ultimately a political decision. In my view, the arguments for an increased focus on gross emissions reductions become stronger as time passes. Assuming that the NZ ETS is the primary climate policy tool, this implies the need for a steadily rising carbon price over time. The modelling in this document clearly shows that this is not possible under the NZ ETS if there is any significant access to forestry removals.

The suggestion of significant changes to forestry's treatment in the NZ ETS will be confronting, especially for those with forestry interests and some Māori landowners. They have legitimately made significant investments based on policy settings about the role of forestry in the NZ ETS that (with various modifications) date back at least 15 years and, in terms of New Zealand's advocacy for a net approach, date back to the 1990s.

While my comments may be viewed by some as anti-forestry, they are not intended that way. The report argues that the forecasts for the future of the NZ ETS don't work for anyone involved, including forestry. Forestry should have a role in climate mitigation policy. However, that role should be substantially different from the one it plays today. While some avenues for forestry should be closed off, new avenues should also be opened.

It is my view that forestry should be progressively removed from the NZ ETS or, at the very least, its participation and use should be severely restricted. Exactly how all this is done needs careful thought and analysis to avoid a range of perverse consequences. Consideration should also be given to potential compensation for foresters for the investments they have made in good faith to the best of the Crown's ability.

Removing forestry from the NZ ETS does not mean that the inclusion of forest sinks should not be a legitimate way for New Zealand to meet its international climate commitments. That is currently provided for by international rules dealing with the treatment of LULUCF activities, and they are unlikely to change significantly anytime soon.

In order for New Zealand to meet its climate targets, significant afforestation will still be needed. I am simply suggesting that this be done outside the NZ ETS, where there can be more control on the type, location and quantity of planting. NZ ETS auction proceeds (if auctions begin to clear) could be used to fund some of this afforestation, potentially allowing a wider range of afforestation options than are currently being incentivised.

New Zealand could also harness the carbon sequestration superpower of *Pinus radiata* as a feedstock for geological CCS that would help overcome the permanence issues of storing carbon in trees outlined in this report and assist our energy independence.

Developing a 'methane ETS' could both provide a less fraught climate mitigation role for forestry and help New Zealand tackle its significant agricultural emissions that sit outside the NZ ETS.

Finally, consideration should be given to the ways in which plantation forestry could contribute wood (as a structural product) and biomass (as an energy source) to support the transition to a zero fossil fuel emissions economy.

Recommendation 8: Alongside a major review of the NZ ETS, the Government should develop options for the alternative roles forestry might play in New Zealand's climate mitigation efforts. Any decisions on those roles should be made in tandem with any changes resulting from a review of the NZ ETS.

Mountain hound's tongue fern, *Microsorum novae-zealandiae*

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Notes

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