# MODELLING INSIGHTS BRIEF:

## OUTCOMES OF THE NZ ETS UNDER THE STATUS QUO, POLICY ALTERNATIVES AND A REMOVALS INVESTMENT MECHANISM

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## Declaration of interests

The author provides consulting services, including market forecasting, data analysis and advice, to businesses operating within the NZ ETS market. The author was previously employed by the Ministry for Primary Industries, leading work as part of a prior review of the NZ ETS considering reform options of a similar nature to those discussed in this brief. The analysis and conclusions presented in this brief are the author's own, and have been developed as part of a broader Motu project on pathway options for the NZ ETS and removals.

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## Disclaimer

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# EXECUTIVE SUMMARY

## Outcomes under the status quo

1 **From the mid 2030s, the status quo New Zealand Emissions Trading Scheme continues to operate but is unable to deliver further net emissions reductions.** Models examined converge on a market fully supplied by forestry and industrial allocation from around the mid 2030s. From that point auctioned units are not needed, and attempts to rally the emissions price through auction settings will prove ineffective. Prices peak at $60–$105 (real 2025 NZD) in the 2030s and decline thereafter, with long-run outcomes ranging from $5 to $55 by 2060.

2 **Emissions budgets are not met under the status quo.** All scenarios meet emissions budget 2, only one meets emissions budget 3, and none meet the Climate Change Commission's (2024a) recommended emissions budget 4 volume (21–63Mt $CO_2e$ over). Covering the emissions budget 4 gap (e.g. through additional removals or offshore mitigation) would carry an implied cost of $1.3–4.1bn, valued at average modelled New Zealand Emissions Trading Scheme prices over the period (~$64 per $tCO_2e$). This exceeds all projected auction revenue from emissions budgets 2 and 3 combined.

3 **The New Zealand Emissions Trading Scheme will not deliver significant indigenous afforestation.** Direct planting of indigenous species can cost $20,000–$28,000/ha to establish, against $1,400–$2,500/ha for pine, and presents a negative net present value even under emissions price paths rising from $90. With land suitable for exotic afforestation abundant, exotic species will remain the marginal supplier. The scheme likewise provides no incentive to enhance carbon stores across New Zealand's 9.2 million hectares of pre-1990 forest, or post-1989 standard forest after it has reached its long-term average.

4 **Auction revenue falls away with the price under the status quo.** Revenue averages $550m across scenarios during emissions budget 2 and $245m during emissions budget 3 (real 2025 NZD), with no model projecting any auction revenue from emissions budget 4 (2036–2040) onwards. The Government earned $3.8bn (nominal) from auctioning through to the end of emissions budget 1, equivalent to $4.3bn in real 2025 NZD. The status quo erodes the effectiveness of both its primary lever over unit supply and its revenue from the scheme at the same time.

## Opportunities through New Zealand Emissions Trading Scheme reform and a removals investment mechanism

5 **A removals investment mechanism could pay for removals directly, outside the New Zealand Emissions Trading Scheme.** The removals investment mechanism examined here is an illustrative design for costing, not a policy proposal. It is Crown-funded, starts in 2030, and covers new afforestation and any existing forests transferred out of the New Zealand Emissions Trading Scheme. Indigenous forests receive establishment payments covering roughly the full cost of establishment (against at most 30% under prior grant schemes for typical direct planting), plus $90 per $tCO_2e$ for ongoing sequestration and management, giving landowners a positive net present value. Exotic

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forests receive a recurring payment of $50 per $tCO_2e$, above or roughly equivalent to the long-run prices forecast in status quo scenarios.

6 **Reforming the New Zealand Emissions Trading Scheme and introducing a removals investment mechanism offers the opportunity to regain control over New Zealand's emissions targets, while generating net revenue for the Crown.** A gross emissions ETS with ambition set by the Climate Change Commission's emissions budget 4 demonstration pathway or its high-technology and high-systems change scenario generates $31.9–41.6bn in auction revenue to 2050 (real 2025 NZD, undiscounted). After funding a removals investment mechanism to reach the Climate Change Commission's recommended -20Mt $CO_2e$ target, this leaves a positive net fiscal impact to 2050 of $5.6–9.0bn (social rate of time preference).[1] Under the status quo, meeting the same target with a removals investment mechanism has a net fiscal impact of -$9.1bn to -$11.5bn (social rate of time preference).

7 **Keeping forestry in the New Zealand Emissions Trading Scheme does not reliably raise revenue.** Options that retain forestry in a constrained form lift prices, but stock change forests can switch to permanent management and supply units that would otherwise be auctioned. Where new registrations are restricted to indigenous forests, meeting the same -20Mt $CO_2e$ target with a removals investment mechanism has a net fiscal impact to 2050 of -$11.0bn when this switching is allowed (PCE: native only future) and -$5.1bn when it is constrained and units are auctioned instead (NZUpy: native only future) (social rate of time preference).

8 **Deferring New Zealand Emissions Trading Scheme reform carries a fiscal cost.** Deferring reform to later in the 2030s would forgo roughly $11–12bn in auction revenue between 2031–2035 that could fund the removals investment mechanism, with a significant portion captured as rents by unit suppliers, landowners, and speculators.

9 **The design of the removals investment mechanism affects its cost.** Costs depend on the outcomes pursued, such as the mix of forest types and payment levels. Under the settings tested, lowering recurring payment rates reduces lifetime costs more than capping funding for forest establishment. Raising the indigenous share of funded area from 67% to 80% adds around $6.4bn (social rate of time preference) to the removals investment mechanism's lifetime cost.

## Achieving net zero and beyond

10 **Where the status quo meets the current 2050 target, it does so fragilely.** In scenarios examined for the status quo New Zealand Emissions Trading Scheme, differences between target and New Zealand Emissions Trading Scheme accounting for forests mean forests incentivised by the scheme offset up to 70% of long-lived emissions outside the scheme. This offset could narrow or reverse, including through policy changes already under consideration. Modelling prepared for the Parliamentary Commissioner for the Environment (2026) also sees the target breached from the mid

[1] SRTP is a social rate of time preference discount rate recommended by the Treasury for non-commercial proposals (The Treasury, 2024)



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2050s, as removals from New Zealand's early 2020s afforestation surge stop counting under target accounting and are not replaced as afforestation declines with the falling emissions price.

11 **Reform and a removals investment mechanism offer an opportunity to restore New Zealand's indigenous forests.** Under a gross emissions ETS, a removals investment mechanism funding the removals needed to reach the Climate Change Commission's recommended -20Mt $CO_2e$ target could lift New Zealand's natural forest estate to 8.8 million hectares by 2050, alongside action on gross emissions consistent with the Commission: EB4 demonstration pathway. This would return indigenous forest cover to 33% of total land area, just above levels last seen in 1962.

12 **Sustaining the 2050 target depends in part on the yield tables used to recognise removals.** The target must be met in every year after 2050, not only in 2050. Target accounting uses post-1989 natural forest yield tables that reflect the predominance of mānuka/kānuka afforestation, with sequestration rates tapering from around age 20. This makes indigenous afforestation look like a declining asset, understating what well-managed tall-tree forests funded by a removals investment mechanism could deliver beyond 2050.

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## OVERVIEW

13 This brief sets out what existing modelling and evidence can tell us about the likely outcomes of the New Zealand Emissions Trading Scheme (**NZ ETS**) under its current (status quo) settings, and under alternative policy options that either modify the NZ ETS while retaining its focus on net emissions, or separate the incentives placed on gross emissions and removals.

14 An illustrative removals investment mechanism (**RIM**) is also sketched out and costed to determine the net cost of meeting New Zealand's 2050 targets under each of these formulations of the NZ ETS. Assumptions made about the RIM's design reflect a plausible scheme, broadly building on NZ ETS forestry and the One Billion Trees (**1BT**) Fund as a reference point. Where the evidence in this brief points elsewhere, the design of the RIM departs from those schemes – for example, in setting establishment payments well above the rates granted under 1BT.

15 However, the formulation of the RIM presented here does not reflect the fruits of a full policy design process, nor has it had input from those with an interest in its design and the outcomes it delivers. Assumptions for its design should not be read more broadly as a statement of what the RIM should look like in practice.

16 The brief serves as evidence input to a Motu project on NZ ETS pathways, and predominantly draws on existing models and modelling reports. The models and reports drawn on include:

a. The Ministry for the Environment (**MfE**)[2] NZ ETS market model

b. **NZUpy**: an open-source Python-based NZ ETS optimisation model[3]

c. Modelling prepared by Concept Consulting for the Parliamentary Commissioner for the Environment (**PCE**) using the Emissions in New Zealand (**ENZ**) model

d. Scenarios published by the Government and the Climate Change Commission (**the Commission**) drawn from ENZ and sector-specific projection models.

17 Removals in the NZ ETS are calculated using the models above. Removals counted towards New Zealand's targets (**target accounting**) are either taken directly from ENZ or, for the MfE NZ ETS market model and NZUpy, are calculated by inputting

[2] This brief refers to MfE throughout, rather than the new Ministry for Cities, Environment, Regions and Transport (**MCERT**), formed 1 July 2026, given that reports cited were published before the merger into MCERT.
[3] NZUpy was principally developed by the author of this brief, and is freely available under MIT license at https://github.com/kgreen7/NZUpy.



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afforestation projections from these models into the Commission's (2026c) forestry model.[4]

18 The brief is structured into four parts:

a. **Part A** provides background information on New Zealand's current forest estate.

b. **Part B** sets out projected outcomes under the status quo NZ ETS (e.g. emissions price, net emissions, afforestation, and auction revenue).

c. **Part C** turns to the policy alternatives, providing projected outcomes for variants of a modified net NZ ETS and a gross emissions ETS.

d. **Part D** provides the removals that could be delivered by an illustrative RIM intended to align New Zealand's net emissions with its long-term targets, as well as the associated cost of a RIM.

19 Together, the four parts are intended to answer a sequence of questions:

a. What removals are physically and economically available in New Zealand and on what terms (Part A)?

b. What is the NZ ETS likely to deliver if left as it is (Part B)?

c. What would changing the scheme's treatment of removals, and/or funding removals outside the NZ ETS, mean for the outcomes delivered (Parts C and D)?

20 The brief does not describe the design or history of the NZ ETS, which is already well covered in existing literature (Leining, 2026). Nor does it attempt a full account of the interaction of policies affecting land-use decisions in New Zealand, explored by the PCE (2025a). It also does not model the wider economic or household impacts of the emissions price pathways presented (e.g. through computable general equilibrium modelling). The Commission's (2024a) C-PLAN modelling of its EB4 demonstration pathway, which underpins the gross emissions ETS scenarios in Part C and Part D of this brief, gives a relevant indication of these impacts (e.g. a GDP level around 1% lower in 2050 than in its reference scenario).

21 A summary description of the characteristics of models and scenarios used in this brief is provided in Appendix A.

[4] Note, target accounting projections taken directly from the MfE NZ ETS Market Model differed from projections run through the Commission's forestry model for the same levels of afforestation, and so outputs from the Commission's model are used to ensure better consistency between scenarios from different models.



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# PART A: NEW ZEALAND'S FOREST ESTATE, ONGOING TRENDS, AND POTENTIAL FOR INCREASED CARBON STORES

## Evolution of New Zealand's forest estate

22 Forest land, consisting of both indigenous and exotic species, makes up a significant share of New Zealand's total land use, and constituted 38% (10.3 million hectares or **mha**) of total land use (26.9mha) in 2024, placing it second only to grassland as a share of land use (53%, at 14.2mha) (MfE, 2026c).

23 New Zealand's greenhouse gas inventory (**GHGi**) classifies this forest land into planted and natural forests (MfE, 2024b). Planted forests are predominantly formed of exotic species such as Pinus radiata, Douglas fir and eucalypts, and are typically grown for commercial purposes such as timber or carbon revenue. Natural forests are predominantly formed of tall indigenous forests (e.g. rimu, tōtara), and broadleaved hardwood shrubland (e.g. mānuka) (MfE, 2012).[5]

24 New Zealand's natural forest has declined significantly from an estimated 85–90% of total land area prior to human habitation (Kimberley et al., 2014; McGlone, 1989), making up only 8.7mha, or 32% of land area, by 1962 (MfE, 2026c). The loss in indigenous natural forest cover is shown in Figure 1.

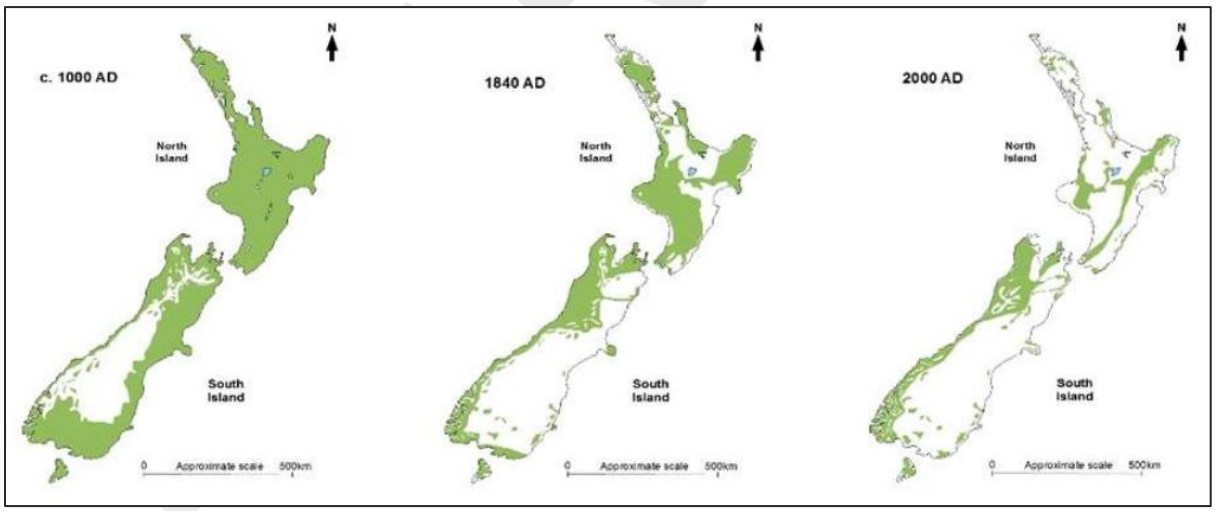



**Figure 1: Decline in extent of indigenous forest in New Zealand from 1000AD, through the time of European settlement, to recent levels.** Source: Drafted by Michael Bergin, adapted from McGlone (1989), Stevens et al. (2007) and Kimberley, Bergin & Beets (2014).

25 From 1962 to 1990, New Zealand's natural forests declined a further 10% in area to 7.8mha, with most of this land converted to grassland or planted exotic forests (MfE, 2026c). New Zealand's planted exotic forest estate grew significantly from 0.45mha to

[5] Note, some self-seeded exotic species (e.g. conifers) are also included in the GHGi definition of natural forests.

1.55mha over this period due to a growing timber and wood processing industry, spurred by both public and private investment (The Treasury, 1984).

26 Changes in the relative profitability of logs/timber, dairy, horticulture, and sheep and beef (**S&B**) have driven varying levels of afforestation and deforestation since 1990. The 1990s saw a large lift in private investment in forestry, stimulated by log prices reaching record highs (PF Olsen, 2021). This resulted in New Zealand's planted exotic forest estate increasing by an average of 51,000ha per annum (**p.a.**) during the 1990s (Ministry for Primary Industries (**MPI**), New Zealand Forest Owners Association, and New Zealand Farm Forestry Association, 2025).

27 A decline in log prices together with an increase in the profitability of dairy by the early 2000s saw the strong net afforestation of the 1990s stall and reverse, with the planted forest estate declining from 2.13mha in 2004 to 2.07mha by the end of 2017 (MfE, 2026c). The evolution of New Zealand's planted forest estate since 1990 is shown in Figure 2 below, and the annual changes in area (net afforestation per year) in Figure 3.

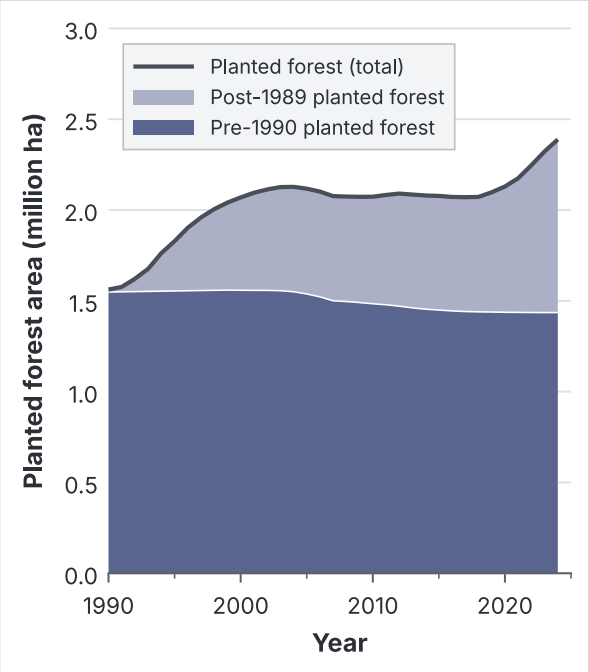



**Figure 2: Total area of planted forest from 1990 to 2024.** Sourced from: MfE (2026c).

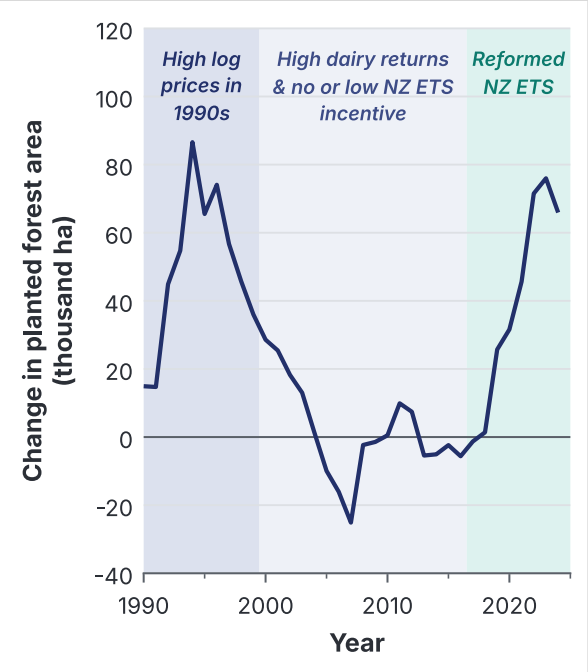



**Figure 3: Change in total planted forest area per year from 1990 to 2024, separated by descriptive era.** Sourced from: MfE (2026c).

28 Meanwhile, the total area of natural forest in New Zealand has remained relatively static since 1990, increasing just 53,000ha above 1990 levels in total over more than three decades, reaching 7.87mha by 2024 (MfE, 2026c).

29 Ngā Pou a Tāne (2024) estimates Māori own around 1.3mha of forest land. This includes 572,980ha of indigenous forest, 190,181ha of exotic forest, and 559,576ha of ex-Crown forest land, mostly in exotic forest owned by private companies (Holt & Bennett, 2014). Forestry makes up an estimated 46% of the total area of whenua Māori covered by Te

Ture Whenua Māori Act[6] (Hohaia, 2022), with this forestry disproportionately pre-1990 natural forest (74%) compared with general title land (53%) (MPI, 2022).

## Impacts of policy on New Zealand's forest estate in recent years

30 Reforms initiated by successive governments helped to raise the NZ ETS price and, with them, foresters' expectations of future carbon returns. The Fifth National Government began phasing out the scheme's one-for-two surrender obligation in 2016 (Bennett, 2016), and the Sixth Labour Government raised and then removed the scheme's fixed price option, replacing it with an auction mechanism (MfE & MPI, 2020; Shaw & Jones, 2018).

31 These changes to the NZ ETS, together with grants through the 1BT Fund, led to a substantial increase in rates of exotic afforestation in recent years, reaching levels similar to New Zealand's 1990s afforestation spike, and increasing New Zealand's planted forest estate to 2.4mha by 2024 (MfE, 2026c).

32 As of June 2026, 718,000ha of New Zealand's exotic planted forest estate is registered in the NZ ETS as post-1989 forest land (MPI, 2026a). Owners of pre-1990 planted forest land face liabilities in the NZ ETS if they deforest their land, but are unable to earn units in the scheme for sequestration by these forests.

33 The rising emissions price has also affected landowners' intentions for these forests. For example, 20% of new exotic forests planted in 2025 are expected to be managed as permanent forests (Manley, 2025), where the forest will not be clear-fell harvested, and in most cases will rely predominantly on the NZ ETS as a source of revenue from the forest.[7] This is also reflected in MPI registration data for the mandatory emissions return period 4 (**MERP4**) window (2023–2025)[8], where 20% of newly registered exotic forests by area were entered into the permanent forestry category (MPI, 2026a).[9]

34 Public data on the predominance of other non-clear-fell forest management regimes (e.g. continuous cover forests and transition forests) is lacking. However, these forest management regimes have seen increased interest in New Zealand in recent years (Dickinson et al., 2025; Forbes Ecology, 2021), due in part to their potential for improved environmental outcomes relative to clear-fell models.

35 Pinus radiata makes up a dominant share of New Zealand's exotic forest estate, estimated at around 90% of New Zealand's planted forest estate (Manley, 2023).

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[6] Te Ture Whenua Māori Act 1993 defines Māori land as Māori freehold and Māori customary land. These figures exclude land held by Treaty settlement entities, and broader land held under general title by Māori.

[7] Some landowners may also use permanent forests to generate revenue from tourism, understorey crops, and other activities within the forest.

[8] Foresters participating in the NZ ETS are required to submit an emissions return at the end of each MERP. MERPs are set to align with New Zealand's five-year emissions budget cycle from 2026 onwards.

[9] Area of exotic forests registered in permanent forest category 2023–2025: 50,825ha. Area of exotic forests registered in NZ ETS 2023–2025: 257,061ha.



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However, there are signs that other exotic species are growing in popularity. MPI's most recent Afforestation & Deforestation Intentions survey indicated a drop in planting intentions for Pinus radiata, at 85.8% of planned exotic afforestation in 2025, and growing proportions of eucalypts (5.6%), redwoods (3.6%), and hybrid pine species (2.8%) (Manley, 2025).

36 Regulatory measures controlling the harvesting and milling of natural indigenous forests through the Forests Act 1949 have sought to prevent deforestation of New Zealand's natural forest estate, while grant schemes such as the Afforestation Grant Scheme and 1BT Fund have encouraged indigenous afforestation/reforestation. A fuller summary of the 1BT Fund outcomes is provided in the breakout box below.

**Outcomes of the One Billion Trees (1BT) Fund**

- The 1BT Fund (2018–2021) contracted $54.9 million in direct landowner grants across 19,200ha, delivering 67% indigenous afforestation and 33% indigenous/exotic by area – meeting its two-thirds indigenous target (Te Uru Rākau, 2025a).
- 1BT was designed to provide staged, milestone-based payments (30% before establishment, up to 80% by discretion) to ease the upfront capital constraint that had undermined earlier schemes (Te Uru Rākau, 2018).
- However, grant rates were set below typical establishment costs. The $6,000/ha maximum funding rate fell well short of typical direct-establishment costs for indigenous afforestation, with blanket planting averaging around $25,000/ha (PCE, 2025a).
- Funding covered establishment costs only, and provided no payments for ongoing management or climate outcomes delivered. Just 73% of contracted area has reached established status by 2025, falling to 59% for reversion (Te Uru Rākau, 2025a).
- Funding ran for three years with no successor, and specific causes of planting failure went unrecorded (PCE, 2025a).

37 Around 168,000ha of post-1989 indigenous forest is registered in the NZ ETS as of June 2026 (MPI, 2026a).

38 Surveys of afforestation intentions indicate plans for a small total area of indigenous planting in 2025 (2,600ha), but higher levels of reversion planned to be registered in the NZ ETS (18,600ha) (e.g. from protecting regenerating mānuka scrub). Parts of this indigenous forest reversion come from land that received 1BT grants and is now able to enter the NZ ETS (Manley, 2025), and so may not have occurred with the incentive of the NZ ETS alone.

## Potential for enhancing carbon stocks in New Zealand's forests

39 Carbon stock levels in New Zealand's forests can be broadly increased through encouraging afforestation and reforestation, avoiding deforestation, and enhancing carbon stocks in existing forests (e.g. pest control, weed control, fencing, improvements in tree species genetics, switching to continuous cover forestry).

40 By design, the NZ ETS places incentives on these activities for current and prospective post-1989 forest land. However, it does not provide any incentives for enhancing carbon stores in New Zealand's 9.2mha of pre-1990 natural (7.8mha) and planted forests (1.4mha), which make up the majority of New Zealand's forest estate.

41 Actions to enhance carbon stocks in existing forests are not recognised in all contexts in the NZ ETS. Smaller participants with less than 100ha of registered forest area using the default carbon look-up tables see no carbon benefit from activities that increase sequestration and improve forest health (e.g. pest management and fencing to exclude browsing stock). Small landowners make up around 20% of registered post-1989 forest land in the NZ ETS, but close to 80% of registered forestry participants.[10]

42 Estimates of the land suitable for further afforestation/reforestation in New Zealand, which may be a target for carbon pricing or other incentives, vary depending on the methods and criteria used to identify land (i.e. the geospatial analysis filters applied) and the types of forest being considered (e.g. permanent forests only, or permanent and production forest).

43 Examples of prior estimates of land suitable for afforestation include estimates published by MfE and StatsNZ (2018), which identified 1.1mha of land deemed at risk of severe erosion and suitable for permanent forest cover. Similarly, analysis by MPI in 2024 identified 2.4mha of grassland on Land Use Capability (**LUC**) classes 6–8 held in private title as suitable for afforestation, with 0.8mha suitable for production forestry in addition to other forest types (PCE, 2025a).[11] This is broken down in Table 1 below.

| Afforestation potential type | LUC 6 | LUC 7 | LUC 8 | Total |
|---|---|---|---|---|
| **Suitable for all tree species except production exotic** (ha) | 452,000 | 297,000 | 25,000 | 774,000 |
| **Suitable for all tree species** (ha) | 1,232,000 | 424,000 | 9,000 | 1,664,000 |
| **Total (ha)** | **1,638,000** | **721,000** | **34,000** | **2,438,000** |

**Table 1: Land area suitable for afforestation on LUC class 6–8 land identified through geospatial analysis.** Adapted from: PCE (2025a).

[10] Figure from author's personal communications with Te Uru Rākau staff, September 2026.
[11] Filters applied: Low producing grassland and grassland with woody biomass classes, LUC classes 6 to 8, Erosion Susceptibility Classification class of Very High (Red Zone) excluded for production exotics, areas with mean annual rainfall of 500–2,000mm for production exotics and areas with over 500mm for all other trees. Extending the scope to include high producing grassland within LUC classes 6–8 would increase estimated areas suitable for forestry, and so areas provided may understate the actual area impacted by the NZ ETS under its status quo design.

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44 Among non-government estimates, the Recloaking Papatūānuku initiative established by Pure Advantage (2023) estimated up to 5mha of land suitable for either enhancement of existing degraded forest, natural reversion in marginal hill country and Crown land, or afforestation/reforestation of non-forest land.

45 Once established, well-managed tall indigenous forest (e.g. tōtara, kauri, kahikatea, rimu) can sequester carbon at rates approaching pine forests (Kimberley et al., 2022), reaching 18.2–29.9t$CO_2$/ha p.a. by age 50 and mean annual sequestration over 50 years of 10–16.4t$CO_2$/ha p.a. This compares to 21–27t$CO_2$/ha p.a. average sequestration over 50 years for Pinus radiata forests in MPI's current default look-up tables, and 36t$CO_2$/ha p.a. using the Field Measurement Approach (**FMA**).[12]

46 These sequestration rates are significantly higher than rates typically achieved for indigenous forests in the NZ ETS to date, where regenerating broadleaved hardwood mānuka/kānuka can see average rates approximate to 6.5t$CO_2$/ha p.a. (Kimberley et al., 2022).

47 For whenua Māori specifically, around 124,000ha of Māori freehold land has been identified as well suited to forests (MPI, 2022). Of this, around 71,000ha has been identified by MPI as remote and marginal-to-harvest land suitable for permanent forest cover, and 68,500ha as suitable for production forests. Ngā Pou a Tāne (2024) has a stated ambition to increase Māori forested land to 1.6mha by 2040, up from around 1.3mha today across Māori-owned forests and ex-Crown forest land, mostly in forests owned by private companies.

## Economic cost of activities that increase New Zealand's land carbon stores

48 The emissions price placed on post-1989 forestry through the NZ ETS has a strong impact on the relative profitability of both permanent and production exotic forests relative to pastoral farming.

49 MPI (2024b) calculated the relative economic returns (net present value, or NPV) per hectare for typical exotic forests, S&B farms and dairy farms using economic data supplied by Beef+Lamb NZ and DairyNZ. It found that both permanent and production exotic forests produced greater economic returns than some types of S&B farms at emissions prices as low as $35, and approached typical dairy farms in profitability at an emissions price of $100. MPI's results are presented in Table 2.

[12] Weighted average FMA tables sourced from MPI (2024a).



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| Land use | Emissions price | | | |
|---|---|---|---|---|
| | $0 | $35 | $70 | $100 |
| **Permanent exotic forest** | ($3,800) | $6,500–$9,500 | $16,500–$22,000 | $25,000–$33,000 |
| **Production exotic forest** | $5,500 | $12,500–$14,000 | $18,500–$22,000 | $24,000–$29,000 |
| **S&B: North Island hard hill** | $5,000–$7,000 | | | |
| **S&B: hill country** | $9,000–$11,000 | | | |
| **S&B: finishing farm** | $12,500–$20,000 | | | |
| **Dairy farm** | $28,000 | | | |

**Table 2: Comparison of economic returns (NPV) per ha for different land uses at different emissions prices.** Adapted from: MPI (2024b, pp. 21–22). Cash flow returns based on EBIT. S&B and dairy farm NPV assumes no woodlots incorporated on-farm, and no emissions price placed on agricultural emissions.

50 Similarly, analysis by Manley (2023) used a selection of mapped small-scale post-1989 forests and found that when using land expectation value to compare economic returns, permanent exotic forestry was more profitable than production forestry on 71% of mapped forest estate at a $50 emissions price.

51 With 394,000ha of exotic forest registered under stock change accounting (with no controls on how these forests are managed), the relative economics of production and permanent forests suggests that large areas of existing NZ ETS registered land may be converted to permanent exotic forestry under a rising emissions price path.

52 Differing establishment costs for direct planting of indigenous species and exotic species (e.g. pine) contribute to significant differences in economic returns between these forests. Direct planting of indigenous species at a density of ~4,444 stems/ha (1.5m spacing) can cost $22,000–$28,000/ha in establishment costs (seedlings, planting, releasing, and blanking alone) (AgFirst & Forbes Ecology, 2024; Forbes Ecology, 2022).

53 Separate analysis by Tāne's Tree Trust (2024) estimated a range in establishment costs from $5,000–$40,000/ha depending on site difficulty, stocking rate, and species selected, with average costs around $20,000/ha on most sites. The lower end of this range ($5,000) represents low-density mānuka that will see lower typical long-term sequestration rates than forests formed of tall indigenous species.

54 These costs for direct planting of indigenous forests sit well above typical estimates of establishment costs for pine forests, at around $1,400–$2,500/ha (AgFirst & Forbes Ecology, 2024; MPI, 2024a; Tāne's Tree Trust, 2024).

55 When judged based on economic returns, direct planting approaches for indigenous forests see a negative NPV at present day NZ ETS emissions prices circa $50, even where establishment costs are assumed to be lower than the typical values presented above (e.g. using $13,750/ha estimated establishment costs for an indigenous forest from the Aotearoa Circle (2020)).[13] Research by Weaver (2023) similarly found that

[13] NPV calculated using MPI's (2024) afforestation economic analysis with harvest model.



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large-scale direct planting presented a negative NPV under emissions price paths rising from a starting point of $90.

56 The economics of indigenous forests relative to permanent and production exotic forests (which present a positive NPV at emissions prices as low as $35), and relative abundance of land suitable for exotic afforestation on LUC classes 6–8, mean that the NZ ETS is unlikely to be effective at incentivising direct planting of indigenous forests in the foreseeable future under its status quo design.

57 Regeneration of indigenous forests is typically cheaper than direct establishment and can be economically viable at present day NZ ETS prices in some sites. Fencing costs for retirement of land at the start of a project are estimated to be $595–$7,430/ha (Forbes Ecology, 2022, p. 21), substantially lower than direct planting approaches, but with wide variance in costs depending on the context of the land and fencing needs.

58 However, regeneration outcomes are less certain than direct establishment, with growth typically slower and dependent on site-specific factors such as proximity to seed sources, climate, presence of browsing stock, pest and weed pressure, and the degree of intervention needed (Forbes et al., 2023; Tāne's Tree Trust, 2022). While some sites using regeneration can reach closed canopy within decades, others may not regenerate meaningfully without intervention (Forbes et al., 2023). Species often targeted for regeneration (e.g. mānuka) also present low long-term sequestration compared to tall indigenous and exotic species, and can taper off in sequestration by around age 20.

59 Where enrichment planting is used to supplement natural regeneration with additional species (e.g. to reintroduce species absent from the local seed source), this can add a further $6,900–$15,000/ha on top of retirement costs (Forbes Ecology, 2022), with costs highly variable and driven by site-specific circumstances. Research suggests that enhanced species diversity (e.g. via enrichment planting to ensure a mix of fast- and slow-growing species) supports both ecological and carbon storage goals in indigenous forests (Te Uru Rākau, 2026a).

60 Pest and weed control costs vary too, and can be either an annual cost or one-off cull, depending on the site, its local pressures, and aims of the project (e.g. full eradication or managing pest levels). The limited number of estimates provided in Forbes Ecology (2022) for annual costs beyond establishment were $200–$575/ha p.a. and of varying time scales.

61 Transition forests have been explored as an approach that can help to overcome the high cost of direct establishment of indigenous species, where a forest is first established using exotic species (e.g. pine or exotic softwoods) and selective harvesting is undertaken in later decades to allow natural regeneration.

62 However, studies examining the sequestration profile of transition forests have found these approaches come with trade-offs, where achieving indigenous species dominance in later decades often reduces the total carbon stock stored (Mason et al., 2025; MPI, 2022).

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63 For example, modelling by Kimberley et al. (2025) across a range of management approaches for pine-to-native transition (varying the timing of harvesting and degree of thinning of the initial pine trees) found carbon stocks declining for a period of decades in most scenarios, with long-term outcomes varying depending on which native forest type eventually establishes on the site.

64 This carries implications for the economics of transition forests under the NZ ETS, where the emissions price will vary over time and cannot be predicted with perfect foresight. This presents risks that transition forest operators may be caught out by unexpected price fluctuations that increase the cost of losses of carbon in the forest at harvest beyond what has been budgeted for decades prior.

65 These risks can be obscured when transition forests are compared to direct establishment and regeneration-based indigenous afforestation approaches based on an NPV calculation at the project outset. This is because the negative cash flows transition forests experience years or decades later as the forest shifts to indigenous species are downweighted by discount rates applied to future earnings and losses.

66 Successive governments have shown interest in recognising carbon sequestration by on-farm vegetation that falls short of the NZ ETS forest land definition, typically because it doesn't meet the minimum area (1ha), width (30m), height (5m), or canopy cover (30%) thresholds. This includes riparian strips, shelterbelts, small woodlots, pole plantings, and regenerating scrub such as mānuka in some contexts. Reported sequestration rates for these vegetation types are summarised in Table 3 below. All estimates provided below are uncertain due to limited extant research on typical carbon sequestration for these vegetation types.

| Vegetation type | Approximate sequestration rate during growth phase ($tCO_2$/ha p.a.) |
|---|---|
| **Riparian strips** | ~3.5 (surrogate estimate[14]) |
| **Shelterbelts** | ~1 to 2.3 (once established/trimmed) |
| **Small woodlots (do not meet forest definition)** | ~16 (median) |
| **Pole plantings** | ~2.0 |
| **Regenerating shrubland (mānuka/kānuka)** | ~6.5 |

**Table 3: Estimated sequestration rate per ha of common types of on-farm vegetation that may not currently qualify for NZ ETS.** Sourced from: Burrows et al. (2018).

67 Most on-farm vegetation that falls outside the NZ ETS forest definition occurs in small, scattered patches, making it costly to map, measure, and verify relative to the value of sequestration earned. For many landowners, their vegetation may also already be approaching a mature, steady-state carbon level, meaning there would be limited further sequestration left to claim. Together, these factors mean that including these sparse vegetation sources in the NZ ETS under its current design would make poor

[14] Researchers have sourced sequestration rate estimates from related vegetation types as stand-ins.

economic sense for the landowner once compliance and transaction costs are accounted for.

68 At a national scale, Burrows et al. (2018) estimate that small woodlots could sequester in the order of 1Mt $CO_2e$ p.a. by around 2050 if established on just 0.4% of agricultural land. They also estimate a 10m-wide riparian strip along half of New Zealand's farm-adjacent waterways could add a further ~0.72Mt $CO_2e$ p.a.; though the authors caution this riparian estimate rests on several unproven assumptions. Farm-level case studies (using $GWP_{100}$ carbon dioxide equivalents) in the same report found these vegetation types currently offset only 0–2.5% of on-farm emissions on intensive farms (e.g. dairy), rising to 5–20% on extensive hill country sheep and beef farms.

## Risks of loss of carbon in New Zealand's forests

69 The NZ ETS applies permanence controls differently across forest categories. Forests in the permanent forest category cannot be clear-fell harvested for 50 years from registration (with rolling 25-year extensions). Early exit requires ministerial approval plus repayment of units (Climate Change Response Act, 2002, s 190B; MPI, 2026b).

70 Some voluntary carbon market standards and credit mechanisms have begun to explore and/or implement longer monitoring and commitment periods, such as 100 years (ICVCM, 2024). New Zealand's application of an initial 50-year commitment within the permanent forest category stems from constraints on the length of leasing arrangements for Māori freehold land, where Te Ture Whenua Māori Act 1993 limits courts from granting leases exceeding 52 years (MPI, 2018; Te Puni Kōkiri, 2025). This is a material constraint given the significant role that forestry plays within whenua Māori.

71 Stock-change forests carry no equivalent commitment. Landowners can switch intentions between harvesting and permanent management at any point, and face no obligation to declare these intentions to NZ ETS regulatory agencies. This means that any future environmental and forest management standards applied to permanent forests within the permanent forest category (e.g. to address wildfire risk) will not necessarily apply to permanent forests operating under regular stock change accounting.

72 All NZ ETS post-1989 forests are covered by the Temporary Adverse Event Suspension (**TAES**) mechanism, which pauses earning and surrender obligations on damaged areas until carbon stocks recover (MPI, 2025). TAES was designed to alleviate the need for private insurance, shifting that risk to the Crown (MPI, 2019; PCE, 2025a). No requirements exist in the NZ ETS for participants to reserve revenue or units (**NZUs**) against eventual restoration costs, even as private insurance for some risks (e.g. wildfire) becomes harder to obtain (PCE, 2025a).

73 The PCE (2026) argues that this arrangement compounds moral hazard. Because the Crown absorbs reversal risk rather than the forest owner, owners face no equivalent incentive to actively manage that risk down. Surveys of forest owners found that 38.5% of large-scale forest owners possessed insurance in 2021/22, and an estimated 35% of small forest owners (Dudfield, 2023).

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74 Climate change is expected to increase physical loss risk for forests. Wildfire damage to plantation forests has already grown faster than the plantation estate itself in recent years (Dudfield, 2023), and very extreme fire conditions are projected to become materially more frequent in parts of the South Island (Melia et al., 2022). Wind, drought, and pest/disease risks are also expected to rise (Watt et al., 2019), with destabilisation and run-off due to storms already a pertinent risk to exotic pine forests in regions such as Tairāwhiti (Marden, 2024).

75 Wildfire hazard depends more on forest structure and management than on species origin. The hazard is highest in young, open, grass/scrub-dominated areas and declines as canopy closes, though even old growth can burn intensely under extreme drought once alight (Gross et al., 2024). Some native species (mānuka/kānuka) are themselves highly flammable, underscoring that characterisation of wildfire risk based solely on whether a forest is made up of exotic or indigenous species can be misleading (Fogarty, 2002; Gross et al., 2024).

76 The permanent forest category imposes no requirements on stocking density, species mix, or ongoing silvicultural management. Internationally, timber plantations (low diversity, even-aged) show roughly double the wildfire probability of naturally regenerating forest under matched conditions, with New Zealand among the largest differences (Bousfield et al., 2025). Denser even-aged stands have also been linked to greater fire severity once ignited in redwoods in international studies (Kane & Carrasco, 2025), a species identified as a priority for new look-up tables in Te Uru Rākau's (2025b) recent consultation.

77 The carbon accounting settings of the NZ ETS may increase this risk. The FMA, which applies to forestry participants with 100ha or more registered, rewards measured carbon stock directly. It therefore favours dense stocking of fast-growing exotic species that maximise sequestration, whereas diverse, mixed-species forests (with a range of growth rates), which may carry lower wildfire risk, earn less under FMA.

78 This compounds the moral hazard identified above. Not only does the absence of insurance leave owners with reduced incentive to manage reversal risks down, the FMA's reward structure points in the opposite direction, favouring denser, less diverse stocking that carries greater risk.

79 Permanent forests also accumulate substantially larger carbon stocks per hectare than production forests as they age, putting greater levels of carbon at risk. A typical production forest formed of Pinus radiata holds around 359t$CO_2$/ha for forests operating on look-up tables and 573t$CO_2$/ha for forests operating on FMA; but when managed as a permanent forest, the same species can accumulate 1,292t$CO_2$/ha under look-up tables and 1,792t$CO_2$/ha under the FMA by age 50[15] – a three-and-a-half-fold increase in the long-term carbon exposed to loss.

[15] $CO_2$ per ha at age 16 (average age for pine) and age 50 taken from weighted average participant for default look-up tables and FMA from the Commission (2026c), sheet "ETS carbon yield tables".



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80 To illustrate this scale of exposure, the 2019 Pigeon Valley wildfire (Nelson, 2,300ha) and the Pōrangahau fire (Hawke's Bay, 250ha) together burnt through roughly 2,550ha of forest, holding an estimated ~700,000 tonnes of $CO_2$ between them (PCE, 2026)[16]. The combined area involved, 2,550ha, is a small fraction of New Zealand's roughly 55,000ha of exotic species registered in the permanent forest category, illustrating that reversal risks of increased scale do not require an unprecedented event.

81 These risks may be mitigated to an extent by Fire and Emergency New Zealand's statutory powers (e.g. to require landowners to create firebreaks), alongside industry guidelines on wildfire risk (New Zealand Forest Owners Association & New Zealand Farm Forestry Association, 2025). However, the current design of the NZ ETS still encourages forest management regimes that may carry greater risk than alternatives.

82 New Zealand's forestry accounting applied to its Nationally Determined Contributions (**NDCs**) and emissions budgets excludes qualifying natural disturbance losses (and the matching recovery removals) from official accounting until pre-disturbance carbon stocks are restored (MfE, 2025; UNFCCC, 2011, Decision 2/CMP.7).

83 This means that, in general, losses to New Zealand's forests from significant wildfire, insect and disease infestations and extreme weather events may be excluded from forestry's measured contribution against NDCs and emissions budgets, comparable to how TAES is applied within the NZ ETS. However, these losses reflect an accounting treatment choice, not a change in the physical outcome seen by the atmosphere.

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[16] Estimate of 700,000t$CO_2$ taken from PCE (2026), which multiplies regional look-up table values for pine at age 16 for Nelson region (260t$CO_2$/ha) and Hawke's Bay (398t$CO_2$/ha) by the area burned for the Pigeon Valley wildfire and Pōrangahau fire respectively.

# PART B: OUTCOMES OF THE NZ ETS UNDER THE STATUS QUO

## Trends in emissions price in recent years

84 Since the introduction of an auction mechanism, the NZ ETS has seen prices paid for NZUs on secondary markets fluctuate between a minimum of $33.20 (on 16 January 2026) and a maximum of $88.50 (on 15 November 2022). Spot market trends have been shaped by the tenor of the Government's policy decisions related to climate change, the large number of surplus stockpile units held in private accounts, auction settings, and expectations around the trajectory of prices in the NZ ETS in future.

85 In recent years, the NZ ETS has been able to satisfy annual demand from gross emitters' surrender obligations without drawing on auctions, with only two out of the last 15 auctions since January 2023 clearing any units (NZX & EEX, 2026). This is due in large part to the large number of surplus units held in private accounts, estimated at 29.7 million at 31 December 2025 (17.1–41.7 million unit range) (Climate Change Commission, 2026b). The surplus has decreased in recent years due to the repeated failure of auctions, having dropped from an estimated 50.2 million NZUs at the end of 2024 (Climate Change Commission, 2025).

86 Both the Commission and the Government have stated aims to reduce surplus units in private accounts to zero by 2030 (Climate Change Commission, 2026b; MfE, 2026a). Auction volumes are set at levels expected to be consistent with this aim, by undersupplying the market relative to volumes that would be consistent with meeting New Zealand's 2026–2030 emissions budget.

87 Many market analysts and commentators anticipate that this is likely to result in auction units being needed again, at least for a period of time (Brunel, 2026; Green, 2026; Kivi, 2026; MfE, 2026a), leading to spot market prices rising from their present day price of $55 as of late July 2026 (Carbon News, 2026) to levels needed to clear the auction price floor (set at $71 in 2026, $75 in 2027, and $78 in 2028, etc.).

## Supply and demand under the status quo

88 Modelling studies published to date forecast that the NZ ETS will see both rising supply from forestry and declining demand from gross emitters under the status quo.

89 Reductions in gross emissions demand are expected to emerge due to the gradual adoption of lower-emissions technologies in gross emitting sectors (e.g. electric vehicles), reductions in gas reserves, and the effect of policies alongside the NZ ETS (PCE, 2025b).

90 Declines in gross emissions demand are expected to occur over time, irrespective of the emissions price applied. This is illustrated in Figure 4a below, which shows projections of gross emissions covered by the NZ ETS under current policy settings, and a hypothetical $0 emissions price scenario applied with other current policies alongside the NZ ETS maintained.

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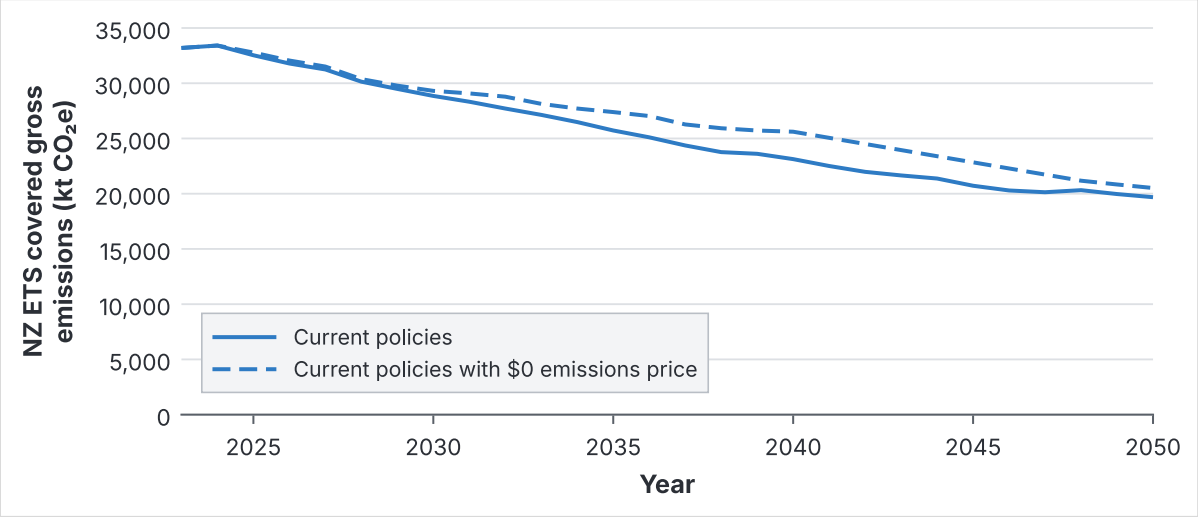



**Figure 4a: Gross emissions covered by the NZ ETS (kt $CO_2e$) under current policies (status quo) and current policies with $0 emissions price.** Sourced from: MfE (2026d, 2026b).

91 These trends are projected to occur in all gross emitting sectors covered by the NZ ETS, as shown in Figure 4b below for a hypothetical $0 emissions price.

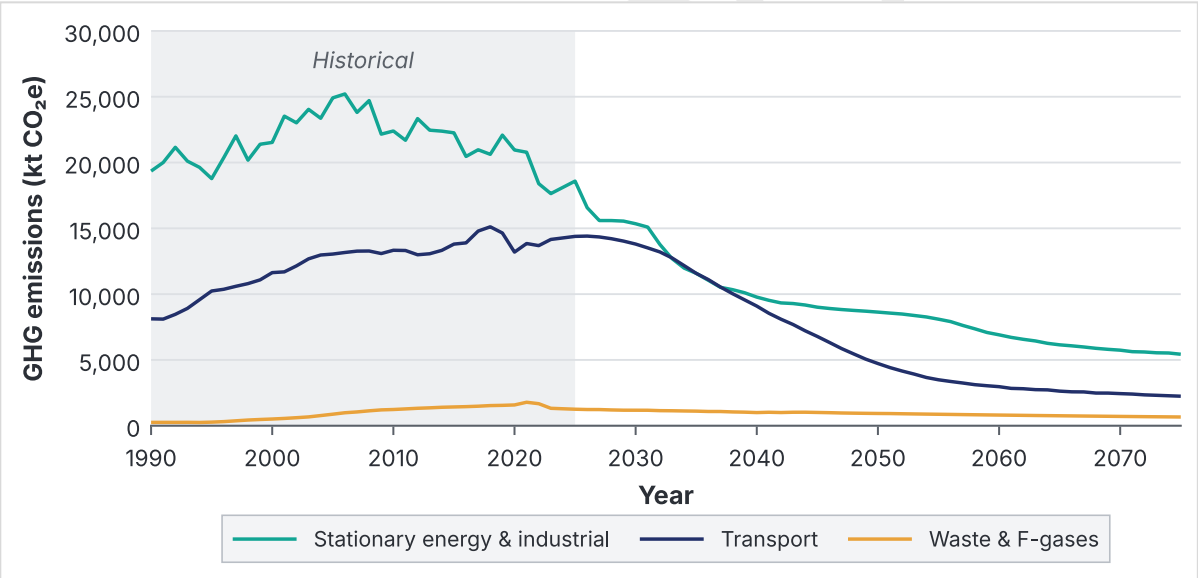



**Figure 4b: Gross greenhouse gas (GHG) emissions (excl. biogenic $CH_4$) covered by the NZ ETS (kt $CO_2e$) with $0 emissions price from 2026.** Adapted from: Concept Consulting (2026).

92 Increased forestry supply over time is also highly likely to eventuate due to the cost-effectiveness of exotic afforestation at present-day emissions prices, and the abundant land available on LUC classes 6–8 for further afforestation (refer Part A of this brief).

93 Eventually, these trends are expected to lead to a new norm in which the market is able to satisfy all demand for units through supply from forestry and industrial allocations alone, without any need for auctioned units sold by the Government.

94 Current estimates place this convergence in demand and supply from non-government sources at around the mid 2030s (PCE, 2025b). This is reflected in Figure 5 below, drawn from MfE's NZ ETS market model.

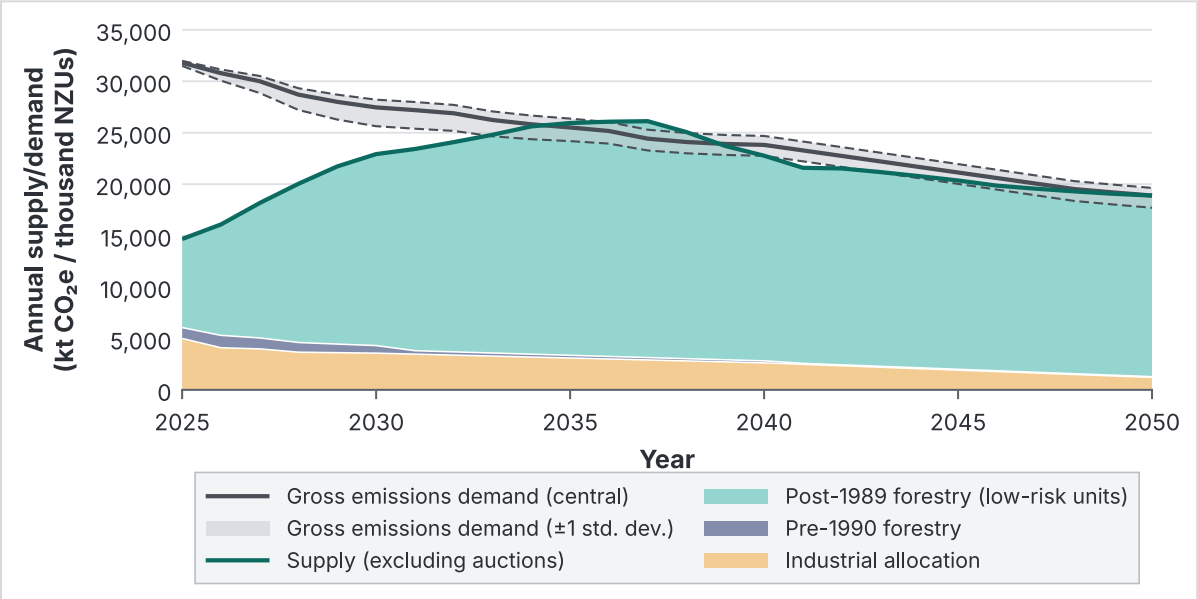



**Figure 5: NZ ETS gross emissions demand compared against supply from sources other than auctioning under status quo NZ ETS (kt $CO_2e$ / thousand NZUs per annum).** Sourced from: MfE (2026b) under emissions price scenario reflected in Figure 6 (below). Pre-1990 forestry supply taken from central projection from Commission (2026c). Notes: Gross emissions demand range varies based on demand elasticity (1 standard dev. from central scenario). Supply shown in figure excludes transfers into or out of stockpile and use of surplus units, which cover the gap to gross emissions demand in the 2020s and early 2030s.

95 In the models examined, supply and demand often remain roughly equivalent once convergence occurs (i.e. throughout the 2040s), with forestry supply often declining in models in the long run alongside falling gross emissions demand. This reflects rational behaviour on the part of foresters, where afforestation should be expected to slow down as the market approaches a state in which existing registered forests are able to satisfy demand in the market.

96 The saturation of gross emissions demand by supply from forestry and industrial allocation units leads to a situation in which no units are sold through auctions from the early or mid 2030s.

97 Attempts by government to rally the scheme's price at this point (e.g. through raising the auction price floor or tightening auction supply) will prove ineffective given both the availability of units from forestry and industrial allocation, and the large number of forestry participants registered in the NZ ETS (5,865 as of June 2026). In plain terms, auctioned units will not be needed by the market from around the mid 2030s onwards.

98 The stockpile of units in private accounts is also expected to increase again over time from the 2030s given the uneven age profile of production forests on stock change accounting. Though whether or not a new surplus of units in private accounts is created depends on the ability of the market to match supply and demand (i.e. whether foresters generate excess units that they wish to sell to the market, but are unable to).[17]

[17] These dynamics also create issues with respect to NDCs, where New Zealand has not stated it will carry over units between NDC periods.

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## Forecast emissions price under the status quo

99 Forecasts published to date suggest that these supply and demand trends will lead to a short-term rise in prices (lifting up to prices needed to clear the auction price floor and/or to induce reductions in net emissions later in the 2020s), followed by a decline in the emissions price as supply from non-government sources begins to approach levels needed to satisfy annual demand in the NZ ETS. This is reflected in Figure 6 below, where most scenarios see the emissions price (expressed in real 2025 NZD) peaking around 2030–2035.

100 The extent of the peak in emissions prices in the early to mid 2030s in models surveyed typically varies based on modelling assumptions related to:

a. **Afforestation response:** The responsiveness of afforestation to the emissions price

b. **Forest management flexibility:** The extent to which foresters can and will switch management intentions from production to permanent forests

c. **Market liquidity**: The extent to which participants holding stockpile units are willing to sell units to emitters as prices rise, and buy these back later as prices fall.

101 Model runs presented for the MfE NZ ETS market model, PCE (2026) and NZUpy attempt to reflect these uncertainties:

a. **Afforestation response:** The two MfE NZ ETS market model scenarios presented reflect conditions in which there is constrained afforestation (using a lower responsiveness formulation of the Manley equation) or responsive afforestation (higher responsiveness to emissions price).

b. **Forest management flexibility:** The PCE scenario reflected allows endogenous switching from production forestry to permanent forestry when harvest is due, depending on the relative returns of each. Other scenarios (e.g. from NZUpy, MfE NZ ETS market model) do not allow dynamic switching.

c. **Market liquidity**: The scenarios presented for NZUpy see liquid market conditions (with greater levels of borrowing from the stockpile), and relatively more illiquid market conditions (with minimal borrowing).[18]

102 Differences in assumptions used in each model are a key reason why modelled results illustrated in Figure 6 reflect a range in potential peak price (ranging from ~$60 to ~$105). The variability in results shown in Figure 6 also reflects the uncertain nature of emissions price forecasting for the status quo design of the scheme, due to factors such as unrestricted supply from forestry and units not having an expiry date.

[18] Modelled as up to 1% of stockpile can be drawn on each year by emitters (NZUpy: illiquid market) or up to 5% (NZUpy: liquid market).



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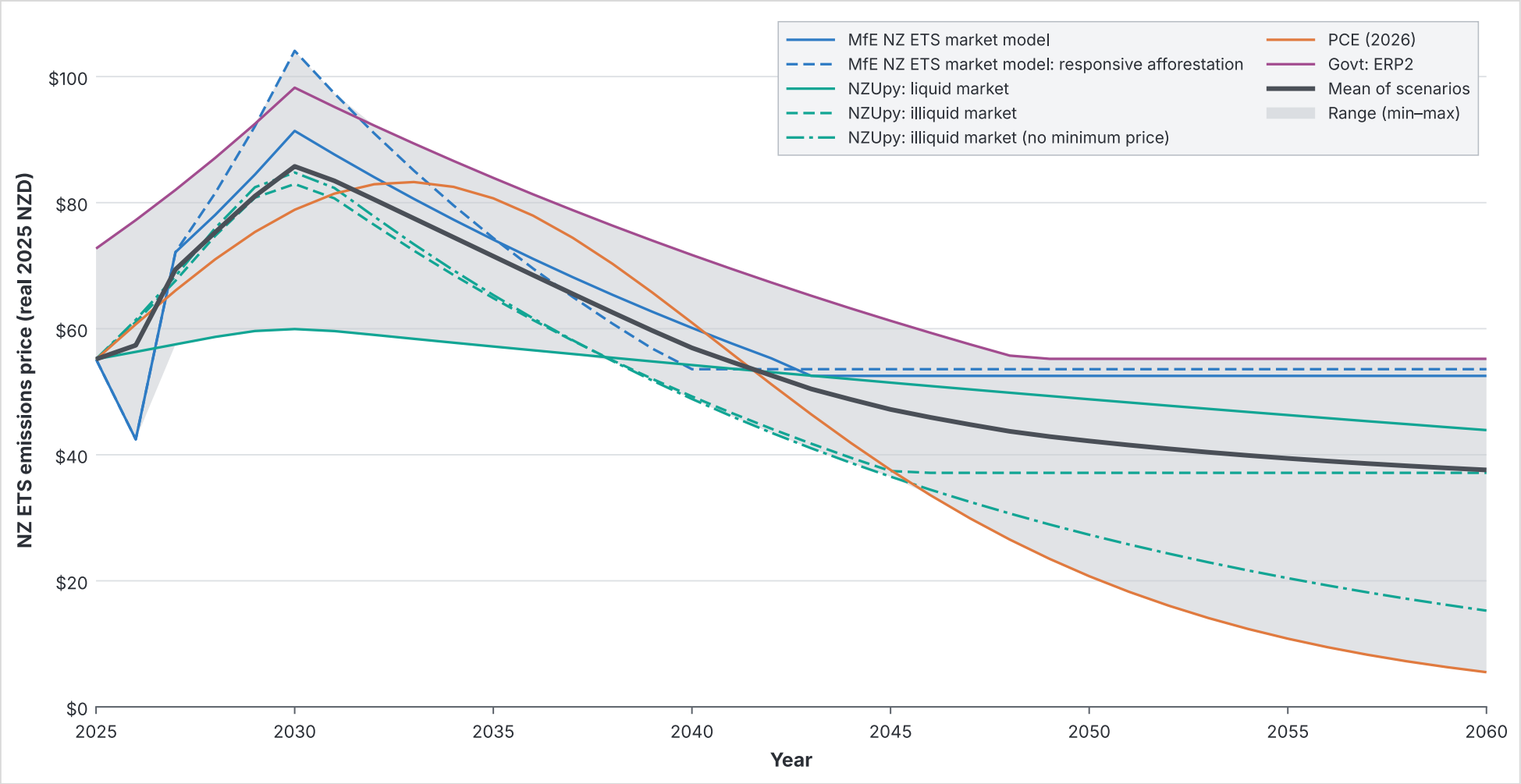



**Figure 6: NZ ETS emissions price (real 2025 NZD) under status quo NZ ETS settings from a range of different models and reports, 2025–2060.**[19]

[19] Scenarios that settle on the same long-run emissions price (MfE NZ ETS market model) are varied in this chart by $0.50 to allow visual separation.

103 In some models featured in Figure 6 above, a $50 price point is assumed to serve as a minimum long-term price level in the scheme (e.g. the MfE NZ ETS market model), with this generally premised on the basis that this price level reflects the long-run marginal cost for forestry supply and afforestation (MfE, 2024a).

104 This specific $50 emissions price point can be loosely tied to Manley (2023), which found that the majority of surveyed sites were more profitable in permanent forestry relative to production forestry at an emissions price of $50. Thus, below this price, forest operators on stock change accounting may switch intentions to production forestry, reducing supply and increasing demand, thereby generating a rebound price effect back up to $50.

105 In the PCE: status quo scenario, no minimum price level is set, and prices fall to $20 by 2050 and $5 by 2060 (real 2025 NZD). This result is driven by high costs for switching from permanent exotic forestry to other land uses (e.g. production forestry, S&B) that make switching away from permanent exotic forestry uneconomic in the model, even at very low emissions prices.

106 The two NZUpy scenarios featured in Figure 6 use a lower minimum price of $37 (real 2025 NZD), reflecting the price point at which both permanent and production exotic forestry models are economic relative to some types of S&B farms in MPI (2024a).

107 Removing the minimum price in the scenario run with greater market liquidity (i.e. more borrowing from the stockpile can occur) had no effect on the modelled emissions price, as the model never reaches $37 in this scenario. For NZUpy: illiquid market, removing the minimum price assumption saw prices falling off more in the long term, reaching $29 by 2050 (versus $37 at 2050).

## Impact of restrictions on forestry by land class

108 From 31 October 2025, the Government restricted registration of exotic post-1989 forest on LUC classes 1–6 land in the NZ ETS. The restrictions do not apply to land that was already forest land on that date. Under the current settings:

a. Landowners may register up to 25% of the LUC 1–6 land on an individual land title as exotic post-1989 forest

b. A twice-yearly ballot allocates permits for exotic afforestation on LUC Class 6 land, with 7,500ha available per ballot (15,000ha p.a.); permits from this ballot are additional to the 25% allowance

c. Afforestation on LUC classes 7–8 land is unrestricted

d. Indigenous forest, exempt Māori land, land identified as high- or severe-erosion-prone in a regional or district plan, Crown afforestation land, and unmapped land are unrestricted regardless of LUC class.

109 The exact impact of the restrictions on afforestation rates in the long-term is unclear. MPI's (2024b) Regulatory Impact Statement (**RIS**) estimated that the Government's

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ballot limit of 15,000ha would lead to ~28,000ha p.a. afforestation, down from the RIS's status quo counterfactual of ~38,000ha p.a.

110 Separately, MPI's most recent afforestation intentions survey found a decline in afforestation intentions (falling to 17,200ha in 2026), attributed to uncertainty over the LUC restrictions themselves (Manley, 2025). Concept Consulting (2026) however suggest that the effective long-term impact on afforestation is uncertain, since the 25% on-farm exemption could in principle permit up to 1mha of LUC classes 1–6 conversion.

111 The restrictions are unlikely to fundamentally alter the long-term price trajectory of the NZ ETS under the status quo, given that even afforestation rates only slightly above the 15,000ha ballot limit will still see substantial long-term forestry supply.

## Afforestation and deforestation

112 Areas of exotic permanent and production forestry are expected to increase under the status quo. Most models and reports examined treat exotic afforestation as endogenous within the model, with the emissions price response function derived from Manley (2019, 2021a). Only Concept Consulting's ENZ scenarios (2026) featured in PCE (2026) allow for dynamic switching between permanent and production exotic forestry during the lifetime of a forest (with foresters able to indefinitely defer harvest when this is due).

113 Models and reports surveyed in this brief typically treat indigenous afforestation crudely, with MfE's NZ ETS market model for example assuming that indigenous afforestation stays proportionate to total afforestation at a rate consistent with the Government's afforestation forecasts.

114 This assumption is reasonable in the case of the status quo for direct planting of indigenous species, given this form of afforestation is not economic under forecast emissions prices, but it may understate the degree of regenerating mānuka/kānuka registered each year.

115 Afforestation rates are presented in:

a. Figure 7a for the Government's central with-additional-measures (**WAM**) projection (consistent with a long-term ~$50 emissions price)

b. Figure 7b from PCE: status quo, which features emissions prices peaking at around $83 (real 2025 NZD) in 2033 and declining thereafter

c. Figure 7c from NZUpy: illiquid market with the emissions price declining to $37 in the long term.

116 Govt: WAM-central sees long-term rates of exotic afforestation totalling around 27,000ha p.a. while PCE (2026) and NZUpy see afforestation rates tapering off as the emissions price falls. In the PCE report, afforestation reaches as low as 6,000ha in 2050 and 3,000ha in 2070, consistent with the low emissions prices seen in this projection.

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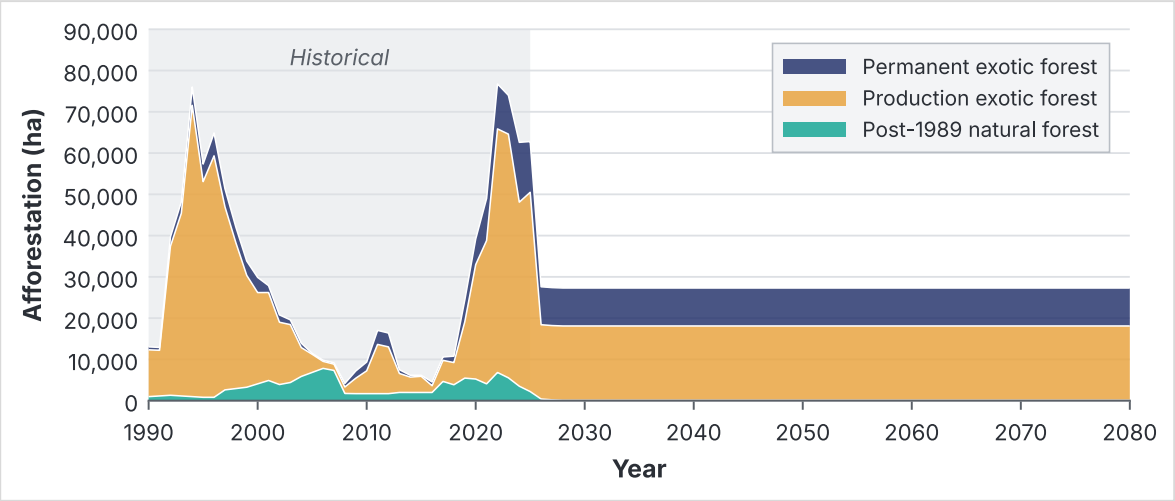



**Figure 7a: Projected afforestation in Govt: WAM-central for status quo NZ ETS.** Sourced from: Commission (2026c).[20]

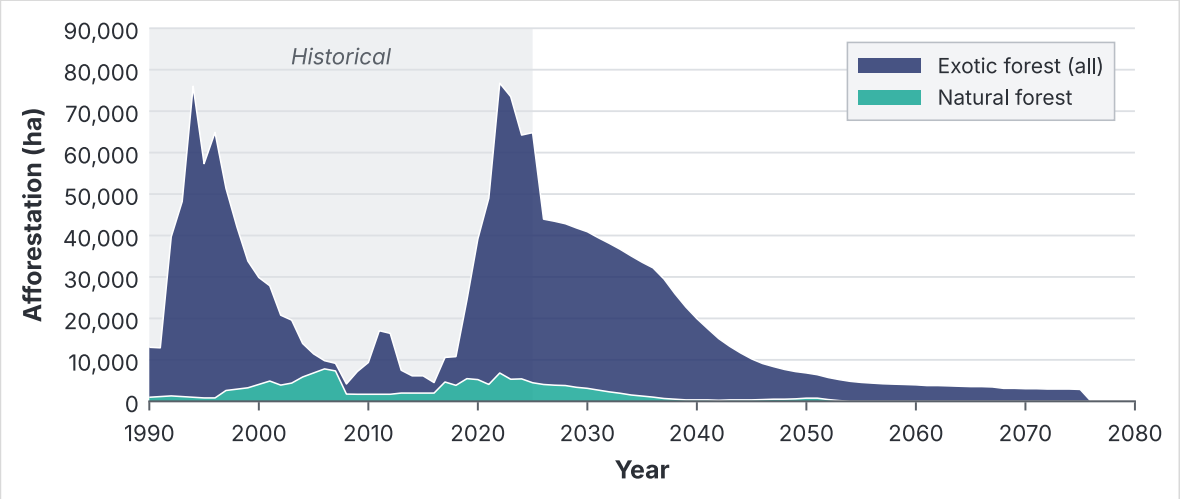



**Figure 7b: Projected afforestation in PCE: status quo for status quo NZ ETS.**

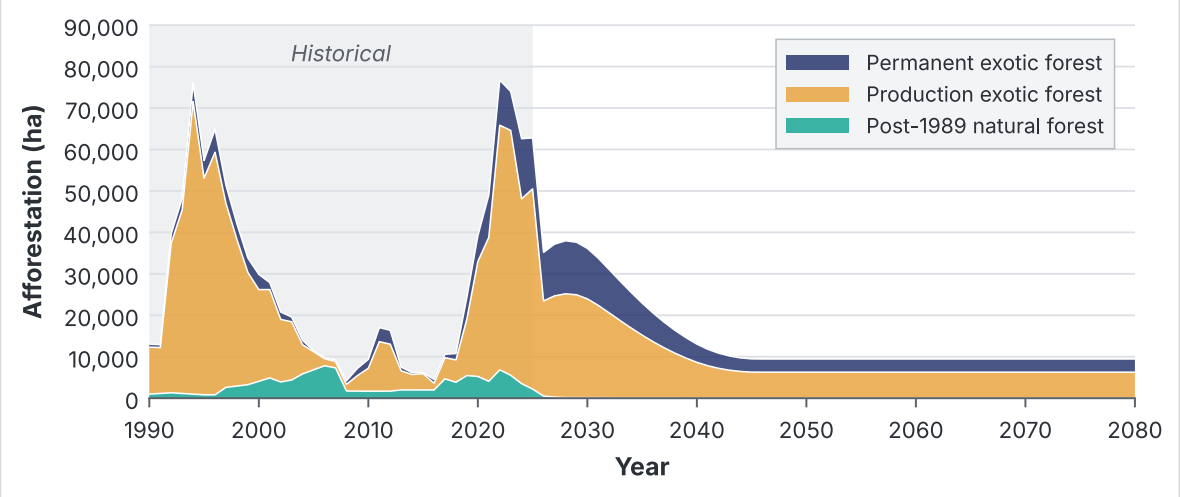



**Figure 7c: Projected afforestation in NZUpy: illiquid market for status quo NZ ETS.**

[20] To the author's knowledge, the Government's WAM-central projection reflects static assumptions for long-term afforestation rates rather than modelled outcomes.

117 Indigenous afforestation is offset by deforestation in all three projections, and New Zealand's indigenous natural forest estate is only projected to increase by 38,400ha by 2050 in Govt: WAM-central.[21] By comparison, New Zealand's planted exotic forest estate is projected to increase by 849,500ha in the same period, representing a 35.6% increase on New Zealand's current exotic planted forest estate.

118 The corresponding change in New Zealand's natural indigenous and planted exotic forest estates is shown in Figures 8a and 8b respectively for all three scenarios.

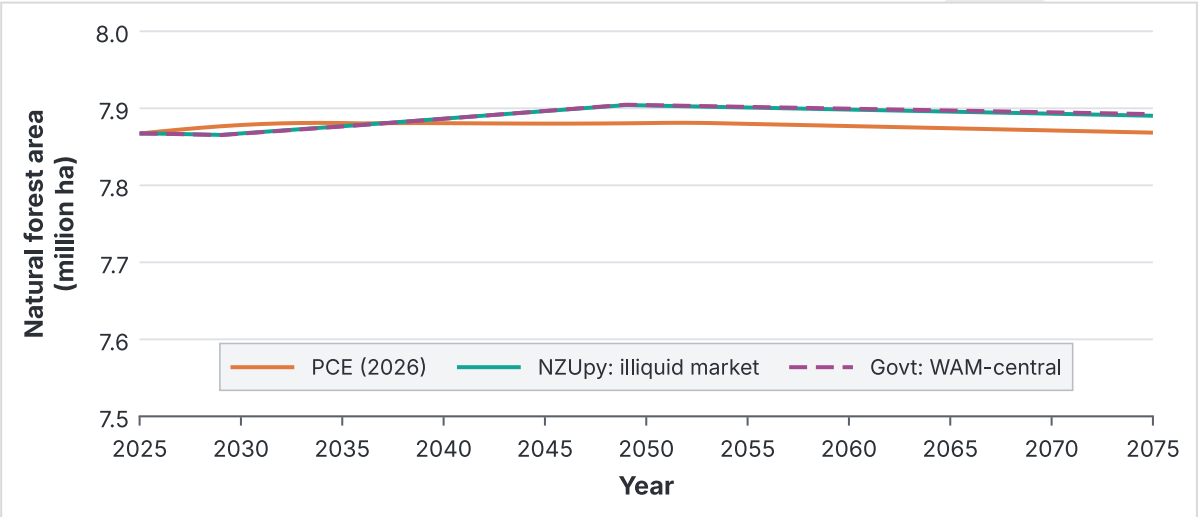



**Figure 8a: Total natural forest area from 2025 to 2075 in PCE: status quo, NZUpy: illiquid market and Govt: WAM-central.** Notes: Historical forest area in 2024 taken from MfE (2026c); Govt: WAM-central and NZUpy: illiquid market include the Government's plans for afforestation on Crown land; y-axis minimum is set to 7.5mha to allow visual distinction between scenarios.

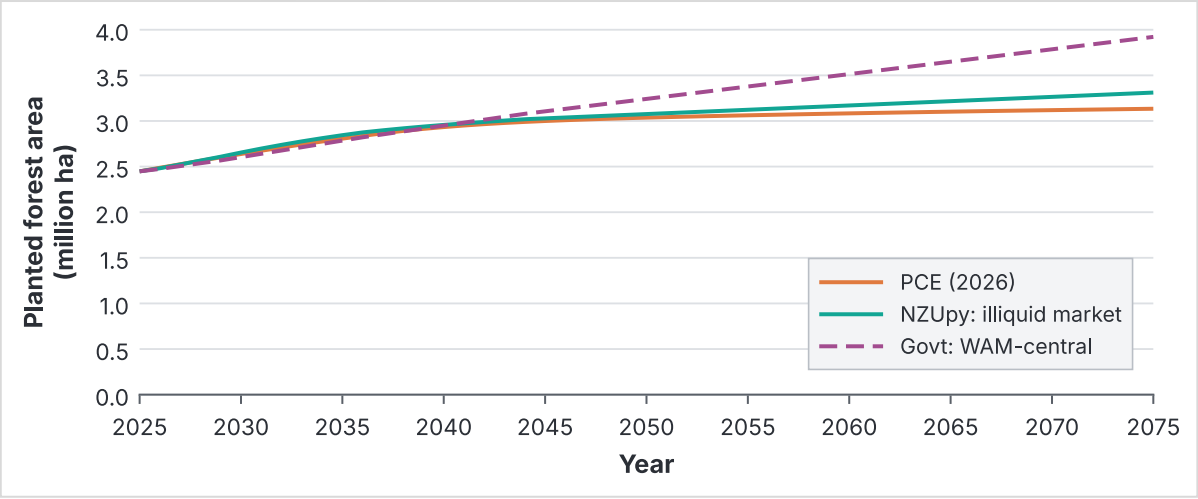



**Figure 8b: Total planted forest area from 2025 to 2075 in PCE: status quo, NZUpy: illiquid market and Govt: WAM-central.** Notes: Historical forest area in 2024 is taken from MfE (2026c); Govt: WAM-central and NZUpy: illiquid market include the Government's plans for afforestation on Crown land.

[21] Author's calculation using data from the Commission (2026c). For natural forest, 50,000ha afforestation comes from the Government's plans for afforestation on Crown land, but is offset by deforestation, reducing the total new net afforestation through to 2050 to 38,400ha.

## Auction revenues

119 Modelling studies published to date indicate that it is likely that prices will lift to clear the auction price floor again for a period of time during emissions budget 2 or 3 (**EB2** or **EB3**). Results for auction units sold and revenue, where available, are presented in Table 4 below from the model scenarios featured in Figure 6 above (page 25).

| Model scenario | Auction units sold (Million NZUs) | | Auction revenue (real 2025 NZD) | |
|---|---|---|---|---|
| | *EB2* | *EB3* | *EB2* | *EB3* |
| MfE NZ ETS market model | 11.7 | 5.2 | $925m | $450m |
| MfE NZ ETS market model: responsive afforestation | 11.7 | 5.2 | $975m | $490m |
| PCE: status quo | 3.9 | 0.6 | $300m | $50m |
| NZUpy: illiquid market | 7.4 | 3 | $580m | $240m |
| NZUpy: liquid market | 0 | 0 | - | - |
| **Average of model scenarios** | **6.8m** | **2.8m** | **$550m** | **$245m** |

**Table 4: Units sold at auction and auction revenue (real 2025 NZD) to the Crown during EB2 and EB3 in a selection of scenarios.** Note: Auction units rounded to nearest 1 decimal place and auction revenue to nearest $5m.

120 No models project any auction revenue from EB4 (2036–2040) onwards under the status quo, as all models see the market fully supplied with industrial allocation and forestry removals units by this point in time, or able to draw on a large stockpile to cover any short-term shortfalls in supply.

121 For comparison to the revenue figures presented in Table 4 above, government revenue from auctioning through to the end of EB1 was $4.3bn (real 2025 NZD), with over $2bn in revenue from auctions in 2022 alone.[22]

## Emissions outcomes

### *Net emissions outcomes relative to emissions budgets*

122 Reductions in net emissions will be generally limited by the current structure of the NZ ETS, where the scheme is only able to deliver net emissions outcomes in covered sectors equivalent to the level of remaining industrial allocation (as removals delivered beyond this point will find no buyers).

123 Projections of net emissions using target accounting for forestry are presented below relative to New Zealand's current emissions budgets from a selection of models using scenarios reflecting status quo policy settings (see Figure 9 below).

[22] Author's calculation converted to real 2025 NZD using auction clearance price and volumes sold on NZX & EEX (2026).



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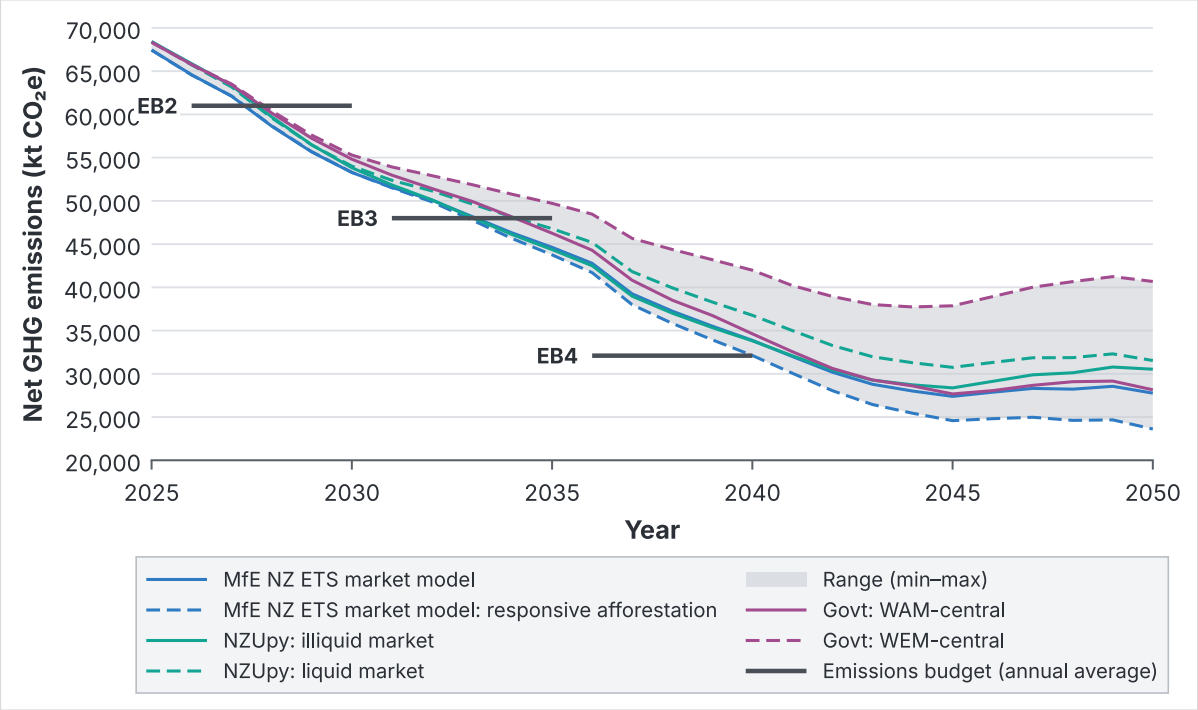



**Figure 9: Net GHG emissions (kt $CO_2e$) using target accounting in a selection of status quo scenarios, 2025–2050.** Notes: Govt: WAM-central and Govt: WEM-central are the Government's central projections with additional measures and with existing measures, respectively. NZUpy and MfE NZ ETS market model scenarios use Govt: WAM-central for emissions outside the NZ ETS. Y-axis minimum set to 20,000kt $CO_2e$ for clearer distinction between scenarios.

124 All scenarios are projected to meet New Zealand's budget for EB2 (2026–2030), whereas for EB3 (2031–2035), only one scenario (MfE NZ ETS market model: responsive afforestation) meets this budget. The remaining scenarios range from 0.5 to 19Mt $CO_2e$ above the budget.

125 For the Commission's (2024a) recommended budget for EB4 (160.5Mt $CO_2e$ over five years), no scenarios met this budget, with all scenarios at least 20Mt $CO_2e$ over budget (21–63Mt $CO_2e$ range). Paying for units to cover this gap for EB4 (e.g. via additional removals or international purchase[23]) would carry an implied cost of $1.3 to $4.1bn if valued at average modelled NZ ETS prices observed during that period ($64.35, real 2025 NZD). This value exceeds future projected auction revenue during EB2 and EB3 (see Table 4 on page 30 above).

126 Projections presented in Figure 9 above for NZUpy and the MfE NZ ETS market model slightly understate net emissions in scenarios with lower rates of afforestation than the Government's forecasts, given the use of a fixed assumption for agricultural emissions

[23] Under section 5Z of the Climate Change Response Act 2002, emissions budgets must be met, as far as possible, through domestic emissions reductions and domestic removals. However, offshore mitigation may be used if there has been a significant change of circumstance that affects the considerations on which the relevant emissions budget was based, and that affects the ability to meet the relevant emissions budget domestically.

drawn from the Government's WAM-central projection. This is because afforestation is expected to reduce S&B land use, and subsequent S&B sector emissions.

127 As illustration, when factoring in the implied greater area of remaining S&B farms in the NZUpy: illiquid market scenario, net emissions in this scenario would be 400–640kt $CO_2e$ higher than those reflected in Figure 9 at 2050.[24]

### *Outcomes for 2050 target for net GHG emissions excluding biogenic $CH_4$*

128 Splitting out biogenic $CH_4$ emissions from other GHGs requires assumptions for some models, due to their aggregation of all GHGs into total gross and net $CO_2e$ emissions figures for the NZ ETS. For biogenic $CH_4$ from municipal waste (included in the NZ ETS), emissions are assumed to remain broadly consistent each year as a share of NZ ETS emissions, as in the Government's WAM-central scenario. This assumption is used to split out biogenic $CH_4$ to present outcomes for other GHG emissions ($CO_2$, $N_2O$, non-biogenic $CH_4$, etc.) in scenarios for these models.

129 Projections of net emissions excluding biogenic $CH_4$ see emissions of +4.5 to -4.8Mt $CO_2e$ over or under New Zealand's 2050 target (i.e. the target is met in some scenarios at 2050, and missed in others). This is presented in Figure 10 below across a selection of scenarios reflecting the status quo.

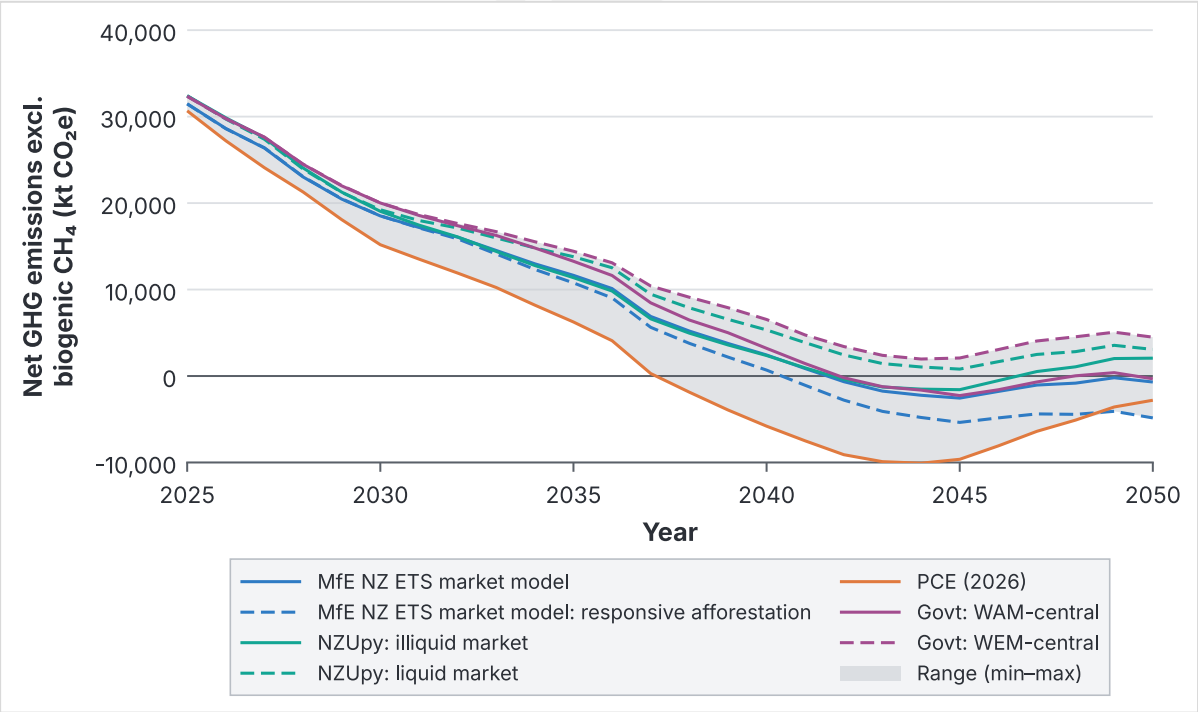



**Figure 10: Net GHG emissions excluding biogenic $CH_4$ (kt $CO_2e$) using target accounting in a selection of status quo scenarios, 2025–2050.** Notes: Govt: WAM-central and Govt: WEM-central are the Government's central projections with additional measures and with existing

[24] Author's calculation using average emissions per ha for S&B farms ranging from 2.3t$CO_2e$/ha to 3.66t$CO_2e$/ha. Lower-end estimate sourced from MfE (2024a) for S&B farms, and excludes fertiliser emissions (reported as a separate category). Higher-end estimate sourced from Vibart et al. (2022) drawn from Beef+Lamb NZ economic data from a sample of 170 S&B farms.

measures, respectively. NZUpy and MfE NZ ETS market model scenarios use Govt: WAM-central for emissions outside the NZ ETS.

130 Beyond 2050, the potential for falling prices in the NZ ETS creates risk that New Zealand will be unable to sustain net-zero GHG emissions. This risk is pertinent because the 2050 target requires net accounting emissions (other than biogenic $CH_4$) to be zero not only in 2050, but in every subsequent calendar year (Climate Change Response Act, 2002, s5Q(1)(a)).

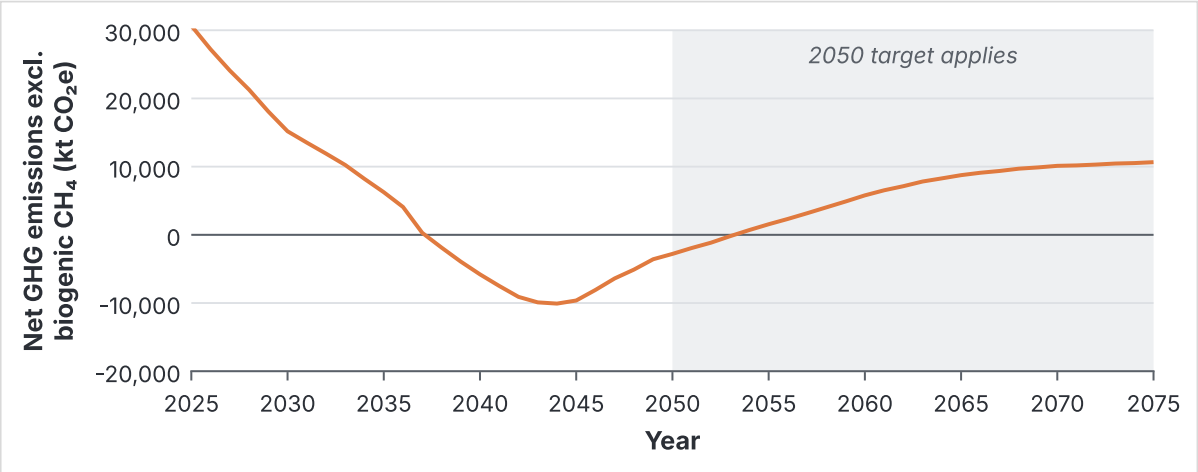



**Figure 11: Net GHG emissions excluding biogenic $CH_4$ (kt $CO_2e$) using target accounting for status quo NZ ETS in PCE: status quo, 2025–2075.** Sourced from: PCE (2026) and Concept Consulting (2026).

131 Modelling prepared for the PCE illustrates this risk (see Figure 11 above). This projection sees net GHG emissions (excluding biogenic $CH_4$) falling to around -10,000kt $CO_2e$ in the mid 2040s before rising again, breaching the target from the mid 2050s and rising further thereafter (Concept Consulting, 2026; PCE, 2026).

132 This result reflects the timing of afforestation. Under target accounting, production forests stop contributing removals once they reach their long-term average age (23 years), so New Zealand's surge in afforestation in the early 2020s stops contributing from the mid 2040s. With afforestation declining over time as the emissions price falls in the PCE scenario (Figure 7b, page 28), newer forests do not fill this gap, and net emissions eventually breach the target.

133 Thus, while some scenarios reflecting the status quo NZ ETS may meet New Zealand's target in 2050, the scheme may struggle to sustain this target beyond 2050 where its current structure is maintained.

134 Whether the target is met at 2050 under the status quo at all also depends on the extent to which forestry offsets long-lived GHG emissions outside the NZ ETS. New Zealand is currently able to offset its remaining long-lived GHG emissions outside the NZ ETS in projections (~8.4Mt $CO_2e$ at 2050, predominantly agricultural $N_2O$) due in part to differences between target accounting for forestry and NZ ETS accounting.

135 This occurs due to core differences between the two. First, target accounting incorporates harvested wood products (**HWP**) into its average age, crediting production forests up to 23 years, compared with 16 years for pine in the NZ ETS. Second, look-up

tables for small exotic forest participants (under 100ha registered) are substantively lower than those used in the GHGi and target accounting. While target accounting also reflects emissions from soil carbon and biomass loss at the point of land use change to forestry, these only partially offset the additional removals credited under target accounting in the long term.

136 The contribution towards offsetting long-lived GHG emissions outside the NZ ETS due to accounting differences in the NZ ETS is shown in Figure 12 below for the NZUpy: illiquid market scenario.

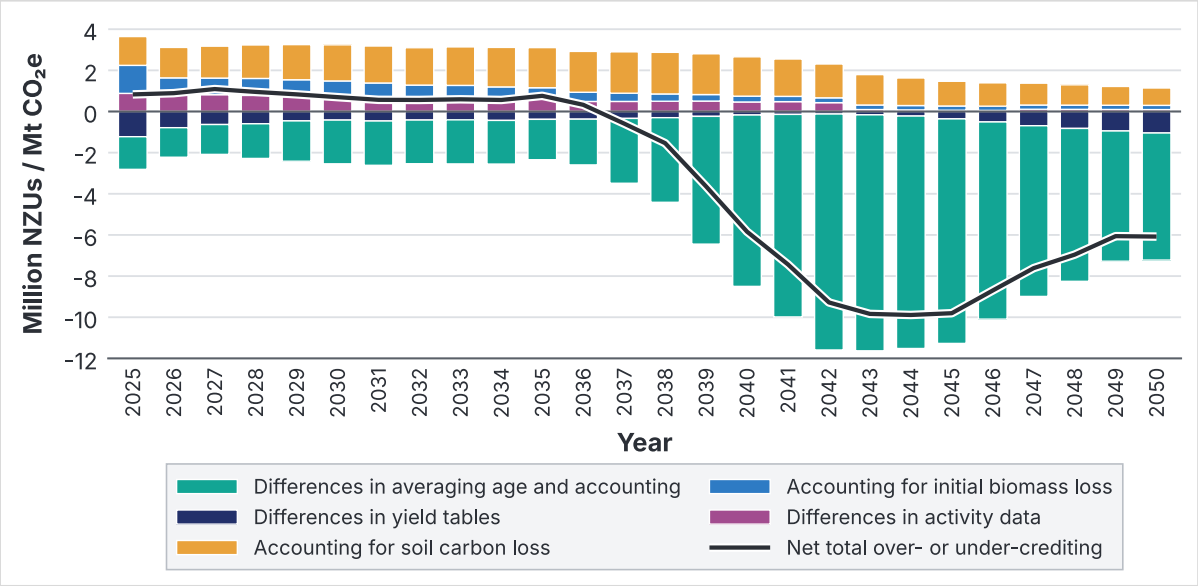



**Figure 12: Additional offset for GHG emissions outside NZ ETS (Mt $CO_2e$) provided by differences between the NZ ETS and target accounting for forestry in NZUpy: illiquid market, 2025–2050.** Notes: Negative figures represent greater levels of removals credited under target accounting than in NZ ETS. Chart produced using the Commission's (2026c) forestry model with NZ ETS afforestation results from NZUpy: illiquid market.

137 Cumulatively these target accounting differences offset an additional 6.1Mt $CO_2e$ outside the NZ ETS in 2050, enough to offset around 70% of long-lived GHG emissions outside the NZ ETS (8.4Mt $CO_2e$) that year.

138 Reliance on this offset to reach New Zealand's 2050 net-zero target carries risk, since the accounting gap could narrow or reverse. For example, periods of increased deforestation, which may occur at the lower long-term emissions prices forecast in the PCE status quo scenario, could flip the gap the other way.

139 Policy changes can also affect the gap too. The Government consulted on raising credited sequestration rates in the default look-up tables for exotic forests in 2025 (Te Uru Rākau, 2025b), and adopting these would narrow the accounting gap.

140 A choice by a future government to restrict forestry, bring HWP into the NZ ETS, encourage use of wood for bioenergy, or otherwise reduce NZ ETS-covered gross emissions would all narrow the accounting gap. These changes work either by reducing afforestation, reducing HWP, or by bringing NZ ETS accounting closer to target accounting.

141 If this happens, the NZ ETS could still deliver the same emissions outcomes within its own accounting context, but it would no longer offset as many emissions outside the scheme, putting New Zealand's 2050 net-zero target at risk.

142 In addition, the NZ ETS sets no expiry date on NZUs, allowing participants and speculators to bank and borrow units, then sell or surrender them when commercially advantageous. This weakens the link between emissions in any given year and the unit caps the Government sets to align with New Zealand's targets and budgets.

143 A shortfall in removals in the lead-up to 2050 – for example, from lower-than-projected afforestation – therefore won't necessarily trigger a corrective price response and mitigation within gross emitting sectors. The market can instead draw down the existing stockpile.

144 Uncertainty in projections adds to this risk. Gross emissions projections in some sectors do not capture year-to-year variability unrelated to policy or price – for example, dry years affecting electricity generation emissions. Here, too, the market may rely on stockpiled units from removals that occurred years or decades prior.

145 These factors risk net emissions outcomes that exceed New Zealand's 2050 net-zero target for GHGs other than biogenic $CH_4$ either at 2050, or subsequently. This risk is exacerbated by the status quo design of the scheme – for example, non-expiring units and largely unconstrained supply from removals.

### Other removals under the status quo

146 Information on the effective cost-point of removals other than forestry is limited (e.g. bioenergy with carbon capture and storage (**BECCS**), direct air capture (**DACs**), non-forest vegetation). However, anecdotal evidence from Todd Energy has suggested even conventional carbon capture and storage is not cost-effective at their facilities at present day prices circa $50 (Gibson, 2025).

147 Uncertainty around the emissions price in the long term under the status quo, with the potential for emissions prices falling below present-day prices in real terms, will increase the commercial risk of pursuing capital-intensive carbon removal technologies such as BECCS and DACs, rendering their uptake questionable at best in the status quo.

148 Inclusion of forms of biological non-forest removals will also struggle to compete with forestry, given the small and fragmented nature of non-forest vegetation. Where included, they will likely have a negligible impact on long-term emissions price outcomes under the status quo.

149 Inclusion of non-forest removals in the NZ ETS that are not well captured by the GHGi at a sufficient Intergovernmental Panel on Climate Change (**IPCC**) methodology tier (or are excluded from its current categories/boundary) can also serve to make net emissions outcomes measured against New Zealand's targets worse, as forestry removals – which would count towards the target – are replaced with removals not counted in New Zealand's GHGi and targets.

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# PART C: OUTCOMES FOR POLICY ALTERNATIVES TO STATUS QUO

## Policy alternatives to the status quo considered

150 Two broad approaches to reform of the NZ ETS are considered:

a. **A modified net emissions NZ ETS:** Forestry remains included in the scheme, but measures are undertaken to lift emissions prices facing gross emitters.

b. **A gross emissions ETS:** Forestry and gross emissions are moved to separate schemes, with forestry shifted to a RIM (e.g. from 2031).

151 A number of potential policy options have been proposed for modifying the NZ ETS while retaining elements of its current design centred on net emission reductions (Climate Change Commission, 2026a). These include:

a. Specified limits on the area of new forest that can enter

b. Limits on the proportion of forestry NZUs that gross emitters can surrender

c. Changes to surrender obligations for gross emitters to devalue forestry (e.g. gross emitters need to surrender two forestry units per 1 tonne of GHG emissions)[25]

d. Charging a top-up levy/tax on gross emitters

e. Introducing vintaging (e.g. units can only be used by gross emitters within the budget period they are issued in).

152 Predicting or modelling the effect of these policies is complex. It necessitates challenging assumptions on the part of the modeller related to the particulars of how the policy might be designed, and subsequent market and participant behaviour. Some policies surveyed above (e.g. vintaging) would also require significant modification to existing models, or development of new models entirely.

153 Given these constraints, five specific options are reflected in this brief for a modified net NZ ETS or gross emissions ETS.

**Modified net NZ ETS: limits on the area of new forest that can enter:**

a. A fixed rate ballot for all exotic afforestation is specified (e.g. 20,000ha p.a. total) [PCE: afforestation limit and NZUpy: afforestation limit]

b. Only indigenous afforestation may register in future [PCE: native only future and NZUpy: native only future]

[25] This option is sometimes referred to as a "discount rate" change to forestry NZUs. This term is not used in this brief given its use in other contexts (e.g. the discount rate applied for economic analysis).



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**Modified net NZ ETS: changes to surrender obligations for gross emitters:**

c. Gross emitters surrender two forestry units per tonne of emissions, modelled as exotic forests being paid 50% of NZU price [PCE: 2for1forestry]

**Modified net NZ ETS: exotic forestry transferred to a RIM:**

d. Exotic forestry is transferred from the NZ ETS to a RIM, while indigenous forestry remains in the scheme [PCE: native and gross only].

**Gross emissions ETS:**

e. Forestry is transferred from the ETS to a RIM, and new afforestation is incentivised outside the scheme (e.g. through a RIM) [PCE: gross ETS forestry outside]

154 These options are not policy proposals. They are selected to span part of the range of possible reforms, and to test how different approaches affect emissions prices, auction revenue, and emissions outcomes. An actual reform package could combine elements of several options, vary their settings, or take a different approach entirely.

155 Removing forestry from the NZ ETS as part of the shift to a gross emissions ETS would require significant and complex policy decisions on how this transition occurs (e.g. whether all existing forestry participants are transferred out of the scheme, from what date, and what type of scheme they are moved to).

156 This brief assumes for a gross emissions ETS that existing forestry participants in the scheme are moved to a new RIM, alongside new and prospective forestry landowners, and that this transition occurs in 2030.

157 This assumption is premised on the complex nature of the policy design process that would be required (with a raft of legal, technical, financial, administrative, equity, and Te Tiriti o Waitangi considerations). This timing also ensures changes are aligned with the end of the current emissions MERP for forestry, when emissions returns are due for all NZ ETS forests.

158 The Government may wish to expedite changes within the current emissions budget and MERP however, which could generate auction revenues from an earlier date that could be used to fund the RIM, and would mitigate the risk of an extended lapse in afforestation.

159 This part of the brief presents projected emissions prices, auction revenue, and GHG emissions for the options considered for a modified net NZ ETS and a gross emissions ETS in turn.

## Outcomes for four variations of a modified net NZ ETS

160 Projections for emissions price, auctioning, and net emissions for a modified net NZ ETS are taken from ENZ featured in Concept Consulting (2026) and PCE (2026), and NZUpy. Both models feature similar demand-response functions (given the MfE NZ ETS model and NZUpy derive this from ENZ), as well as forestry supply-response functions, both

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derived from Manley (2019, 2021a). However, the models differ in terms of their optimisation process.

161 NZUpy iterates through price paths to minimise the difference between supply and demand to a defined end year (e.g. 2050).

162 The ENZ scenarios use different optimisation processes for each scenario. The status quo scenario and some other scenarios iterate through price paths while optimising for a long-run equilibrium stockpile of 50 million NZUs (Concept Consulting, 2026). Scenarios with more significant modifications to the NZ ETS (e.g. removing forestry) optimise for net emissions aligned with New Zealand's current 2050 targets.

The optimisation process used by each model is discussed as part of results for each scenario, including how this affects the interpretation of similarities or differences in results.

### *Modified net NZ ETS: A fixed rate ballot for exotic afforestation*

163 In Concept Consulting (2026) and PCE (2026), an afforestation limit of 20,000ha p.a. is applied to new registrations of exotic forestry for its scenario reflecting a strict limit on new afforestation. In this scenario, no exceptions to the ballot limit exist (e.g. there is no ability for farmers to register 25% of their LUC classes 1–6 land separate to the ballot). This 20,000ha p.a. limit is also run through NZUpy.

164 The emissions price impacts for the NZUpy and PCE scenarios reflecting a strict afforestation limit are comparable, having the effect of both increasing and delaying the peak price observed in the model, as shown in Figure 13 below.

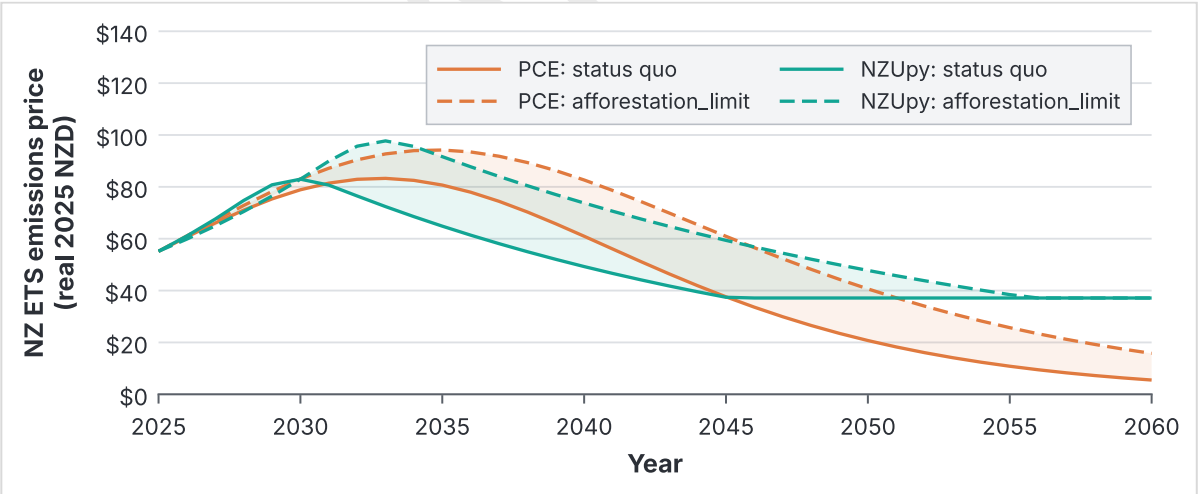



**Figure 13: Comparison of NZ ETS emissions price (real 2025 NZD) under status quo and modified net NZ ETS with 20,000ha exotic afforestation limit from PCE (2026) and NZUpy.**

165 Net emissions outcomes also reflect a similar result between models, with net emissions exceeding the 2050 target by a few million tonnes (see Figure 14 below). This reflects the comparable optimisation approach between models for this scenario, with ENZ optimising for a particular stockpile balance in 2050, rather than aiming for net-zero emissions outcomes in 2050.

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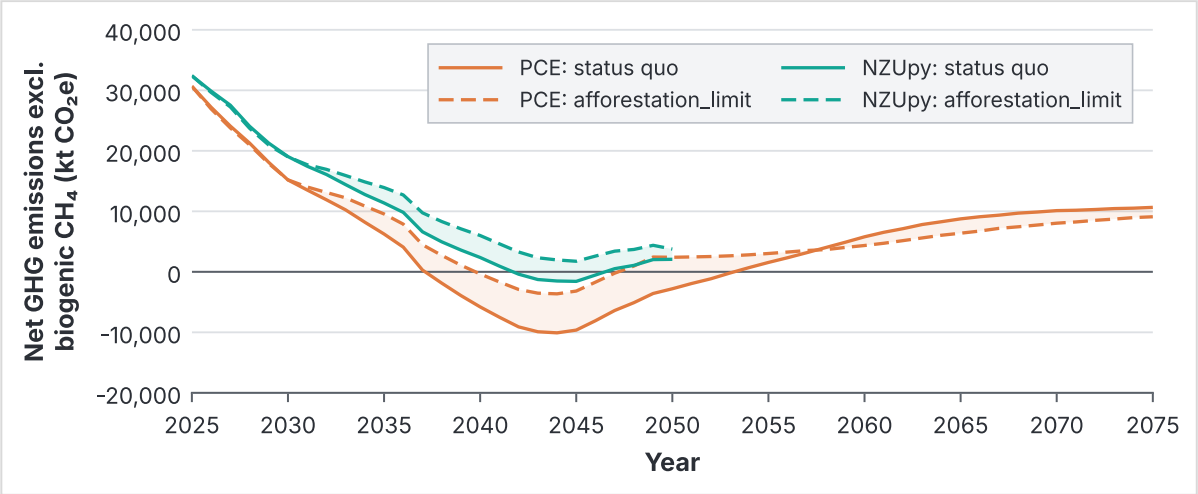



**Figure 14: Net GHG emissions (excl. biogenic $CH_4$) under status quo and modified net NZ ETS with 20,000ha exotic afforestation limit in PCE (2026) and NZUpy.**

166 Auction volumes rise slightly in NZUpy: afforestation limit, with 7.4m NZUs sold in EB3 compared with 3m under the status quo. PCE: afforestation limit sees no additional units sold relative to the status quo, with EB3 auction revenue only $3m higher. Neither scenario sees auctions clear from EB4 onwards.

167 The strict afforestation limit also sees greater borrowing from the stockpile in NZUpy: afforestation limit, with low levels of ongoing borrowing through the 2030s and 2040s. Given the declining emissions price path, this is commercially advantageous for stockpile holders, who can buy back units later at a lower price if needed. This greater reliance on stockpile borrowing adds to the risk of New Zealand missing its net-zero 2050 target, with net emissions in NZUpy: afforestation limit exceeding net zero in 2050 (see Figure 14).

*Modified net NZ ETS: Only indigenous afforestation may register*

168 Emissions price outcomes are expected to rise in a modified net NZ ETS relative to the status quo if exotic species are prevented from entering the scheme from a future date, but existing exotic forests remain in the scheme (see Figure 15 below).

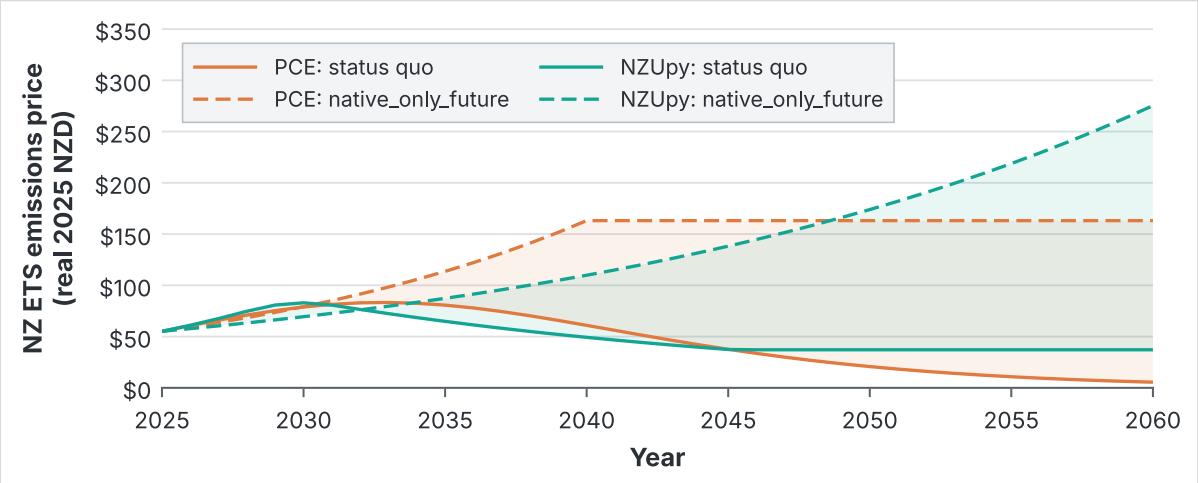


**Figure 15: Comparison of NZ ETS emissions price (real 2025 NZD) under status quo and modified net NZ ETS preventing future registration of exotic species from PCE (2026) and NZUpy.**

169 Prices in PCE: native only future rise to just above $160 by 2040 (real 2025 NZD) and remain constant in real terms from then onwards. This switch to a flat emissions price in real terms from 2040 onwards in part reflects a modelling choice, where a two-phase growth curve is applied by Concept Consulting (i.e. differing price trends occur before and after 2040).

170 NZUpy: native only future in Figure 15 sees a rising emissions price, reaching $110 in 2040, $174 in 2050, and increasing thereafter. This long-term consistent rate of change is due to its scenario design where price dynamics are assumed to reflect Hotelling's rule.

171 In principle, it may be reasonable to expect a non-linear adjustment in emissions price immediately following the announcement of a significant policy such as the prevention of any further registrations of exotic forestry, reflecting the substantive change in market conditions. However, this is not captured in either the PCE or NZUpy scenarios.

172 The two models see differing outcomes for net GHG emissions excluding biogenic $CH_4$, shown in Figure 16 below. In NZUpy: native only future, net GHG emissions are higher than the status quo when no further exotic forests are allowed to enter the scheme, exceeding the 2050 target by 11Mt $CO_2e$. In contrast, the PCE: native only future is able to achieve net-zero GHG emissions both in 2050 and subsequently, consistent with the goal of its optimisation process for this scenario.

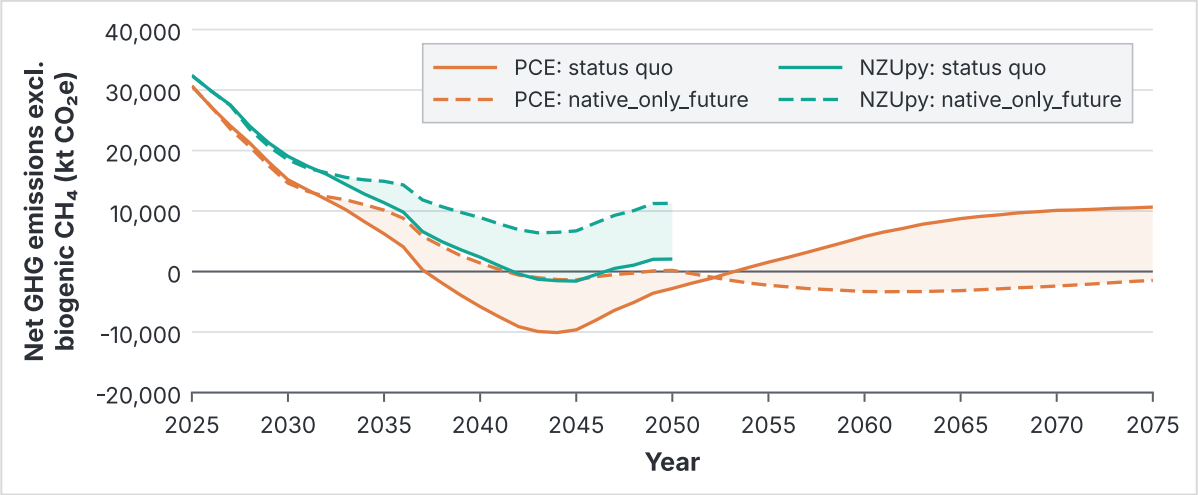



**Figure 16: Net GHG emissions (excl. biogenic $CH_4$) under status quo and modified net NZ ETS preventing future registration of exotic species in PCE (2026) and NZUpy.**

173 The differences in net emissions outcomes between the two models come from differences in their optimisation objective, and how each model treats the future management of forests registered on stock change accounting.

174 In PCE: native only future, the ENZ model achieves net-zero emissions in part through seeing existing exotic stock change forests switching to permanent forestry when their harvest is due (as the rising emissions price makes this cost-effective in the model). In

contrast, the NZUpy model does not allow for endogenous switching to permanent forestry, so this mitigation lever is not realised in NZUpy: native only future.

175 Realistic assumptions on whether exotic foresters on stock change accounting will switch to permanent forestry and at what price are difficult to form. Many foresters operating on stock change accounting will have timber/logs revenue as part of their core business plans, and so may be disinclined to switch to permanent forestry in practice (apart from selling off more marginal and remote sites).

176 In some cases, production foresters may opt to sell their land or management rights for the forest to a permanent forest operator, but will still harvest the forest and walk away with the timber/log revenue before the forest is then replanted as a permanent forest. Where this occurs, the contribution made to New Zealand's target and NZU supply flows seen in the NZ ETS may not drastically change until several years or decades later for these forests, potentially differing from the ENZ modelling assumption (with higher net emissions, potentially exceeding net zero, as a result).

177 These differing assumptions for whether stock change foresters are allowed to switch between production and permanent forestry, and the extent to which they realistically would, also affect the auction volumes cleared within each scenario.

178 In the PCE: native only future scenario, no auctions are cleared after 2031, as the market can satisfy demand by buying units from stock change foresters who have converted to permanent forestry and drawing on an increasing stockpile if needed. Auction revenue totals just $182m to 2050 (real 2025 NZD, undiscounted).

179 However, this scenario's price path is optimised to reach net zero rather than to balance supply and demand, and the stockpile grows by several times over relative to annual demand by 2050 (Concept Consulting, 2026). A surplus of this size would be expected to weigh on emissions prices, so this net-zero outcome should be treated with caution.

180 In the NZUpy: native only future scenario, auctions begin clearing again from around the mid 2030s, with the full allowed volume clearing from then through to 2050, where the NZ ETS cap and auction volumes are assumed to be set in line with the Commission's EB4 demonstration pathway. Auction revenue totals $17.4bn to 2050 in this scenario.

### *Modified net NZ ETS: Two forestry units surrendered per tonne of gross emissions*

181 For a policy in which changes to surrender obligations devalue forestry (e.g. two forestry units are required for every tonne of gross emissions), Concept Consulting (2026) modelled this by applying a price for exotic forestry at 50% of the rate of the rest of the NZ ETS. Modelled outcomes for the gross emissions price see the price rising at a constant rate to $250 (real 2025 NZD) by 2040, and flat in real terms thereafter. Exotic foresters would receive a price equivalent to half this value.

182 Net GHG emissions other than biogenic $CH_4$ in this scenario are optimised to meet New Zealand's net-zero 2050 target, and this is sustained beyond 2050, hovering around -1 to -4.5Mt $CO_2e$ out to 2050, shown in Figure 17 below.

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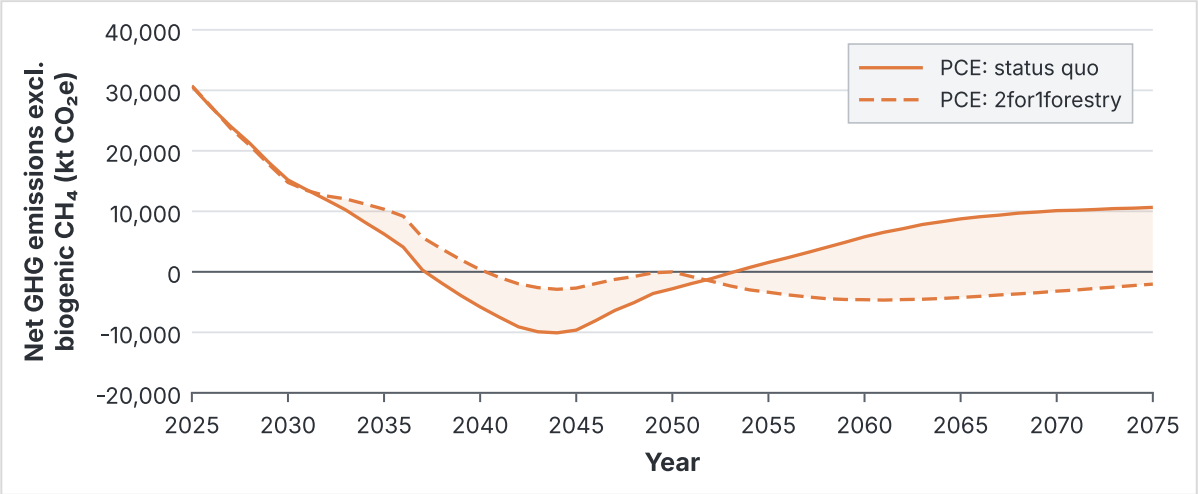



**Figure 17: Net GHG emissions (excl. biogenic $CH_4$) under status quo and modified net NZ ETS with forestry devalued by 50% (PCE: 2for1forestry).** Sourced from: PCE (2026).

183 As with the prior PCE scenario, in which no new exotic forests are allowed to enter the scheme, auction revenues are low for the modelled option devaluing exotic forestry units, with $645m in revenue generated from auctions (real 2025 NZD), and no auctions cleared after 2031. Thus, pushing beyond net zero with this policy option would likely come at significant additional cost to the Crown.

184 Further modelling of this policy option is also likely to be needed, given the use of a stylised 50% price for forestry within ENZ will not pick up the policy's effects on stockpile dynamics in the late 2020s and early 2030s (where this policy would significantly exacerbate the relative shortage in supply expected over this period). In light of this, forecast auction revenue for this scenario should be treated with caution. As with PCE: native only future, this scenario's price path is optimised to reach net zero rather than to balance supply and demand, and the stockpile grows to several times annual demand by 2050 (Concept Consulting, 2026). This net-zero outcome should therefore also be treated with caution.

#### *Modified net NZ ETS: Exotic forestry transferred out of the scheme*

185 Where all exotic forestry is transferred from the NZ ETS and not incentivised elsewhere while indigenous forestry remains in the scheme (PCE: native and gross only), the emissions price rises to $381 (real 2025 NZD) by 2050. As this outcome is more comparable to those seen for a gross emissions ETS, results for this option are presented alongside PCE: gross ETS forestry outside in the following section on a gross emissions ETS (see Figures 18, 19 and 21).

## Outcomes for a gross emissions ETS

186 Emissions price outcomes in a new gross emissions ETS would depend on the Government's objectives for reform, including its strategy with respect to how complementary measures alongside the NZ ETS are deployed.

187 PCE (2026) and Concept Consulting (2026) modelled multiple scenarios that reflect variations of removing forestry from the NZ ETS. The scenario selected for a gross

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emissions ETS is PCE: gross ETS forestry outside, in which forestry is transferred out of the NZ ETS but incentivised alongside it (e.g. through a RIM). Figure 18 below compares this with the modified net NZ ETS option in which only exotic forestry is transferred (PCE: native and gross only). The emissions price on gross emissions reaches $250 in 2050 in PCE: gross ETS forestry outside, and $381 in PCE: native and gross only.

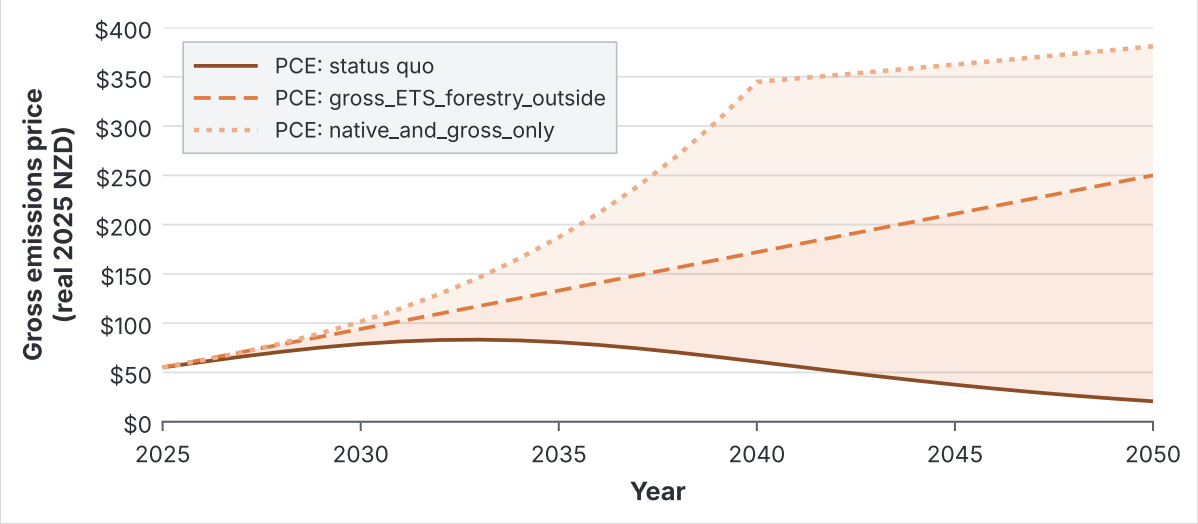



**Figure 18: Emissions price (real 2025 NZD) outcomes in a gross emissions ETS and a modified net NZ ETS with exotic forestry transferred outside NZ ETS, from PCE (2026).**

188 The outcomes of these stylised scenarios reflect the optimisation process used in the ENZ model (seeking net-zero emissions at and post 2050), whereby scenarios that see less action on removals require greater effort on gross GHG emissions to meet the net-zero target, driving up the price on gross emissions accordingly.

189 PCE (2026) and Concept Consulting (2026) also modelled a scenario with forestry removed from the NZ ETS and no further action taken on removals, in which the emissions price rose to $1,731 per $tCO_2e$ by 2050. This emissions price path would generate significant auction revenue for the Crown but pose significant economic and equity challenges if it were to occur (e.g. for lower-income households, remote communities, and trade-exposed industries with hard-to-abate emission sources).

190 However, this result likely says more about the model and the constraints applied within it than about the true cost of deep cuts to gross emissions. ENZ, like many partial and general equilibrium models, struggles to capture the technological, systems, and economic change a very high emissions price would drive, such as structural shifts in demand, early scrappage of vehicles and equipment, or the interplay between carbon pricing and other policies (where investment or regulation may be better suited to highly inelastic emissions sources). For these reasons, this scenario is not considered further in this brief.

191 The two scenarios shown in Figure 18 still offer some insight into how gross emissions respond to price in the model. Figure 19 shows that raising the price path from $250 to $381 per $tCO_2e$ at 2050 delivers around 0.8Mt $CO_2e$ of additional abatement in transport, with smaller impacts in stationary energy and industrial sectors.

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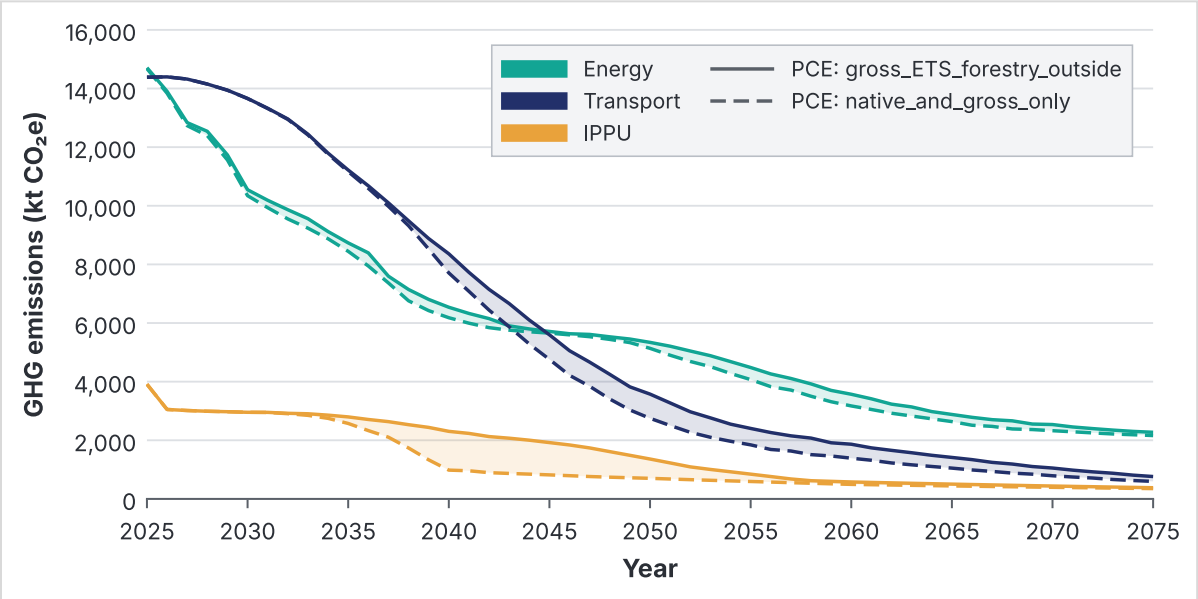



**Figure 19: Gross GHG emissions per sector (kt $CO_2e$) for scenarios rising to $250 by 2050 (PCE: gross ETS forestry outside) and $381 by 2050 (PCE: native and gross only).** Sourced from: PCE (2026).

192 However, both scenarios assume policies outside the ETS that are broadly consistent with the status quo, and so implicitly leave the heavy lifting on mitigation to carbon pricing, even in sectors with a highly inelastic response to emissions price. This reliance is an implied policy choice rather than an inevitable feature of a gross emissions ETS.

193 Grubb et al. (2023) suggest that decision-making related to lower-emissions choices spans several distinct domains: habits and choices constrained by limited money, time, or information to act differently; deliberate cost-minimising choices, where price is the natural lever; and longer-term, strategic choices about technology, infrastructure, and dynamic change to systems. Carbon pricing can be well suited to shaping the middle domain but structurally mismatched to the other two.

194 Transport emissions, as an example, are a product of all three. Lower-income households are constrained by the practical transport options available (even as some fuel and trip decisions do respond to price); while a deeper shift away from car dependency relies on long-term investment in infrastructure, irrespective of whatever emissions price is applied.

195 Technology adoption is also path dependent, with existing infrastructure and accumulated expertise giving incumbent, higher-emissions technologies a persistent advantage, so innovation naturally continues flowing there unless redirected (Aghion et al., 2019).

196 Reliance on carbon pricing and research subsidies alone can encourage innovation in clean technologies, but the transition will typically be slow (Acemoglu et al., 2016), potentially leading to firms investing in making existing technology more efficient, rather than switching to a genuinely low-emissions alternative (Aghion et al., 2019). This is echoed empirically, where a review of several hundred ex-post climate policy studies reported that combining price with other measures outperforms pricing alone (Hoppe

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et al., 2023). Thus, where modelled emissions prices rise steeply for relatively little additional gross abatement, this points to a gap that price alone should not be relied on to close.

197 The Commission's (2024b) pathways, used to support its recommendations for New Zealand's 2050 targets and EB4 volume, reflect this approach to carbon pricing. In both of its EB4 demonstration pathway and high-technology and high-systems (**HTHS**) change scenarios, the effective emissions price rises to $245 (real 2025 NZD) by 2050, but greater implied effort alongside the NZ ETS helps lead to lower emissions outcomes in HTHS (see Figure 20 below), bringing more ambitious long-term targets into play (e.g. -20Mt $CO_2e$ at 2050).

198 Given their differing levels of ambition for gross emissions, these two scenarios are used in place of PCE: gross ETS forestry outside to estimate auction revenue for a gross emissions ETS (see below), and as the basis for analysis of a gross emissions ETS with a RIM in Part D.

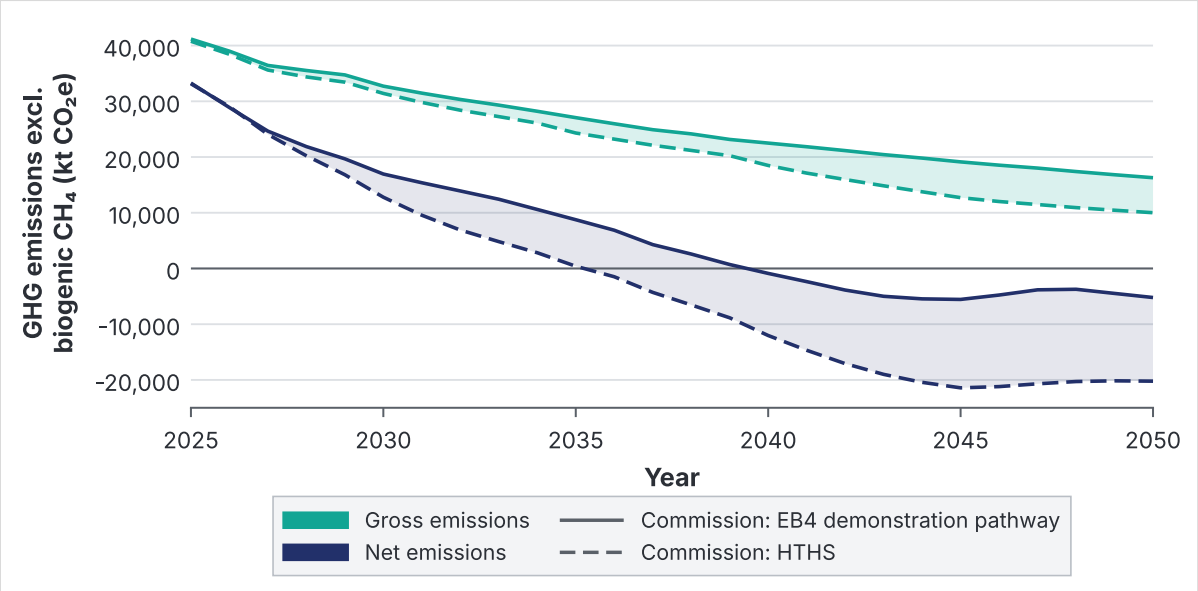



**Figure 20: Gross and net GHG emissions (kt $CO_2e$) excl. biogenic $CH_4$ in Commission: EB4 demonstration pathway and Commission: HTHS scenarios.**

*International comparison*

199 The prices seen in PCE: gross ETS forestry outside and PCE: native and gross only are generally in line with or below modelled scenarios for the European Union Emissions Trading Scheme (**EU ETS**), and UK Emissions Trading Scheme (**UK ETS**).[26] Prices for EU ETS permits are at €84 as of September 2026 (EEX, 2026), equivalent to $159 per $tCO_2e$ (real 2025 NZD); while August auctions in the UK ETS cleared at £58 (Intercontinental

[26] Both schemes cover energy generation, aviation, maritime transport, and industry. A new scheme scheduled for implementation in 2027–2028 in the European Union called the EU ETS2 will cover road transport, buildings, and small industry not captured by the EU ETS, and is similarly expected to have carbon prices significantly higher than the current NZ ETS (BloombergNEF, 2025).

Exchange, 2026), equivalent to \$129 per $tCO_2e$ (real 2025 NZD).[27] These prices are not exceeded in the PCE: gross ETS forestry outside scenario until 2039 and 2035 respectively, and are two-and-a-half to three times higher than the NZ ETS spot market price today.

200 Published price scenarios for the UK ETS and EU ETS converted to real 2025 NZD are compared to the PCE: gross ETS forestry outside and PCE: native and gross only scenarios, as well as the mean price result for the status quo NZ ETS in Figure 21 below.

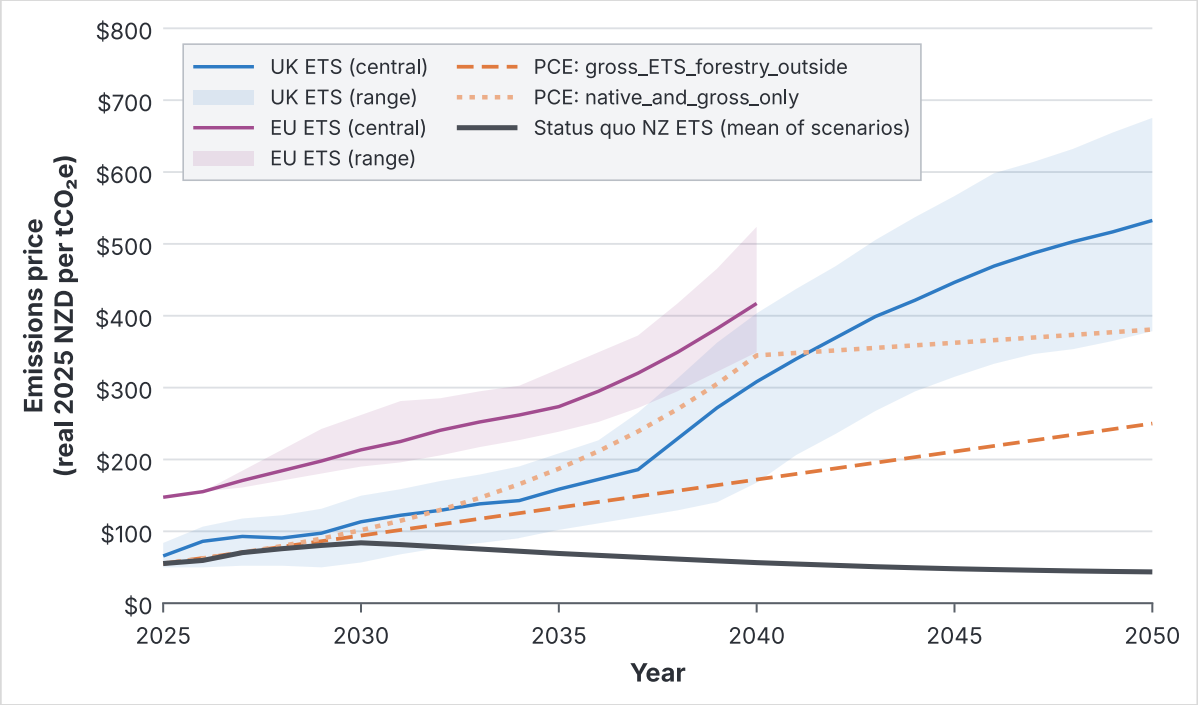



**Figure 21: Modelled price scenarios for gross emissions ETS and modified net NZ ETS with exotic forestry removed from PCE (2026) and status quo NZ ETS compared to modelled scenarios for UK ETS and EU ETS emissions price (real 2025 NZD).** Sourced from: UK ETS: Department for Energy Security & Net Zero (2026); EU ETS: SEB Group (2026). Notes: UK ETS and EU ETS price scenarios are converted to real 2025 NZD using RBNZ (2026) monthly average exchange rate for 2025. EU ETS scenarios shown sit above recent market analyst expectations for EUA futures (Szabo & Manuell, 2026).

### *Auction revenues*

201 Under a gross emissions ETS, auction revenues are inferred from each of the Commission: EB4 demonstration pathway and Commission: HTHS scenario (with higher ambition) using each scenario's effective emissions price pathway, and emissions for gross emitting sectors within the NZ ETS. The same pathway applies in both scenarios: emissions price values are an exogenous input to the Commission's ENZ model, drawn from government projections rather than solved for, and so do not vary with scenario ambition. Industrial allocation volumes are subtracted from each emissions pathway to

[27] EU ETS price deflated using ECB Survey of Professional Forecasters SPF Q3 2026 (European Central Bank, 2026) and UK ETS using OBR (2026). Both are then converted using respective average monthly 2025 exchange rates from the Reserve Bank of New Zealand (**RBNZ**) (2026).

provide the estimated auction units cleared each budget period. Auction volumes and revenue are presented in Table 5 below.

| Budget period | Commission: EB4 demonstration pathway | | Commission: HTHS | |
|---|---|---|---|---|
| | *Auction units sold* | *Revenue* | *Auction units sold* | *Revenue* |
| EB2 (2026–2030) | 7m | $0.7bn | 7m | $0.7bn |
| EB3 (2031–2035) | 88m | $11.9bn | 85m | $11.4bn |
| EB4 (2036–2040) | 65m | $10.8bn | 60m | $9.9bn |
| EB5 (2041–2045) | 50m | $9.6bn | 33m | $6.3bn |
| EB6 (2046–2050) | 38m | $8.5bn | 16m | $3.5bn |
| **Total (2026–2050)** | **248m** | **$41.6bn** | **200m** | **$31.9bn** |

**Table 5: Estimated auction volumes sold and revenues (real 2025 NZD) for gross emissions ETS from 2026–2050 for Commission: EB4 demonstration pathway and Commission: HTHS scenarios.** Notes: Projection for Commission: HTHS assumes custom 5% industrial allocation phase-out rate 2031–2040, 3% 2041–2050[28]; Commission: EB4 demonstration pathway assumes current industrial allocation phase-out rates. Figures may not sum due to rounding.

202 Because the same emissions price pathway applies to both scenarios, the higher ambition of the Commission: HTHS scenario leaves fewer units to be auctioned at the same price. The gap widens over time, from a modest difference in EB3 to $3.5bn against $8.5bn over 2046–2050. These estimates therefore assume that complementary effort in Commission: HTHS materialises alongside the ETS to achieve enhanced levels of mitigation, and without those complementary measures, a higher price may be needed.

203 Leaving decisions on potential reform to the NZ ETS to later decades (e.g. reforms taking place in the mid 2030s or 2040s) will significantly reduce potential auction revenues through to 2050. Delaying reforms to EB4, for example, will mean forgoing ~$11–$12bn in potential revenue from 2031–2035 that could be used to fund complementary measures, the RIM, other government spending, or tax relief. A significant portion of these forgone revenues will be captured by forestry participants, speculators, landowners and other NZU suppliers in the form of rents where any reform is deferred to later decades.

[28] This sees industrial allocation phased out for moderately emissions intensive trade-exposed industries by 2040, and 2050 for highly emissions intensive trade-exposed industries.



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# PART D: POTENTIAL OUTCOMES DELIVERED BY RIM

## Role of the RIM

204 The RIM set out in this part is an illustrative design, used to cost the removals needed alongside each version of the NZ ETS. It is not a proposal for how a RIM should be designed. Its settings, such as the mix of forest types, payment rates, and payment durations, are one plausible combination among many. Other designs could differ substantially, and would deliver different costs and outcomes. The costings are best read as indicating the scale of funding required, and how the net fiscal position of the Crown varies with its choices on NZ ETS reform.

205 Three distinct streams of forestry-related funding are envisaged for the RIM:

a. Providing an ongoing incentive to NZ ETS forests, where they are transferred out of the scheme as part of the transition to a new gross emissions ETS

b. Incentivising afforestation/reforestation

c. Enhancement of carbon stores in existing forests.

206 The deployment of a RIM is considered for each of a modified net NZ ETS, a gross emissions ETS, and the status quo.

207 The role of the RIM in each instance is assumed to be to support New Zealand to meet its 2050 target for net-zero emissions excluding biogenic $CH_4$, while also supporting net-negative targets at or beyond 2050. Calibration of the RIM to each of New Zealand's current 2050 target, and the Commission's recommendation for a -20Mt $CO_2e$ 2050 target, is examined (Climate Change Commission, 2024c).

208 Though it is envisaged that a key role for the RIM is to enhance carbon stores in existing forests, this brief provides no estimate for this potential part of the RIM. MPI (2026c) is currently funding research to examine the impact of actions that enhance carbon stored in New Zealand's pre-1990 natural and planted forest estate through the Maximising Forest Carbon work programme. The design and costing of this part of the RIM will be contingent on findings from this research.

## How the RIM is modelled

### *RIM incentives for new afforestation*

209 Funding is split into four distinct afforestation categories, reflecting the differing economics and carbon sequestration profiles of each forest type. The areas of each type of afforestation funded are assumed to match 1BT Fund levels reported on in Te Uru Rākau's (2025a) most recent annual monitoring report:

a. **Direct planting of indigenous forests:** 27% of total funded area

b. **Reversion/regeneration of indigenous forests:** 40%

c. **Direct planting of production exotic forests:** 13%

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d. **Direct planting of permanent exotic forests:** 20%.

210 This brief assumes that the RIM adopts differing incentive structures for the indigenous categories relative to the exotic species funding categories, reflecting the findings of Part A.

211 Indigenous species receive a hybrid payment structure involving:

a. An establishment payment to address the high up-front costs of these forests

b. A recurring payment, of a set length, linked to carbon sequestration.

212 The establishment payment is staged following the 1BT Fund's milestone structure (Te Uru Rākau, 2018), with 30% paid at contract signing, 50% when the forest is planted, and 20% once trees are successfully established. A 5% failure rate for indigenous afforestation and 1% for exotic afforestation is assumed (with no assumed carbon benefit), reflecting the varying difficulty of establishing exotic and indigenous species.[29]

213 Exotic forests are assumed to receive a recurring payment of set length (e.g. 16 years for production forests, matching the averaging age for pine in the NZ ETS), and receive no establishment payments.

214 The recurring payment for indigenous species is set to $90 per $tCO_2e$, a higher payment rate than exotic species ($50). This higher rate reflects a general focus on ensuring payments provide for adequate forest management (e.g. ongoing pest and weed control), such that both carbon and other nature-based benefits are realised.

215 Establishment payments for indigenous forests are set roughly equivalent to the full assumed establishment costs of each indigenous forest, $3,000/ha for regeneration and $20,000/ha for direct planting. For simplicity, the reversion/regeneration stream costing is premised on a passive model of regeneration, involving fencing and pest control, with no supplemental planting to introduce absent species.[30]

216 Forest management costs for indigenous species are derived from Tāne's Tree Trust (various sources) and Forbes Ecology (2022), with rates and insurance from MPI (2024a). Exotic forest costs are derived from Watt et al. (2023), while log/timber returns are derived from MPI (2024a) and Manley (2021a, 2021b). A full schedule of cost and revenue assumptions is provided in Appendix C.

217 Typical assumed sequestration rates for each category factored into the landowner NPV are taken from:

[29] Failure rates observed in the 1BT Fund are not used, as the majority of contract withdrawals to date provide no reason for withdrawal (Te Uru Rākau, 2025a), and in many cases may reflect landowners registering their forest in the NZ ETS following the carbon price spike observed from 2021 to 2023. It is also assumed that the higher payment rates for the RIM relative to 1BT would reduce failure rates.

[30] Any future work on a RIM should consider developing funding streams for supplemental planting to introduce absent tall-tree species (see Appendix B). This would help enhance long-term carbon stocks, with less drop-off in sequestration than reflected in current yield tables.



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a. **Direct planting of indigenous forests:** Tāne's Tree Trust (2026b), 2,200 stems/ha, 50% trees (tōtara) & 50% shrubs (mānuka), average site quality

b. **Reversion/regeneration of indigenous forests:** NZ ETS indigenous FMA weighted look-up tables (reflecting the high predominance of mānuka/kānuka regeneration in the NZ ETS at present), from MPI (2024a)

c. **Direct planting of production exotic forests:** Te Uru Rākau (2025b) proposed look-up tables for North & South Island pine, weighted 50/50

d. **Direct planting of permanent exotic forests:** Te Uru Rākau (2025b) proposed look-up tables for redwoods and exotic softwoods (NZ), weighted 50/50.

218 The carbon benefit accrued towards New Zealand's targets uses the GHGi post-1989 natural and post-1989 planted forest yield tables, sourced from MPI's (2024a) afforestation economics model.

219 Landowners are assumed to apply a 6% discount rate for indigenous afforestation, sourced from Weaver (2023), and an 8% discount rate for exotics, drawn from forestry valuers' average pre-tax discount rate for forests under 1,000ha (Manley, 2024).

220 The resulting economics of each funding tier from the landowner's perspective are provided in Table 6 below.

| Variable | Indigenous reversion | Indigenous direct planting | Exotic permanent | Exotic production |
|---|---|---|---|---|
| **Establishment payment** | $3,000/ha | $20,000/ha | $0 | $0 |
| **Recurring payment:** sequestration | $50 per $tCO_2e$ | | | |
| **Recurring payment:** additional | $40 per $tCO_2e$ | | n/a | |
| **Payment length** | 50 yrs | 50 yrs | 50 yrs | 16 yrs |
| **Landowner discount rate** | 6% | 6% | 8% | 8% |
| **NPV term** | 60 yrs | 60 yrs | 60 yrs | 30 yrs |
| **Total payments received from RIM (present value)** | $12,000/ha | $31,000/ha | $12,000/ha | $12,200/ha |
| **Landowner NPV excl. opportunity cost** | $6,050/ha | $6,650/ha | $7,400/ha | $11,500/ha[31] |

**Table 6: Landowner economics for assumed payment structure and rates.** Notes: Value of payments received excludes recovered fees (e.g. annual admin, emissions return fee). Total payments received and landowner NPV rounded to nearest $50.

221 The rationale for these parameters, and the alternative designs considered and set aside, is provided in Appendix B.

[31] Includes net revenue from harvest.

### *Government costs for new afforestation component of RIM*

222 For simplicity, payments are assumed to be solely borne by the Crown and funded through auction revenues.

223 Government administration costs per hectare registered are derived from the NZ ETS scheme administration costs (Te Uru Rākau, 2026b), uplifted by 20% to reflect additional Crown effort under a RIM. This uplift accounts for the fact that the RIM may require a more intensive process for assessing applications than is the case under the NZ ETS, and may require increased numbers of site visits (e.g. to verify the forest conforms to the funding parameters).

224 Recipients of funding are assumed to submit emissions returns every five years, comparable to the NZ ETS, and so face cost recovery requirements in line with the NZ ETS (involving an annual administration fee and emissions return fees). Forest owners cease detailed emissions returns five years after their last payment is received. The average forest size of RIM recipients is assumed to match the size of funding recipients for the 1BT Fund (smaller on average than the NZ ETS).

225 No design choices are taken with respect to managing reversal risks, where there are a range of possible design choices that could be used.

226 Government costs and revenue (where discounted) are presented using the Treasury's non-commercial proposals discount rate (**social rate of time preference or SRTP**) and mandatory sensitivity test (8%) (The Treasury, 2024).

227 A planned 21-year funding period of 2030–2050 is assumed, with flat rates of afforestation funded each year. Further afforestation funding could be provided for beyond 2050, but this is not examined in this brief.

### *Transfer of existing forests in NZ ETS to RIM*

228 For costing purposes, this brief assumes that, regardless of the core policy approach taken, any transition of existing forests in the NZ ETS to a new arrangement would see:

a. Foresters paid based on the carbon they are willing to trade/sell

b. Existing NZ ETS compliance, cost recovery, enforcement, administration, and measurement, reporting and verification continued for these forests

c. 20% of exotic forests operating on regular stock change accounting are permanent forests and 80% are production forests (matching rates observed for new afforestation in 2025 in Manley (2025))

d. The registered forest area remains constant as a simplifying assumption (i.e. no deregistration).

229 A default payment rate for existing NZ ETS forests transitioned to a RIM of $50 per $tCO_2e$ (real 2025 NZD) is assumed. This rate reflects a price above emissions price returns seen in some modelling results for the status quo, and is consistent with the rate assumed for new exotic forests.

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230 Costs for ongoing administration and cost recovery related to forests transitioned out of the NZ ETS are inferred from Te Uru Rākau (2026b), and are assumed to remain constant in real terms in the scheme. As a simplifying assumption, the transition of forests to a new scheme is assumed to take place at the end of the current MERP (i.e. 31 December 2030).

231 The Government's second Emissions Reduction Plan (**ERP2**) policy plans for afforestation partnerships on Crown land are assumed to continue and contribute towards the 2050 target independent of the RIM, and so are not included in the costings provided.

## Outcomes delivered for RIM

### *Gross emissions ETS with RIM*

232 As set out in Part C, the shift towards a gross emissions ETS would provide significant government revenues to the Crown from auctioning, with these rents no longer captured by unit suppliers and speculators. However, the gap to New Zealand's 2050 target, and auction revenues raised, vary dependent on whether the Government sets auction volumes consistent with the Commission: EB4 demonstration pathway or Commission: HTHS.

233 When combined with target accounting removals from NZ ETS forests registered through to 2030 (the point at which the RIM starts), the gaps to New Zealand's 2050 targets left for the RIM to cover are:

Gross emissions ETS with Commission: EB4 demonstration pathway ambition:

a. **Current net-zero 2050 target:** 3Mt $CO_2e$

b. **Commission -20Mt $CO_2e$ 2050 target:** 23Mt $CO_2e$

Gross emissions ETS with Commission: HTHS ambition:

c. **Current net-zero 2050 target:** Meets target at 2050

d. **Commission -20Mt $CO_2e$ 2050 target:** 17Mt $CO_2e$.

234 These estimates assume agricultural $N_2O$ consistent with the Government's WAM-central scenario, and new registrations of forestry in the NZ ETS continuing through to the end of the current MERP (2030). They should not be read as a strict replication of the Commission's pathways themselves (which see greater mitigation effort taken on emissions outside the NZ ETS). Greater action on agricultural $N_2O$ than assumed here would reduce both the funding needed for a RIM and the scale of afforestation required.

235 Applying the RIM to cover the gap to the Commission's recommended -20Mt $CO_2e$ requires funding for 1.37mha (Commission: EB4 demonstration pathway) and 1.01mha (Commission: HTHS) of afforestation under the parameters assumed for the RIM. The Commission: EB4 demonstration pathway scenario would lift New Zealand's total forest area to around 12.0mha by 2050 (44% of land), and the natural forest estate to 8.8mha (33% of land area), returning natural indigenous forest as a share of New Zealand's land

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area to just above levels last seen in 1962 (32%). Figure 22 shows the change in land area as a result of the RIM.

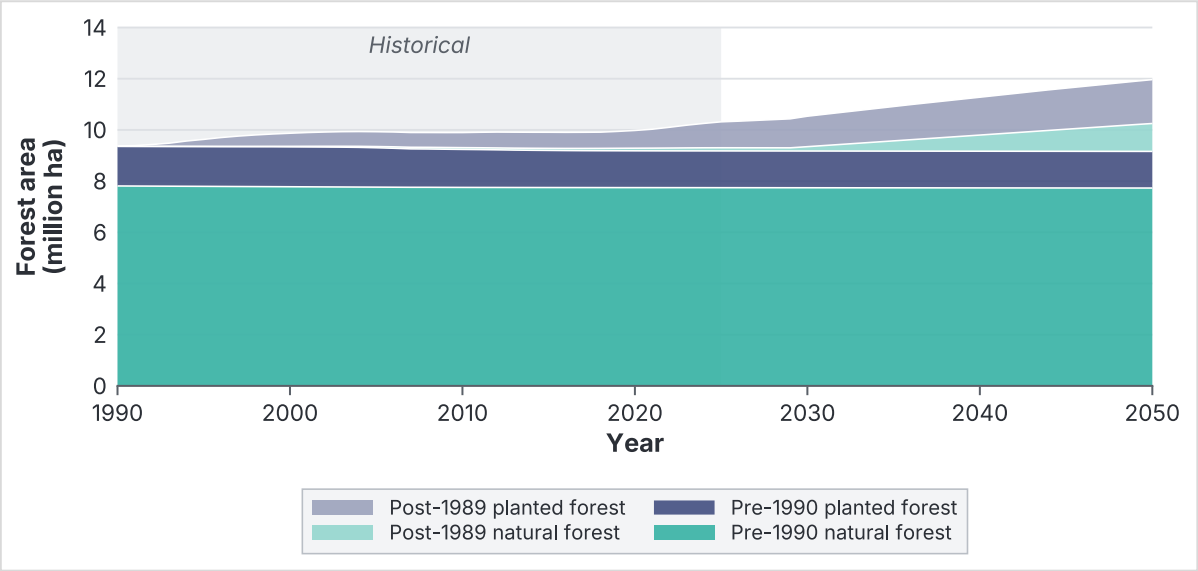



**Figure 22: Total area of natural and planted forest from 1990 to 2050 under a gross emissions ETS (calibrated to the Commission: EB4 demonstration pathway) with RIM (calibrated to a -20Mt $CO_2e$ target).** Notes: Historical forest area through to 2024 is taken from MfE (2026c) and includes afforestation on Crown land.

236 Removals delivered towards New Zealand's targets see substantive contributions from both exotic and indigenous species, with indigenous afforestation contributing around 38% of removals for the new forest component of the RIM in 2050 (see Figure 23 below). If no funding continued past 2050, then removals counted towards New Zealand's target would decline after 2050, with removals contributed by production exotic forests dropping fastest.

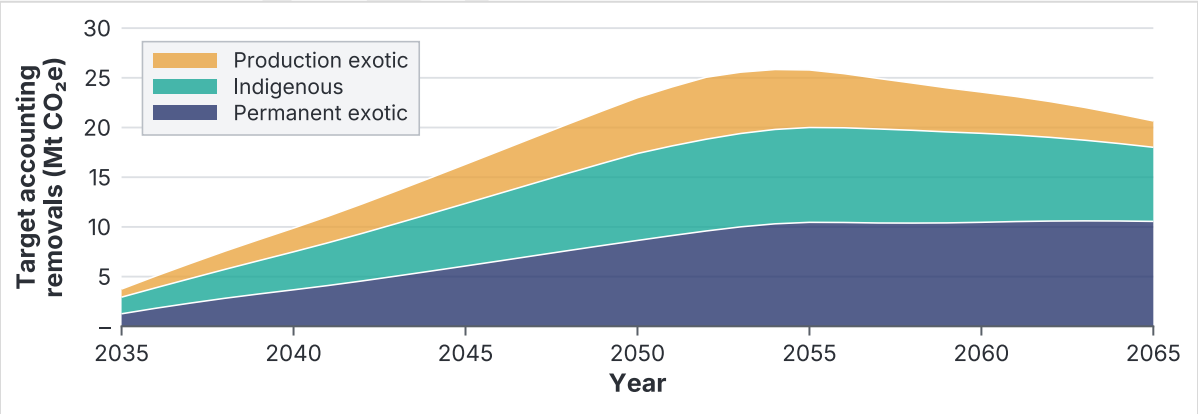



**Figure 23: Target accounting removals (Mt $CO_2e$) contributed by indigenous, permanent exotic, and production exotic forests funded by RIM to reach the Commission's -20Mt $CO_2e$ 2050 target assuming gross emissions ETS calibrated to Commission: EB4 demonstration pathway.**

237 Though there is a common conception that indigenous forests can provide a long-term carbon store for New Zealand, the post-1989 natural forest yield tables used for target accounting see sequestration rates tapering off from around 12t$CO_2$ per ha p.a. at age

20, to 6t$CO_2$ at age 30, and 3t$CO_2$ at age 40, reflective of New Zealand's high predominance of shrubs (e.g. mānuka) in afforestation to date.

238 This means that where the RIM incentivises greater rates of afforestation of tall species with longer growth periods (e.g. tōtara, kauri, kahikatea, rimu, and beech), updates to New Zealand's yield tables to reflect this may mean less of a drop-off in sequestration than forecast. For example, when removals counted towards the target are evaluated using the yield tables used for costing the recurring payments to indigenous forests, sequestration rates for these forests continued rising through to 2065 (even without any funded afforestation after 2050).

239 Total forecast auction revenues raised for a gross emissions ETS, under both the Commission: EB4 demonstration pathway and Commission: HTHS scenarios, are sufficient to cover RIM funding for both existing forests and new forests through to 2050. The net fiscal impact to the Crown, showing the revenue generated from auctioning and the costs of the RIM for existing and new forests, is shown in Table 7.

| Budget period | Existing forests RIM | Commission: EB4 demonstration pathway (billion real 2025 NZD) | | | Commission: HTHS (billion real 2025 NZD) | | |
|---|---|---|---|---|---|---|---|
| | | *ETS revenue* | *New forest RIM* | *Net fiscal impact* | *ETS revenue* | *New forest RIM* | *Net fiscal impact* |
| **EB2** (2026–2030) | n/a | $0.7 | ($0.3) | **$0.4** | $0.7 | ($0.3) | **$0.5** |
| **EB3** (2031–2035) | ($4.9) | $11.9 | ($2.3) | **$4.6** | $11.4 | ($1.7) | **$4.7** |
| **EB4** (2036–2040) | ($4.1) | $10.8 | ($3.5) | **$3.2** | $9.9 | ($2.6) | **$3.2** |
| **EB5** (2041–2045) | ($2.3) | $9.6 | ($5.0) | **$2.3** | $6.3 | ($3.7) | **$0.3** |
| **EB6** (2046–2050) | ($1.5) | $8.5 | ($6.5) | **$0.6** | $3.5 | ($4.8) | **($2.7)** |
| **Total (2026–2050)** | **($12.8)** | **$41.6** | **($17.7)** | **$11.1** | **$31.9** | **($13.1)** | **$6.0** |
| **Present value impact** (discounted) | | | | | | | |
| **2026–2050** | **SRTP** | | | **$9.0** | | | **$5.6** |
| | *8%* | | | *$5.1* | | | *$4.1* |
| **Lifetime impact**[32] | **SRTP** | | | **$12.2** | | | **($3.4)** |
| | *8%* | | | *$5.9* | | | *$3.3* |

**Table 7: Net fiscal impact of gross emissions ETS and RIM for existing and new forests, calibrated to a -20Mt $CO_2$e net-negative 2050 target, for Commission: EB4 demonstration pathway and Commission: HTHS scenarios (real 2025 NZD, undiscounted).** Notes: Figures may not sum to totals due to rounding. Existing forest RIM component excludes cost of administration, as this is assumed to be equivalent to the status quo for NZ ETS forests.

[32] Auction revenues and costs for the existing NZ ETS forests transferred to a RIM are only forecast through to 2075, as these are limited by available gross emissions and yield tables data. The new forest RIM component is forecast through to 2100 (the last year of payments to new forests funded by the RIM).

240 RIM funding for existing forests transitioned out of the NZ ETS decreases over time, dropping from $4.9bn during EB3 to $1.5bn in EB6 (real 2025 NZD, undiscounted).

241 RIM funding for new forests increases over time in both scenarios, rising to $6.5bn by EB6 (2046–2050) in the Commission: EB4 demonstration pathway scenario, and $4.8bn in the Commission: HTHS scenario. This reflects the lower volume of forestry removals needed in Commission: HTHS to reach the -20Mt $CO_2e$ 2050 target, as that scenario achieves more of the required mitigation through gross emissions reductions. By EB5 (2041–2045), new forests RIM funding overtakes existing forests RIM funding as the larger of the two cost components under both scenarios.

242 Changing to a gross emissions ETS with ambition calibrated to the Commission: EB4 demonstration pathway, together with a RIM for new forests targeting the Commission's -20Mt $CO_2e$ target, sees a net fiscal impact through to 2050 of $9.0bn (i.e. net revenue) for the Crown using Treasury's SRTP discount rate ($5.1bn for 8% sensitivity rate).

243 When the gross emissions ETS ambition is calibrated to the Commission: HTHS scenario, the net fiscal impact is $5.6bn (SRTP), $4.1bn (8% sensitivity) through to 2050. This owes to the reduced revenue base seen in the gross emissions ETS when action taken on gross emissions mitigation is increased.

*Status quo with RIM*

244 The status quo NZ ETS is projected to raise little auction revenue through to 2050 (Table 4, Part B). The NZUpy: illiquid market and PCE: status quo scenarios are selected among these as representative scenarios. As these scenarios meet or are just short of New Zealand's current 2050 target, the RIM is considered against the Commission's recommended -20Mt $CO_2e$ target, where about 22Mt $CO_2e$ removals are needed in 2050 to reach this target for NZUpy: illiquid market, and 17Mt $CO_2e$ for PCE: status quo.

245 New Zealand's forest estate increases substantially in each of these status quo scenarios due to the NZ ETS alone (see Figures 8a and 8b in Part B), and the RIM would add significant additional afforestation on top of this to address the gap to a -20Mt $CO_2e$ target. In NZUpy: illiquid market, New Zealand would see 2.05mha afforestation from today through to 2050, consisting of 1.12mha exotic afforestation and 0.93mha indigenous afforestation (with the latter almost solely delivered through the RIM). PCE: status quo would deliver 1.71mha afforestation total by 2050 through the RIM and NZ ETS combined, formed of 0.99mha exotic and 0.72mha indigenous afforestation.

246 Funding the RIM under the status quo would come at a significant net cost to the Crown (see Table 8 below) due to the lack of auction revenue raised.

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| Budget period | PCE: status quo (billion real 2025 NZD) | | | NZUpy: illiquid market (billion real 2025 NZD) | | |
|---|---|---|---|---|---|---|
| | *NZ ETS revenue* | *New forests RIM* | *Net fiscal impact* | *NZ ETS revenue* | *New forests RIM* | *Net fiscal impact* |
| **EB2** (2026–2030) | $0.33 | ($0.3) | $0.1 | $0.6 | ($0.3) | $0.3 |
| **EB3** (2031–2035) | $0.05 | ($1.7) | ($1.7) | $0.2 | ($2.2) | ($2.0) |
| **EB4** (2036–2040) | - | ($2.6) | ($2.6) | - | ($3.3) | ($3.3) |
| **EB5** (2041–2045) | - | ($3.7) | ($3.7) | - | ($4.8) | ($4.8) |
| **EB6** (2046–2050) | - | ($4.8) | ($4.8) | - | ($6.2) | ($6.2) |
| **Total (2026–2050)** | **$0.38** | **($13.1)** | **($12.7)** | **$0.8** | **($16.9)** | **($16.1)** |
| **Present value impact** (discounted) | | | | | | |
| **2026–2050** | **SRTP** | | **($9.1)** | | | **($11.5)** |
| | *8%* | | *($3.8)* | | | *($4.7)* |
| **Lifetime impact** | **SRTP** | | **($25.2)** | | | **($32.4)** |
| | *8%* | | *($5.5)* | | | *($6.8)* |

**Table 8: Net fiscal impact of status quo NZ ETS and RIM for new forests, calibrated to a -20Mt $CO_2e$ net-negative 2050 target, for PCE: status quo and NZUpy: illiquid market (real 2025 NZD, undiscounted).** Notes: Figures may not sum to totals due to rounding.

247 In the two scenarios examined, the net fiscal impact to 2050 of meeting the Commission's recommended 2050 target is between -$9.1bn and -$11.5bn (SRTP), highlighting that the status quo presents a significantly more challenging fiscal position for the Crown when net-negative long-term targets are sought.

248 Though the addition of a RIM to PCE: status quo supports meeting the Commission's recommended -20Mt $CO_2e$ target, net emissions excluding biogenic $CH_4$ still rise post-2050 due to the inability of the NZ ETS to effect further gross emissions mitigation (with the scheme fully supplied by forestry). This is shown in Figure 24 below.

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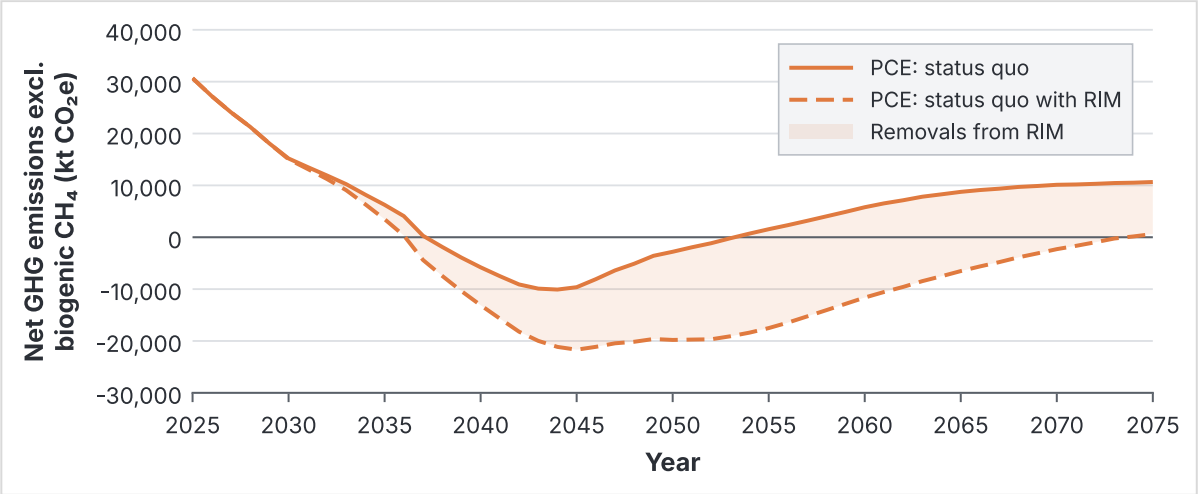



**Figure 24: Net GHG emissions (excl. biogenic $CH_4$) under PCE: status quo and PCE: status quo with RIM tailored to meet -20Mt $CO_2e$ target at 2050.**

### *Modified net emissions NZ ETS with RIM*

249 The addition of a RIM to a modified net NZ ETS presents similar dynamics to the status quo for most options considered, where little or no effort is needed to meet a net-zero 2050 target; but significant funding is needed to raise New Zealand's ambition to achieve a net-negative -20Mt $CO_2e$ target, with little auction revenue to draw on.

#### FIXED RATE BALLOT FOR EXOTIC AFFORESTATION

250 Where hard afforestation limits are placed in the NZ ETS (20,000ha max p.a.), net GHG emissions excluding biogenic $CH_4$ are about 4Mt $CO_2e$ above net zero for NZUpy: afforestation limit. The fiscal impact of meeting both 2050 targets is shown in Table 9.

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| Budget period | NZUpy: afforestation limit (billion real 2025 NZD) | | | | |
|---|---|---|---|---|---|
| | NZ ETS revenue | RIM calibrated to net-zero 2050 | | RIM calibrated to -20Mt $CO_2e$ | |
| | | *New forests RIM* | *Net fiscal impact* | *New forests RIM* | *Net fiscal impact* |
| **EB2** (2026–2030) | $0.3 | ($0.1) | $0.3 | ($0.4) | $0.0 |
| **EB3** (2031–2035) | $0.7 | ($0.4) | $0.3 | ($2.4) | ($1.8) |
| **EB4** (2036–2040) | - | ($0.6) | ($0.6) | ($3.6) | ($3.6) |
| **EB5** (2041–2045) | - | ($0.9) | ($0.9) | ($5.2) | ($5.2) |
| **EB6** (2046–2050) | - | ($1.1) | ($1.1) | ($6.8) | ($6.8) |
| **Total (2026–2050)** | **$1.0** | **($3.1)** | **($2.1)** | **($18.4)** | **($17.4)** |
| **Present value impact** (discounted) | | | | | |
| **2026–2050** | SRTP | | **($1.3)** | | **($12.5)** |
| | *8%* | | *($0.3)* | | *($5.1)* |
| **Lifetime impact** | *SRTP* | | **($5.1)** | | **($35.2)** |
| | *8%* | | *($0.7)* | | *($7.5)* |

**Table 9: Net fiscal impact of modified net NZ ETS and RIM for new forests for NZUpy: afforestation limit (real 2025 NZD, undiscounted).** Notes: Figures may not sum to totals due to rounding.

251 Meeting New Zealand's net-zero target when strict afforestation limits of 20,000ha are placed on the NZ ETS sees a net fiscal cost through to 2050 of -$1.3bn (SRTP), while the discounted lifetime impact is -$5.1bn (SRTP).

252 This reflects that simply limiting new afforestation in the NZ ETS alone will provide minimal additional auction revenue for funding complementary measures (e.g. the RIM), and worsen New Zealand's fiscal position vis-à-vis its net-zero target. Increasing ambition is also prohibitive for this version of a modified net NZ ETS, with the net fiscal impact through to 2050 of meeting a -20Mt $CO_2e$ target rising to -$12.5bn (SRTP).

### Only indigenous afforestation may register

253 More stringent restrictions preventing any new registration of exotic forests in the NZ ETS may help to increase auction revenues, but where it does, a gap will be created to both net-zero and net-negative targets for GHGs excluding biogenic $CH_4$.

254 Auction revenues and funding for the RIM to close the gap to each 2050 target ambition level for NZUpy: native only future (see Table 10 below) would be sufficient to cover costs for the RIM through to 2050 for a net-zero target, with $17.4bn revenue against $8.4bn in costs for the RIM. Extending the RIM to achieve a -20Mt $CO_2e$ target, however, switches to becoming a net cost, with fiscal impact of -$5.1bn (SRTP) to 2050.

| Budget period | NZUpy: native only future (billion real 2025 NZD) | | | | |
|---|---|---|---|---|---|
| | NZ ETS revenue | RIM calibrated to net-zero 2050 | | RIM calibrated to -20Mt $CO_2e$ | |
| | | *New forests RIM* | *Net fiscal impact* | *New forests RIM* | *Net fiscal impact* |
| **EB2** (2026–2030) | - | ($0.2) | ($0.2) | ($0.5) | ($0.5) |
| **EB3** (2031–2035) | - | ($1.1) | ($1.1) | ($3.2) | ($3.2) |
| **EB4** (2036–2040) | $4.4 | ($1.7) | $2.7 | ($4.7) | ($0.4) |
| **EB5** (2041–2045) | $6.7 | ($2.4) | $4.3 | ($6.7) | ($0.0) |
| **EB6** (2046–2050) | $6.3 | ($3.1) | $3.2 | ($8.8) | ($2.4) |
| **Total (2026–2050)** | **$17.4** | **($8.4)** | **$8.9** | **($23.8)** | **($6.4)** |
| **Present value impact** (discounted) | | | | | |
| **2026–2050** | SRTP | **$6.1** | | **($5.1)** | |
| | *8%* | *$1.9* | | *($2.9)* | |
| **Lifetime impact** | *SRTP* | *ne* | | *ne* | |
| | *8%* | *ne* | | *ne* | |

**Table 10: Net fiscal impact of NZ ETS auction revenue and RIM costs for new forests for NZUpy: native only future (real 2025 NZD, undiscounted).** Notes: Figures may not sum to totals due to rounding. ne = not estimated.

255 However, NZUpy: native only future does not model endogenous switching of forests on stock change accounting to permanent forestry management, which should occur in such a scenario if existing registered forests are allowed to freely switch. Thus, figures presented in Table 10 are conditioned on the Government constraining the ability of stock change foresters to freely switch to permanent forestry at any time.

256 The PCE: native only future scenario, in contrast, allows dynamic forest management switching by stock change forests, and so sees negligible auction revenues through to 2050 of just $182m. This scenario would see net zero at 2050 met without the need for a RIM, but would see use of a RIM to meet net-negative targets at or post-2050 going largely unfunded by auction revenues (see Table 11 below), incurring a large net fiscal cost.

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| Budget period | | PCE: native only future (billion real 2025 NZD) | | |
|---|---|---|---|---|
| | | NZ ETS revenue | RIM calibrated to -20Mt $CO_2e$ | |
| | | | *New forests RIM* | *Net fiscal impact* |
| **EB2** (2026–2030) | | $0.13 | ($0.3) | ($0.2) |
| **EB3** (2031–2035) | | $0.05 | ($2.0) | ($2.0) |
| **EB4** (2036–2040) | | - | ($3.0) | ($3.0) |
| **EB5** (2041–2045) | | - | ($4.3) | ($4.3) |
| **EB6** (2046–2050) | | - | ($5.7) | ($5.7) |
| **Total (2026–2050)** | | **$0.18** | **($15.4)** | **($15.2)** |
| **Present value impact** (discounted) | | | | |
| **2026–2050** | SRTP | | | **($11.0)** |
| | *8%* | | | *($4.7)* |
| **Lifetime impact** | *SRTP* | | | **($29.9)** |
| | *8%* | | | *($6.7)* |

**Table 11: Net fiscal impact of NZ ETS auction revenue and RIM costs for new forests for PCE: native only future (real 2025 NZD, undiscounted) calibrated to -20Mt $CO_2e$ target.** Notes: Figures may not sum to totals due to rounding.

### TWO FORESTRY UNITS SURRENDERED PER TONNE OF GROSS EMISSIONS

257 Where gross emitters must surrender two forestry units per tonne of emissions (PCE: 2for1forestry), New Zealand's net-zero 2050 target is met without the need for a RIM, but a gap of close to 20Mt $CO_2e$ remains to the Commission's recommended -20Mt $CO_2e$ target. Little auction revenue is raised ($645m), as stock change forests switching to permanent forestry reduce the need for auction units. A RIM to close this gap would therefore go largely unfunded, with a net fiscal impact through to 2050 of -$10.6bn (SRTP) (see Table 12 below).

258 Auction revenue for this scenario is relatively uncertain, however. This reflects the limitations of current models in replicating NZ ETS unit dynamics where measures devaluing forestry units are introduced (e.g. the stylised 50% price used in ENZ does not capture effects on the stockpile in the late 2020s and early 2030s).

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| Budget period | | PCE: 2for1forestry (billion real 2025 NZD) | | |
|---|---|---|---|---|
| | | NZ ETS revenue | RIM calibrated to -20Mt $CO_2e$ | |
| | | | *New forests RIM* | *Net fiscal impact* |
| **EB2** (2026–2030) | | $0.6 | ($0.3) | $0.3 |
| **EB3** (2031–2035) | | - | ($2.0) | ($2.0) |
| **EB4** (2036–2040) | | - | ($3.0) | ($3.0) |
| **EB5** (2041–2045) | | - | ($4.3) | ($4.3) |
| **EB6** (2046–2050) | | - | ($5.7) | ($5.7) |
| **Total (2026–2050)** | | **$0.6** | **($15.4)** | **($14.7)** |
| **Present value impact** (discounted) | | | | |
| **2026–2050** | SRTP | | | **($10.6)** |
| | *8%* | | | *($4.3)* |
| **Lifetime impact** | *SRTP* | | | **($29.5)** |
| | *8%* | | | *($6.2)* |

**Table 12: Net fiscal impact of NZ ETS auction revenue and RIM costs for new forests for PCE: 2for1forestry (real 2025 NZD, undiscounted) calibrated to -20Mt $CO_2e$ target.** Notes: Figures may not sum to totals due to rounding.

### EXOTIC FORESTRY TRANSFERRED OUT OF THE SCHEME

259 Estimates for the net fiscal impact of a RIM are also not provided for the modified net NZ ETS option in which exotic forestry is transferred out of the scheme while indigenous forestry remains (PCE: native and gross only). In the PCE's formulation of this scenario, existing exotic forests no longer earn units, but forests on stock change accounting must still surrender units when they harvest (Concept Consulting, 2026).

260 Auction volumes in ENZ are set as the residual needed to meet demand from both gross emitters and these harvest liabilities, and can exceed gross emissions covered by the NZ ETS. A large share of auction revenue in this scenario would therefore be paid by foresters meeting harvest liabilities, rather than by gross emitters.

261 Thus, auction revenue for this option is not comparable with the other options considered in this brief, including a gross emissions ETS, where forests are transferred from the NZ ETS to a RIM.

## Which option presents the best economic returns for foresters?

262 This brief has looked at a variety of formulations of potential reform, which each affect new and existing forests, and indigenous and exotic forests differently.

263 For new indigenous afforestation, modelled returns are highest under the modified net NZ ETS options in which exotic forests are transferred out of the scheme entirely (PCE: native and gross only) (see Tables 13a and 13b below).

264 With emissions prices reaching $381 (real 2025 NZD) by 2050, PCE: native and gross only sees high returns for both indigenous reversion/regeneration and direct planting.

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These economics are competitive with dairy farming, and so this option may remove the need for a RIM altogether. However, the broader impacts on land prices, land-use change, nursery capacity and workforce capability would be significant, and are not captured in the modelling. Returns would also be highly sensitive to future governments' choices on NZ ETS price settings, increasing uncertainty for indigenous foresters about the returns they can reasonably expect in practice.

265 Economic returns for indigenous reversion/regeneration in PCE: native only future (where new exotic forests are prevented from entering the NZ ETS) are around $9,550 to $10,600/ha, exceeding returns of the assumed RIM at $6,050/ha (see Table 13a below). However, direct planting approaches are not cost-effective under this modified net NZ ETS option, with an NPV of -$2,550 to -$3,150/ha (see Table 13b). This reflects the high establishment costs of direct planting, which the NZ ETS does not fund.

| Policy option | Scenario | Landowner economic return per ha for afforestation in specified year (NPV/ha) | | |
|---|---|---|---|---|
| | | *2030* | *2035* | *2040* |
| ***RIM*** | *n/a* | $6,050 | | |
| **Status quo NZ ETS** | *PCE: status quo* | ($1,900) | ($3,300) | ($4,450) |
| | *NZUpy: illiquid market* | ($1,400) | ($1,950) | ($2,200) |
| **Modified net NZ ETS** | *NZUpy: afforestation limit* | $200 | ($900) | ($1,750) |
| | *PCE: native only future* | $9,550 | $10,400 | $10,600 |
| | *PCE: native and gross only* | $28,600 | $32,900 | $35,350 |
| | *PCE: 2for1forestry* | $5,400 | $6,450 | $6,750 |

**Table 13a: Landowner economic returns (NPV/ha, real 2025 NZD) for indigenous reversion/regeneration at 2030, 2035 & 2040 under different policy options (without supplementary planting).** Notes: Landowner NPV rounded to nearest $50.

| Policy option | Scenario | Landowner economic return per ha for afforestation in specified year (NPV/ha) | | |
|---|---|---|---|---|
| | | *2030* | *2035* | *2040* |
| ***RIM*** | *n/a* | $6,650 | | |
| **Status quo NZ ETS** | *PCE: status quo* | ($21,150) | ($22,350) | ($23,250) |
| | *NZUpy: illiquid market* | ($18,900) | ($19,250) | ($19,400) |
| **Modified net NZ ETS** | *NZUpy: afforestation limit* | ($18,100) | ($19,200) | ($20,100) |
| | *PCE: native only future* | ($3,150) | ($2,650) | ($2,550) |
| | *PCE: native and gross only* | $27,650 | $31,400 | $33,850 |
| | *PCE: 2for1forestry* | ($8,400) | ($7,750) | ($7,650) |

**Table 13b: Landowner economic returns (NPV/ha, real 2025 NZD) for indigenous direct planting at 2030, 2035 & 2040 under different policy options.** Notes: Landowner NPV rounded to nearest $50.

266 For new exotic afforestation, projects are generally better off in the RIM than the status quo NZ ETS in scenarios that see a declining price path over time. For the default exotic softwood/redwood permanent forest assumed, the RIM provides an NPV of $7,400/ha,

compared with $5,950–$7,350/ha under the status quo NZ ETS for projects started in 2030, falling to between -$500 and $4,600/ha for projects started in 2040.

267 For exotic production forests, the NZ ETS initially provides higher returns, but the falling carbon price seen in NZUpy: illiquid market and PCE: status quo sees afforestation projects better off in the RIM from the mid 2030s (see Figure 25 below).

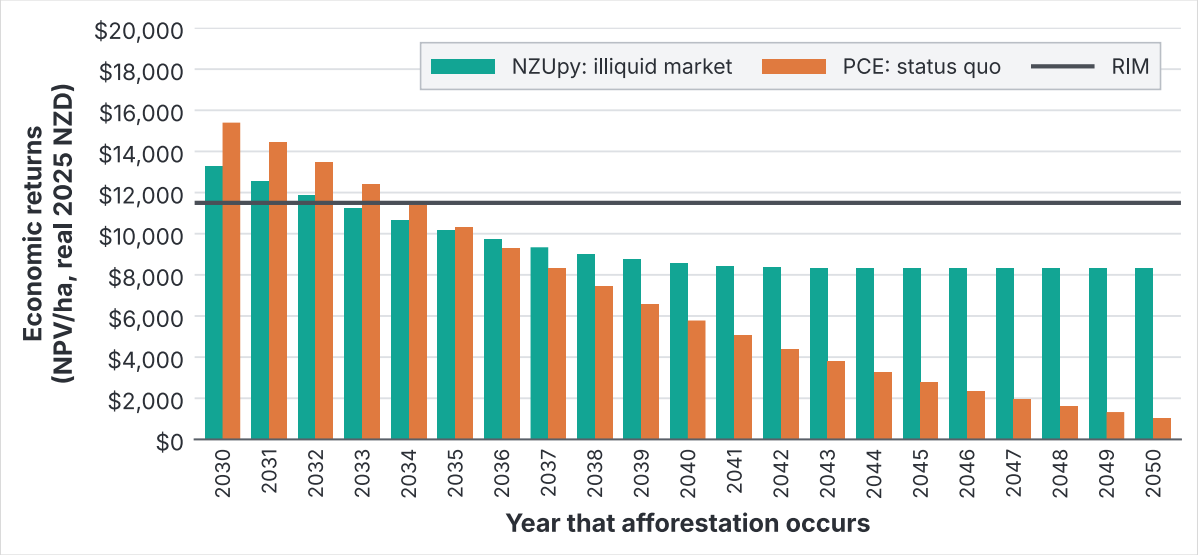



**Figure 25: Economic returns (NPV/ha, real 2025 NZD) for production exotic forest planted at different future years under modelled RIM, and two scenarios for status quo NZ ETS.**

268 The modified net NZ ETS option that prevents new exotic forests from entering the scheme increases returns for existing registered forests, with emissions prices reaching around $160–$175 by 2050 in PCE: native only future and NZUpy: native only future (see Figure 15, Part C, page 40). However, as new exotic forests would receive only $50 per $tCO_2e$ through the RIM, this option raises substantial equity concerns, with some post-1989 forests receiving well above what might be paid for carbon sequestered by new forests through the RIM, or for additional carbon stored by pre-1990 forests. This would significantly distort rural land values, creating stark winners and losers.

269 Exotic foresters see strong returns under the modified net NZ ETS option in which surrender obligations are amended to devalue forestry units (PCE: 2for1forestry), with the effective carbon price received for forestry units reaching $125 by 2040, well above the status quo and the rates assumed for the RIM. However, strong returns for foresters do not make this a desirable option from a wider policy perspective. The market distortions it introduces are likely to increase price volatility, and make it significantly harder to align NZ ETS outcomes with New Zealand's emissions budgets.

## Drivers of cost for RIM

270 This brief has tested a particular formulation of a RIM that sees a mixed portfolio of exotic and indigenous afforestation incentivised. However, alternative runs were performed, with different assumptions expected to have a varying impact on the cost of the RIM relative to outcomes delivered.

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271 Counterfactual scenarios were run for a RIM seeking to achieve 20Mt $CO_2e$ worth of removals in 2050 (see Table 14 below), where one key assumption was varied in each scenario:

a. **Recurring payment for exotic forests:** Exotic forests receive lower ($35 per $tCO_2e$) or higher ($65 per $tCO_2e$) recurring payments rather than $50.

b. **Same recurring payment for indigenous and exotic:** Indigenous forests receive $50 per $tCO_2e$ (the same as exotic forests).

c. **Amount of establishment funding:** Indigenous forests receive establishment payments limited to 70% of the landowner's NPV cost (excluding opportunity cost).

d. **Greater mix of indigenous species:** 80% of funded area is indigenous forest (50% reversion and 30% direct planting), up from two-thirds indigenous in default assumptions.

| Budget period | Default | Exotic receives $35 per $tCO_2e$ | Exotic receives $65 per $tCO_2e$ | Indigenous receives $50 per $tCO_2e$ | 70% establishment funding cap | Indigenous mix – 80% |
|---|---|---|---|---|---|---|
| **EB2** (2026–2030) | $0.3 | $0.3 | $0.3 | $0.3 | $0.2 | $0.4 |
| **EB3** (2031–2035) | $2.0 | $2.0 | $2.1 | $2.0 | $1.5 | $2.9 |
| **EB4** (2036–2040) | $3.0 | $2.8 | $3.3 | $2.9 | $2.5 | $3.9 |
| **EB5** (2041–2045) | $4.3 | $3.9 | $4.7 | $3.9 | $3.8 | $5.2 |
| **EB6** (2046–2050) | $5.7 | $5.1 | $6.2 | $4.8 | $5.1 | $6.8 |
| **Total (2026–2050)** | **$15.4** | **$14.2** | **$16.6** | **$13.8** | **$13.1** | **$19.2** |
| | **Present value cost: lifetime of RIM (discounted)** | | | | | |
| **SRTP discount** | **$30.1** | **$27.2** | **$33.0** | **$23.8** | **$28.3** | **$36.5** |
| *8% sensitivity* | *$6.8* | *$6.3* | *$7.3* | *$5.9* | *$5.9* | *$8.5* |

**Table 14: Cost of RIM under varied assumptions calibrated to achieve 20Mt $CO_2e$ abatement in 2050.** Notes: Figures may not sum due to rounding.

272 Reducing the emissions price paid to foresters has a bigger lifetime impact on costs for the RIM using the Treasury's non-commercial SRTP discount rate than reducing establishment payments.

273 Increasing the proportion of indigenous forests funded from 67% to 80% increases lifetime costs by ~$6.4bn (discounted, SRTP). Increasing the share of indigenous afforestation further to 100% of all funded afforestation increased the costs of the RIM substantially to $53.5bn when discounted by SRTP ($13.1bn for 8% sensitivity test).

## Limitations of the RIM costing

274 Payment rates are calibrated so that each forest type is viable from the landowner's perspective. The costing therefore shows what the assumed level of afforestation would cost if delivered, but does not consider whether the payment rates assumed are sufficient to guarantee sufficient interest and uptake.

275 The costing also does not consider whether the rates of afforestation implied could be achieved in practice. Meeting a -20Mt $CO_2e$ target implies afforestation averaging around 66,000–79,000ha p.a. from 2025 to 2050 in the two status quo scenarios (across the NZ ETS, Crown land and the RIM combined), and up to 96,000ha p.a. in NZUpy: native only future. This compares with an average increase in the planted forest estate of 51,000ha p.a. during the 1990s.

276 The RIM's third funding stream, enhancement of carbon stores in existing forests, is not costed. Refer to the discussion under "Role of the RIM" above.

277 Any increase to New Zealand's yield tables due to the RIM – for example, increases to the post-1989 natural forest yield table due to a higher predominance of tall species forests – is not captured. This reflects the difficulty of forming assumptions for how these yield tables may change over time as a result of a differing mix of afforestation incentivised.

278 No cost is attached to reversals or loss of carbon in RIM-funded forests. The design of mechanisms to deal with reversals is left to a future policy process, and the cost of any such mechanism may be additional to the estimates presented here.

279 For the transfer of existing forests from the NZ ETS to the RIM (under the shift to a gross emissions ETS), the registered forest area is held constant. In practice, some forests may deregister at the point of transfer, so the long-term costs for payments to existing NZ ETS forests moved to a RIM are indicative of scale rather than a forecast.

280 No learning-by-doing effects are assumed for indigenous afforestation costs. In practice, a sustained level of funding for indigenous afforestation may help to reduce costs over time, whereby seedling nurseries are able to rely on more consistent ongoing demand for indigenous seedling varieties to reduce costs per seedling. Learning-by-doing effects could be enhanced through funding alongside the RIM targeting improvements to nursery capacity, genetics research, and workforce training, as was seen with the 1BT's partnership fund (Te Uru Rākau, 2025a). Such funding is not considered in this brief.

281 In practice, the Government could consider enabling more complex funding arrangements linked to carbon or nature markets, placing obligations on certain sectors to pay for some of the removals delivered, or co-funding with councils. These are not considered further, given the wide range of permutations as to how the Government could seek to encourage supplementary investment, and given that the primary focus of this brief is to provide an illustrative costing of different future scenarios for the NZ ETS.

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282 Administration costs for the RIM will depend on the specifics of its design and the extent to which it relies on existing NZ ETS forestry administrative processes, so may vary substantially from the estimates provided in this brief.

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# APPENDIX A: DESCRIPTION OF MODELLING REPORTS AND MODELS USED

| Report | Model/s | Primary developer | Model description | Optimises for | Price path methodology | | |
|---|---|---|---|---|---|---|---|
| | | | | | *Status quo* | *Modified net-ETS* | *Gross emissions ETS* |
| **MfE NZ ETS market model** | | MfE *(now MCERT)* | Macro-enabled Excel-based partial equilibrium model of NZ ETS | Minimise additions/subtractions to stockpile through to end-year (2050) | Endogenous price change rate with exogenous price control parameter and imposed peak year (2030) | n/a | n/a |
| **PCE** (2026) & **Concept Consulting** (2026) | Emissions in New Zealand (ENZ) | Concept Consulting | Macro-enabled, Excel-based, multi-sector partial equilibrium model of the NZ economy (energy, industry, transport, land use, and waste), with additional ETS market functionality | Target stockpile balance at 2050 OR Target emissions levels[33] | Iterative optimisation of a logistic price curve to balance ETS stockpile by 2050 (ETS equilibrium mode) | Two-phase price growth curve solving for net-zero 2050, with exogenous inflection year (2040)[34] | |
| **The Commission** (2024b) | | The Commission (using ENZ licence) | As above (without NZ ETS market functionality) | Emissions outcomes under fixed price pathway | Exogenous price path assumption | | |
| **MfE** (2026d) | ENZ calibrated to sector models | MfE (using ENZ licence) | As above (without NZ ETS market functionality) | Emissions outcomes under fixed price pathway | Exogenous price path assumption | | |
| **NZUpy** | | Kapiti Climate | Open-source Python-based (object-orientated) partial equilibrium model of NZ ETS | Minimise additions/subtractions to stockpile through to end-year (2050) | Endogenous price change rate and peak-year emissions price optimisation using smooth quintic transition formula ($C^2$-continuous) | Endogenous price change rate (following Hotelling's rule) | |

[33] PCE (2026) and Concept Consulting (2026) also used a fixed price pathway to solve for required afforestation (forest-targeting mode), for sensitivity scenarios not drawn on in this brief.
[34] Scenario "PCE: afforestation limit" for modified net-NZ ETS uses same price path methods as status quo.

# APPENDIX B: RIM DESIGN RATIONALE

283 The parameters set out in Part D are one plausible formulation of a RIM, not the product of a policy design process. This appendix sets out the basis for the chosen design, and explains which alternatives were considered and set aside.

## Choice of mechanism

284 There are a range of plausible policy options for a RIM that the Government could consider. Different design options such as a reverse auction, flat per hectare payment rate, or payment per tonne of sequestration delivered will each come with their own pros and cons from a policy design perspective.

285 Choosing between these or other options will require clear decisions on the core objectives for the RIM. This is beyond the scope of this illustrative costing. Likewise, some key design parameters that could affect cost and outcomes are left to a future policy process:

a. The extent to which catchment-scale projects across multiple landowners are prioritised and funded

b. Species or forest management restrictions or requirements

c. Integration of biodiversity and/or other environmental outcomes

d. The conditions on which land is deemed eligible

e. The design of any mechanisms to deal with loss of carbon/reversals

f. Adjustments or exceptions made for whenua Māori in light of Te Tiriti o Waitangi and existing Treaty settlement agreements.

## Structure of payments for indigenous forests

286 Clarke (2020) suggests that grant payments at establishment sized to close the NPV gap between an alternative species and the typical default choice (e.g. Pinus radiata) could be used to shift landowner choice towards that alternative.

287 Figures B1 and B2 show landowner NPV (excluding the opportunity cost of foregone land use) for direct planting of an indigenous forest at different discount rates and payment rates per tonne sequestered.

288 Figure B1 illustrates landowner NPV where no establishment payment is used, and Figure B2 shows where a $15,000/ha establishment payment is provided, equivalent to 75% of Tāne's Tree Trust's (2024) estimate of typical establishment costs for direct planting.[35]

[35] NPV in each cell for Figures B1 and B2 rounded to nearest $100. Costs for the forest, sequestration rates, and the structuring of RIM payments match those set out in Appendix B.



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289 With no establishment payment, direct planting is only viable at payment rates of $100/tCO$_2$e and above (see Figure B1 below), and even then only at discount rates well below the cost of capital landowners face in practice to secure financing for this type of project.

| Discount rate | Carbon price ($ per tCO$_2$e) | | | | | | |
|---|---|---|---|---|---|---|---|
| | $0 | $25 | $50 | $75 | $100 | $125 | $150 |
| 2% | ($27,500) | ($19,000) | ($10,400) | ($1,900) | $6,700 | $15,200 | $23,700 |
| 3% | ($26,400) | ($19,900) | ($13,400) | ($6,900) | ($400) | $6,100 | $12,600 |
| 4% | ($25,500) | ($20,500) | ($15,500) | ($10,500) | ($5,500) | ($500) | $4,500 |
| 5% | ($24,900) | ($20,900) | ($17,000) | ($13,100) | ($9,200) | ($5,200) | ($1,300) |
| 6% | ($24,400) | ($21,300) | ($18,100) | ($15,000) | ($11,900) | ($8,700) | ($5,600) |
| 7% | ($24,000) | ($21,500) | ($18,900) | ($16,400) | ($13,900) | ($11,400) | ($8,800) |
| 8% | ($23,700) | ($21,600) | ($19,500) | ($17,500) | ($15,400) | ($13,300) | ($11,300) |
| 9% | ($23,600) | ($21,700) | ($19,800) | ($17,900) | ($16,000) | ($14,100) | ($12,200) |
| 10% | ($23,200) | ($21,800) | ($20,300) | ($18,900) | ($17,400) | ($16,000) | ($14,600) |
| 11% | ($23,100) | ($21,800) | ($20,600) | ($19,400) | ($18,100) | ($16,900) | ($15,700) |

**Figure B1: Landowner NPV (excluding opportunity cost of foregone land use) for tōtara and mānuka direct planting (2,200 stems/ha) at different payment rates and discount rates with no establishment payment.**

290 Providing a significant up-front payment for establishment costs alongside a recurring payment helps to make the forest viable at lower recurring payment rates (see Figure B2 below) and discount rates typical of non-government financing that may be needed alongside RIM funding.

| Discount rate | Carbon price ($ per tCO$_2$e) | | | | | | |
|---|---|---|---|---|---|---|---|
| | $0 | $25 | $50 | $75 | $100 | $125 | $150 |
| 2% | ($12,600) | ($4,000) | $4,500 | $13,000 | $21,600 | $30,100 | $38,700 |
| 3% | ($11,400) | ($5,000) | $1,500 | $8,000 | $14,500 | $21,000 | $27,500 |
| 4% | ($10,600) | ($5,600) | ($600) | $4,400 | $9,400 | $14,400 | $19,400 |
| 5% | ($10,000) | ($6,100) | ($2,200) | $1,800 | $5,700 | $9,600 | $13,600 |
| 6% | ($9,600) | ($6,400) | ($3,300) | ($200) | $3,000 | $6,100 | $9,200 |
| 7% | ($9,200) | ($6,700) | ($4,100) | ($1,600) | $900 | $3,400 | $6,000 |
| 8% | ($8,900) | ($6,800) | ($4,800) | ($2,700) | ($600) | $1,400 | $3,500 |
| 9% | ($8,800) | ($6,900) | ($5,000) | ($3,100) | ($1,300) | $600 | $2,500 |
| 10% | ($8,500) | ($7,100) | ($5,600) | ($4,200) | ($2,700) | ($1,300) | $200 |
| 11% | ($8,300) | ($7,100) | ($5,900) | ($4,700) | ($3,400) | ($2,200) | ($1,000) |

Colour scaling for Figures B1 and B2 use -$35,000/ha low-end NPV minimum (red, hex code #CA3535), and +$35,000/ha (blue, hex code #1D70B8) maximum, $0 midpoint = white.

**Figure B2: Landowner NPV (excluding opportunity cost of foregone land use) for tōtara and mānuka direct planting (2,200 stems/ha) at different payment rates and discount rates assuming $15,000/ha establishment payment.**

291 The payment rate per tonne sequestered and the landowner's cost of capital are partial substitutes. An up-front payment is received almost undiscounted, so it shields the investment from the cost of capital in a way that a stream of per-tonne payments over the forest's life alone cannot. Comparing Figures B1 and B2, the establishment payment both lowers the payment rate at which the forest becomes viable and reduces how much that threshold moves as the discount rate rises.

292 This matters because the cost of capital is not independent of how the mechanism is designed. International experience with contract-for-difference and similar schemes in the electricity sector indicates that a long-term, government-backed revenue stream reduces risk and can materially lower the cost of capital of projects it supports (Đukan & Kitzing, 2023; Kitzing, 2023).

## Use of a recurring payment alongside establishment funding

293 A recurring payment is used alongside the up-front establishment payment to ensure adequate forest management is provided for, in light of the PCE's (2025a) findings that 1BT's funding structure, which funded establishment only, had significant consequences for planting survival. A lack of follow-up care, such as protection of seedlings from competing weeds, was a recurring cause of failure in native planting.

294 As the NZ ETS has proven effective at incentivising exotic afforestation with a recurring payment alone, exotic forests are assumed to receive no establishment payment.

## Calibration of establishment payments

295 The assumed combination of establishment and recurring payments made through the RIM sees indigenous forests present a positive NPV (excluding opportunity cost). This means that assumed payments for direct planting of indigenous forests are set well above the 1BT Fund cap, where funding for direct planting was, at most, 30% of the total estimated cost of establishment for direct planting (Bayne et al., 2020).

296 Other potential alternative levels of calibrated payments considered were:

a. Calibrating payments to ensure a $0 NPV excluding opportunity cost of foregone land use (e.g. foregone S&B production)

b. Calibrating payments to ensure a $0 NPV when opportunity cost is included

c. Partial funding of establishment costs (e.g. 30% of costs).

297 Indigenous forest payments calibrated to a $0 NPV excluding opportunity cost would still substantially improve the economics of indigenous forests relative to the status quo NZ ETS, particularly for direct planting, and would provide for a lower-cost RIM. It would, however, limit uptake to those with non-economic motivations for pursuing indigenous afforestation.

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298 Payments calibrated to a $0 NPV including opportunity cost were dismissed as an option given the varying opportunity cost that would be observed by different landowners (e.g. council land, S&B farmland), including varying opportunity costs within agricultural farming contexts (Forbes Ecology, 2022).

299 Partial funding was dismissed given the risk that such funding approaches may shift the afforestation mix towards lower-cost forestry models that will not realise optimal outcomes for carbon storage, forest health, biodiversity, and wildfire risk mitigation (e.g. a heavy share of projects that consist solely of mānuka and present limited long-term sequestration).

300 In principle, the Government could pursue partial funding that is higher than 1BT (e.g. 60%–80% of establishment costs), but would need to consider whether uptake would be sufficient to deliver on the rates of afforestation needed to meet New Zealand's targets, and whether this funding rate risks weakened forest management outcomes.

### Scope of indigenous regeneration stream

301 The Government could consider additional funding as an optional add-on that would provide for supplemental planting of absent tall-tree species (e.g. equivalent to the $6,900–$15,000/ha range on top of retirement costs in Forbes Ecology (2022)). This would present the potential for enhanced long-term carbon stocks in regenerating forests where tall species are incorporated.

302 Additional funding for supplementary planting is not provided for in this brief due to the complexity of forming assumptions for the typical additional carbon that would be stored, and levels of uptake of this additional funding.

### Transition of existing NZ ETS forests

303 There are a range of ways that the Government could seek to transition existing forests in the NZ ETS to a new RIM. This could include, for example, acting as the sole allowed buyer for forestry units within the NZ ETS, or shifting these forests to a new RIM with comparable payment rates for sequestration, but without necessarily transacting in NZUs.

304 This brief assumes a default payment rate for existing forests of $50 per $tCO_2e$ (real 2025 NZD) as a simplifying assumption. The choice of this payment rate reflects a price above emissions price returns seen in some modelling results for the status quo. Higher or lower payment rates could be justified depending on the criteria used to determine the rate. Other alternatives could also be considered to set the rate paid for existing foresters' removals (e.g. a reverse auction).

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# APPENDIX C: TYPICAL COSTS AND REVENUE ASSUMED FOR RIM FORESTS[36]

| Variable | Type | Indigenous regeneration | Indigenous direct planting | Production exotic | Permanent exotic |
|---|---|---|---|---|---|
| **Typical species mix assumed** | Forest mix | **Regenerating mānuka** | **~2,200 stems/ha 50/50 mānuka & tōtara** | **Fast growing exotic** (Pinus radiata used as proxy) | **Exotic softwoods / redwoods** |
| **Planting (seeds, blanking, protectors, labour, transport, etc.)** | Cost establishment | **n/a** – no enrichment planting | **$18,200/ha (excl. weed control)** (Tāne's Tree Trust, 2024, 2026c) | **$2,082/ha** (Watt et al., 2023) | **$2,473/ha** (Watt et al., 2023) |
| **Fencing** | Cost establishment | **$2,500/ha** Midpoint from Forbes Ecology (2022) | | | |
| **Weed control** | Cost establishment | n/a (plant weed control grouped in pest control) | **$1,800/ha (years 0–1)** (Tāne's Tree Trust, 2026c) | n/a – captured in planting cost | n/a – captured in planting cost |
| | Cost recurring | | **$200/ha over further 5 years** (Forbes Ecology, 2022) | n/a | n/a |
| **Pest control** | Cost establishment | **$200/ha p.a. initial, falling to $100/ha p.a.** Low-value forest restoration taken from Forbes Ecology (2022) | **$200/ha** (Tāne's Tree Trust, 2026a) | n/a – captured in planting cost | n/a – captured in planting cost |
| | Cost recurring | | **$100/ha p.a.** (Tāne's Tree Trust, 2026a) | **$100/ha p.a. age 0–5, then once every 5 yrs** (Watt et al., 2023) | |
| **Maintenance (roads, tracks, fencing)** | Cost recurring | n/a | n/a | **$50/ha once every 5 yrs** (Watt et al., 2023) | |
| **Fees (insurance, rates, etc.)** | Cost recurring | **$50/ha p.a.** (MPI, 2024a) | | | |
| **Fees (NZ ETS)** | Cost recurring | **Matches MPI cost-recovery settings (annual charge + emissions return fee)** Emissions return due every 5 years, and cease 5 years after last payment receipt | | | |
| **Thinning** | Cost one-off | n/a | n/a | **$1,265/ha, age 9** (Watt et al., 2023) | n/a |

[36] Values presented in table reflect source material. Values are converted to 2025 NZD within RIM calculator workbook based on the date of publication of source material using CPI.

| Variable | Type | Indigenous regeneration | Indigenous direct planting | Production exotic | Permanent exotic |
|---|---|---|---|---|---|
| **Harvest revenue (net of harvest, roading, transport costs)** | Revenue one-off | n/a | n/a | **$30,774/ha, age 28**[37] (MPI, 2024a) | n/a |
| **Establishment payment** | Payments received | **$3,000/ha** | **$20,000/ha** | n/a | n/a |
| **Carbon recurring revenue** | Payments received | **$90 $tCO_2e$ / 50 yrs** | **$90 $tCO_2e$ / 50 yrs** | **$50 $tCO_2e$ / 16 yrs** | **$50 $tCO_2e$ / 50 yrs** |
| **NPV term (landowner)** | - | **60 yrs** | **60 yrs** | **30 yrs** | **60 yrs** |
| **Discount rate (landowner)** | - | **6%** (Weaver, 2023) | **6%** (Weaver, 2023) | **8%** (Manley, 2024) | **8%** (Manley, 2024) |

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[37] Due to the date of original source material relied on for stumpage returns (with MPI's model drawing on 2021 estimates), these do not reflect recent increases in cost pressures on foresters and logging companies (e.g. post-COVID-19 inflation and higher fuel costs), and so may be higher than typical returns achievable today.

# APPENDIX D: SUMMARY OF NET FISCAL IMPACTS FOR POLICY OPTIONS

| Option type | Scenario | 2050 target for RIM | Undiscounted 2026–2050 | | | Net fiscal impact: present value 2026–2050 | |
|---|---|---|---|---|---|---|---|
| | | | *NZ ETS auction revenue* | *RIM cost* | *Net fiscal impact* | *SRTP* | *8%* |
| **Status quo NZ ETS** | | | | | | | |
| **No change to current settings** | PCE: status quo | Net-zero | $0.38 | $0.0 | $0.4 | **$0.4** | *$0.3* |
| | | -20Mt $CO_2e$ | | ($13.1) | ($12.7) | **($9.1)** | *($3.8)* |
| | NZUpy: illiquid market | Net-zero | $0.8 | ($1.5) | ($0.7) | **($0.3)** | *$0.2* |
| | | -20Mt $CO_2e$ | | ($16.9) | ($16.1) | **($11.5)** | *($4.7)* |
| ***Modified net NZ ETS*** | | | | | | | |
| **Fixed rate ballot for exotic afforestation (20,000ha)** | NZUpy: afforestation limit | Net-zero | $1.0 | ($3.1) | ($2.1) | **($1.3)** | *($0.3)* |
| | | -20Mt $CO_2e$ | | ($18.4) | ($17.4) | **($12.5)** | *($5.1)* |
| | PCE: afforestation limit | Net-zero | $0.38 | ($1.9) | ($1.5) | **($1.0)** | *($0.3)* |
| | | -20Mt $CO_2e$ | | ($17.3) | ($16.9) | **($12.2)** | *($5.1)* |
| **Only indigenous afforestation may register** | NZUpy: native only future | Net-zero | $17.4 | ($8.4) | $8.9 | **$6.1** | *$1.9* |
| | | -20Mt $CO_2e$ | | ($23.8) | ($6.4) | **($5.1)** | *($2.9)* |
| | PCE: native only future | Net-zero | $0.18 | $0.0 | $0.2 | **$0.2** | *$0.1* |
| | | -20Mt $CO_2e$ | | ($15.4) | ($15.2) | **($11.0)** | *($4.7)* |
| **Two forestry units surrendered per tonne of gross emissions** | PCE: 2for1forestry | Net-zero | $0.65 | $0.0 | $0.7 | **$0.6** | *$0.6* |
| | | -20Mt $CO_2e$ | | ($15.4) | ($14.7) | **($10.6)** | *($4.3)* |
| **Exotic forestry transferred out of the scheme** | PCE: native and gross only | Net-zero | ne | ne | ne | **ne** | *ne* |
| | | -20Mt $CO_2e$ | | ne | ne | **ne** | *ne* |
| **Gross emissions ETS** | | | | | | | |
| **Forestry transferred from the scheme to a RIM** | Commission: EB4 demonstration pathway | Net-zero | $41.6 | ($14.7) | $26.9 | **$20.1** | *$9.9* |
| | | -20Mt $CO_2e$ | | ($30.5) | $11.1 | **$9.0** | *$5.1* |
| | Commission: HTHS | Net-zero | $31.9 | ($12.8) | $19.1 | **$15.1** | *$8.2* |
| | | -20Mt $CO_2e$ | | ($25.9) | $6.0 | **$5.6** | *$4.1* |

**Table D1: Summary of auction revenue, RIM cost and net fiscal impact to 2050 by policy option and scenario, for a RIM calibrated to net-zero and -20Mt $CO_2e$ 2050 targets (billion real 2025 NZD).** Notes: Auction revenue, RIM cost and undiscounted net fiscal impact are totals for 2026–2050. RIM cost for a gross emissions ETS includes $12.8bn for existing forests transitioned from the NZ ETS. ne = not estimated. Figures may not sum due to rounding.