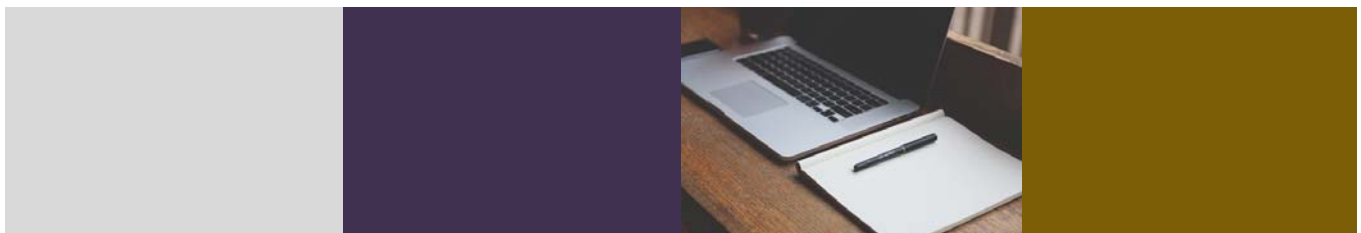


A review of the fiscal cost estimate of moving to averaging accounting for existing forests within the Emissions Trading Scheme

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Executive summary

Averaging accounting

In July of this year, the Ministers for Climate Change and Forestry announced that forests registered in the Emissions Trading Scheme (ETS) before 2019 would not be permitted to use 'averaging accounting'. With averaging accounting, foresters receive New Zealand Units (NZUs) reflecting the long-term average level of carbon storage in their forests; they are not required to return NZUs when their trees are harvested if they replant, as occurs under the current 'stock change' accounting approach, in which NZUs follow the changes in carbon storage.

Forests that are not registered in the ETS may choose to use averaging accounting, and all new forests (from January 2021) will be required to use averaging accounting. New Zealand will use averaging accounting to assess progress against our international commitments to reduce carbon emissions.

The Ministers were advised that it would "create significant extra financial costs to the Government (and taxpayers)" if forests registered in the ETS were to move to averaging accounting; officials estimated this fiscal cost at \$540 million over 10 years to 2030.

This fiscal estimate is mistaken; the policy would impose no financial cost on taxpayers. There are three reasons why the fiscal cost estimate considered by Cabinet was not robust.

1. **The NZU accounting treatment is no longer appropriate:** The rationale for recording the issue of an NZU to a forester as an expense, and the surrender of an NZU by a forester as revenue, in the government's Financial Statement no longer exists. During the first commitment period of the Kyoto Protocol, the government committed to swap NZUs for Kyoto AAUs, and hence each NZU created a potential liability for the Crown. The Kyoto units now have no value and the Government is legislating to remove its obligation to swap NZUs for Kyoto AAUs. In addition, New Zealand's current international commitments to reduce emissions do not result in a financial obligation. The issue and surrender of NZUs by foresters no longer have the potential to give rise to cashflows; no taxpayer will ever be asked to pay more tax if existing forests were to adopt averaging accounting.
2. **Cabinet was presented with a truncated analysis:** The concept of averaging, by definition, means that the allocation of units is equivalent to what would otherwise occur over a full rotation cycle. However, Cabinet was presented with analysis covering only a 10-year period, a timeframe less than half of the typical rotation cycle of a plantation forest. This period is insufficient to capture all of the post-harvest upswing in the government's favour, when, under averaging accounting, it would no longer be required to issue units. Our modelling shows that, when analysed over a full rotation cycle of 28 years, a shift to averaging accounting results in a neutral or, potentially positive, net position for the government. This finding also takes account of forests that hold units above their long-run average will need to surrender sufficient units upfront to reach their average, as part of the transition to averaging.
3. **The modelled near-term impact presented to Cabinet relied on invalid assumptions:** Cabinet was advised that allowing existing forests to move to averaging account would result in a net 21.6 million units to foresters over the period 2021-2030:

- 8.3 million of these additional units (equivalent to 38%) resulted from an assumption that foresters would extend their rotation cycle—that is, defer harvest—to accumulate additional units. We show that deferring revenue from harvest to accumulate additional NZUs would not be rational; the deferring harvest would create a material net cost to foresters, who therefore have no incentive to do so. Findings from a survey of industry intentions conducted by the government’s own specialist consultant are consistent with our modelled conclusion. Correcting this invalid assumption would remove the fiscal cost (\$207.5 million) associated with the 8.3 million units from the officials’ estimates.
- Officials appear to have assumed that foresters would tend to wait until harvest to elect into averaging accounting, and as a result the Crown would receive 13.3 million fewer units over the 10-year period. Officials advised Cabinet that if foresters shifted to averaging sooner, then the reduction in surrendered units could be as few as 1.9 million units. Cabinet has already set a precedent of allowing a time-limited transition to averaging, with this policy being offered for existing forests that are not already registered in the ETS. For regulatory consistency, officials should have advised Cabinet on the fiscal impact of a short-dated election deadline for ETS registered forests, consistent with that precedent. This policy assumption dramatically reduces the impact estimated over 2021-30, from 13.3m units (\$332.5 million) to 1.9m units (\$47.5 million).

We conclude that a more robust assessment would have considered the fiscal impact of permitting existing forests registered in the ETS to shift to averaging accounting over a full rotation cycle, and concluded that the impact would be neutral or, potentially, positive for the government.

Offset planting

The same conceptual issues would arise in evaluating the fiscal impact of a proposal to allow post-1989 forest owners to offset a deforestation liability by planting a forest elsewhere.

Over a full rotation cycle, after 28 years, the net position for the government would be neutral or positive in unit terms if the new forest is planted immediately after the deforestation of the old forest.

In monetary terms, a rising carbon price over that period (using assumptions included in official advice) would result in a positive net position. This is mainly because a rising carbon price amplifies the annual value of units from the new forest that the government does not have to issue. Under the assumption of a rising carbon price, the modelling suggests that the net position for the government after 28 years could be as high as \$7,900 per hectare (in the case where the counterfactual was deforestation) or \$12,200 per hectare (in the case where harvesting and replanting would otherwise have occurred).

Overall conclusion

The accounting treatment underlying the fiscal impact assessments appears to be an uncorrected legacy of the Kyoto obligations as the issue and surrender of NZUs by foresters no longer impact the Crown’s net worth in substance. If the accounting treatment is retained, relying on an estimate of fiscal impact at a point-in-time or over a short period does not represent the full picture, as the ongoing impact of a shift to averaging accounting, or permitting offsetting, relative to the counterfactual, does not reach a steady state. These flows largely net out to a neutral position in units issued and surrendered over a full rotation cycle. With a rising carbon price, permitting offsetting would produce a fiscally positive impact over a full rotation cycle under current accounting policies.

1. Purpose and context

This section sets out the purpose of this report and the policy proposal under consideration.

1.1 Introduction

In July of this year, the Ministers for Climate Change and Forestry announced that forests registered in the ETS before 2019 would not be permitted to transition to averaging accounting. Earlier in the year, the Government decided to introduce averaging accounting for all forests planted from 1 January 2021, with forests registered in 2019 and 2020 having the option to continue using the stock change approach or to move to averaging accounting (Jones & Shaw, 2019).

Under the 'stock-change' approach, a forester is allocated New Zealand Units (NZUs or units) that reflect the carbon sequestered as the forest grows, and must return NZUs to the Crown when trees are harvested, even if the forest will be re-planted.¹

Under 'averaging accounting', foresters receive NZUs as their forest grows, up to a determined average level of long-term carbon storage; foresters using averaging would not be required to return NZUs when their trees are harvested provided they replant. New Zealand will use averaging accounting when it assesses progress against international commitments to reduce carbon emissions.

The Ministers gave three reasons for not allowing existing forests registered in the ETS to adopt averaging accounting. These three reasons are that (Jones & Shaw, Releases, 2019, p. 5):

- "introducing averaging is about seeing more new forests established, to increase carbon stored in New Zealand"
- "moving more than 2,200 existing forests onto averaging could contribute to an oversupply of units (which, under stock carbon accounting, will be surrendered to the Crown upon harvest) into the carbon markets"
- "it would create significant extra financial costs to the Government (and taxpayers) as emission units already credited to forests under stock-change accounting would not be surrendered on harvest."

The New Zealand Carbon Farming Group asked us to review the estimates of fiscal impact relied upon by Ministers when deciding that extending averaging accounting to existing forests would "create significant extra financial costs to the Government (and taxpayers)". We were also asked to consider whether any weaknesses in the estimate of fiscal impact of averaging would likely flow through to how officials would evaluate a proposal to allow post-1989 forest owners to offset a deforestation liability by planting a forest elsewhere.

This report presents our analysis and unfolds as follows:

- in this section we introduce our report and summarise the policy decision on averaging accounting and the estimates of fiscal cost prepared by officials

¹ One NZU represents one metric tonne of carbon dioxide or carbon dioxide equivalent, see <https://www.mfe.govt.nz/climate-change/new-zealand-emissions-trading-scheme/about-nz-ets>.

- our second section explains why the issue and surrender of NZUs no longer have the potential to give rise to cashflows and adopting averaging accounting would not result in extra financial costs for the government or taxpayers
- our third section shows that Cabinet was presented with truncated analysis and draws upon our modelling to show that averaging accounting could result, over a longer timeframe, in the net position being positive for the government
- fourthly, we review whether a move from stock-change to averaging accounting would cause foresters to change when they harvested their trees
- fifthly, we consider the assumption by officials that foresters will wait until harvest to elect into averaging
- sixthly, we consider the implications of the above analysis with respect to the potential fiscal impacts of allowing “offsetting” for registered forests that use stock change accounting
- finally, we set out our conclusions.

Our review relies on the information released in the Regulatory Impact Assessments (RIA), Cabinet Papers, other publicly available information and papers provided to New Zealand Carbon Farming by The Treasury under the Official Information Act. These papers do not show the detail of the calculations underpinning advice to Ministers; we take what is visible, analyse it, and consider the extent to which we can infer the underlying assumptions.

Our modelling of fiscal impacts, consistent with advice to Cabinet, is presented on a nominal basis.

1.2 The policy option

Last year, as part of the ETS changes for forestry, Te Uru Rākau, a business unit of the Ministry for Primary Industries (MPI), consulted on options for accounting for the carbon sequestered in forests registered in the ETS (Te Uru Rākau, 2018). MPI considered a change in accounting approach would encourage planting of new forests, lower compliance costs, and more accurately measure the climate contribution from New Zealand’s forest estate over the long-term.

MPI, in its June 2019, RIA of the forestry accounting proposals, recommended the Government allow foresters a one-way choice to move forests registered in the ETS to averaging accounting (Ministry for Primary Industries, 2019, Option B.3, para 465). Under the recommended proposal, foresters:

- could transition their existing forests to averaging accounting at any Mandatory Emissions Return (MER) in the future (Option C.2, para 469)²
- would receive NZUs for normal forest growth until each forest reaches its long-term average carbon storage amount (para 462 d).

² A MER is to be completed within 6 months of the end of a mandatory return period. Most five-year mandatory return periods ended on 31 December 2017. <https://www.teururakau.govt.nz/growing-and-harvesting/forestry/forestry-in-the-emissions-trading-scheme/emissions-returns/>

1.3 Estimate of fiscal impacts

1.3.1 Regulatory impact assessment

MPI estimated that 46% of existing forests would shift to averaging accounting if foresters were provided with this option (Ministry for Primary Industries, 2019, para. 152). It calculated that the transition of those forests to averaging accounting could result in an increase in supply of 21.6 million NZUs over the period 2021 to 2030 (Ministry for Primary Industries, 2019, p. 45). That estimate assumed 8.3 million additional units would be issued because foresters would extend their rotation cycle to accumulate additional units, and 13.3 million fewer units would be surrendered in the period as foresters waited until harvesting to elect into averaging accounting (i.e. $13.3 + 8.3 = 21.6$).

1.3.2 Cabinet paper

In June 2019, the Ministers for Climate Change and Forestry took a paper to Cabinet for final decisions entitled: "Improving the Emissions Trading Scheme for forestry participants – Final decisions required for drafting the amendment Bill". The Ministers advised Cabinet that allowing existing forests to move to averaging from 2020 would have a financial cost of \$79 million by 2022/23, and an additional \$461 million from 2023 to 2030; that is a total fiscal cost of \$540 million over the 10-year period. This cost estimate was arrived at by multiplying the MPI estimate of 21.6 million addition units by a carbon price of \$25 ($21.6\text{m} \times \$25 = \540m).

The Cabinet paper weighed this estimated fiscal cost against the benefits of enabling foresters to simplify their reporting obligations and providing them a greater number of units they could trade at low risk. The Ministers concluded that the estimated fiscal impact would outweigh the advantages to foresters and recommended Cabinet:

- agree that existing post-1989 forest participants will not be able to use averaging accounting (these forests will continue to use stock change accounting) (recommendation 4);
- invite the Ministers for Climate Change and Forestry to report back to Cabinet in the second half of 2021 on whether the option for existing forests to move to averaging is appropriate (recommendation 12).

Cabinet agreed to these recommendations (ENV-19-MIN-0035 refers).³

³ See <https://www.mpi.govt.nz/protection-and-response/environment-and-natural-resources/emissions-trading-scheme/emissions-trading-scheme-reviews/>.

2. There would be no cost to taxpayers

This section explains that the issue of NZUs to foresters no longer gives rise to potential cash liabilities for the Crown, and hence does not give rise to financial costs to the government or to taxpayers.

2.1 The reason Ministers were told there would be a fiscal cost

Ministers were advised that permitting existing forests registered in the ETS to transition to averaging accounting would give rise to significant fiscal costs. This advice stemmed from the current practice by The Treasury of recording the issue and surrender of NZUs in the Financial Statements of the Government of New Zealand. In preparing these statements, the issue of an NZU is recorded as an expense and the surrender of an NZU is recorded as revenue.⁴ A move to averaging accounting by existing registered forests was modelled by officials as resulting in fewer surrenders of NZUs by foresters in the short-term, and therefore as a reduction in revenue—a fiscal cost. (In subsequent sections of this report we show that the modelled result would be neutral or fiscally positive in the longer-term and that these short-term results derived from invalid assumptions).

2.2 NZUs created potential liabilities during first Kyoto commitment period

Like the stock-change approach to accounting for carbon, the existing accounting treatment for NZUs in the government's financial statements was designed in the context of the first commitment period under the Kyoto Protocol. The Kyoto Protocol created a legally binding obligation for New Zealand to limit emissions to 1990 levels on average during the period 2008 to 2012.

At the start of the first commitment period, New Zealand was assigned Kyoto units (initial Assigned Amount Units or AAUs) equal to its target emission level, and at the end of the commitment period was required to retire Kyoto units equal to its actual gross emissions. Any shortfall in Kyoto units held domestically would have had to be made up through purchases of AAUs, or other eligible units, internationally.⁵ To provide integrity to its NZUs, the government decided to back each NZU with a Kyoto unit (the backing policy).⁶ ETS participants, including foresters, were entitled to swap an NZU for an initially assigned AAU that could then be sold offshore (MfE, 2007).⁷

Hence, the combination of obligations made under Kyoto's first commitment period and the ETS settings gave rise to four forms of potential liability during the period 2008 to 2012:

⁴ See page 14 of <https://treasury.govt.nz/sites/default/files/2016-10/fsgnz-year-jun16.pdf>.

⁵ Other eligible units included Certified Emission Reductions (CERs), Emission Reduction Units (ERUs), Removal Units (RMUs).

⁶ This was reflected in section 86(7) of CCRA 2002 (Balance of units at end of true-up period or other balance date) through to 2013.

⁷ This provision was introduced into the Climate Change Response Act 2002, as amended from 26 September 2008 (section 30E). The Climate Change Response Act refers to these initially assigned AAUs as "designated amount units" (section 30E(5)).

- The Crown's obligation under the Kyoto Protocol to make-up any shortfall in the AAUs (and other eligible units) it held at the end of the period relative to gross emissions over the first commitment period.
- A contingent liability for the Crown during the first commitment period to purchase AAUs overseas to make-up any shortfall in initially assigned AAUs that could have arisen from enabling the NZU-AAU swap in the domestic market (MfE 2011, para 72)
- A requirement to hold, or subsequently purchase (as a result of the backing policy), AAUs beyond those required for the first commitment period to back-up NZUs allocated to foresters who would not be required to surrender those units until they harvested their forests at some point after the end of the first commitment period (MfE, 2011, para 70).
- In the event that New Zealand signed up to Kyoto's second commitment period, a contingent liability arising from the potential harvesting of post-1989 forests for which carbon removals had been recognised during the first commitment period.⁸

Recording the issue of an NZU as an expense, and the surrender of an NZU to the Crown as revenue, in the government's financial statements reflected these requirements. The Office of the Auditor-General drew attention to these linkages when commenting on the accounting treatment of NZUs in 2011:

NZUs have a market value and the issue of NZUs without charge to participants is an expense to the Government and creates a liability, which, at a minimum, represents an obligation to swap the NZUs for Kyoto AAUs if the participant asks for this (OAG, 2011, p. 45).

To mitigate this potential liability, the Climate Change Response (Emissions Trading and Other Matters) Amendment Act 2012, subsequently amended the swap policy so that conversion would only be permitted to extent that the government held sufficient AAUs to meet the request—the government would not be required to purchase AAUs to back conversion requests.⁹ In practice, only a small number of NZ AAUs were ever sold overseas because buyers were limited (Ormsby & Kerr, 2016).

2.3 No liabilities arise under current commitments

At the end of the first commitment period, New Zealand elected to take its 2020 unconditional target of reducing emissions to 5% below 1990 levels under the United Nations Framework Convention on Climate Change (UNFCCC), rather than within the Kyoto Protocol (MfE, 2019b). Compliance with this 2020 target does not involve the retirement of unit assets.¹⁰ As MfE described in its 2019 annual report:

Because the 2020 target was taken under the UNFCCC it does not place any legally binding fiscal liability on the Crown. Therefore, this does not give rise to an obligation under PBE IPSAS 19: Provisions, Contingent Liabilities, and Contingent Assets (MfE, 2019d, p. 126)

⁸ Note 32 (on contingent liabilities) in Treasury's 2010-2013 financial statements.

⁹ See section 30E(3A), Climate Change Response Act 2002. The reasoning for introducing this section is explained on page 3 of NZ Parliament Finance and Expenditure, 2012 report.

¹⁰ The government will use its first commitment period surplus to count towards its 2020 target.

More recently, New Zealand's commitment under the Paris Agreement to reduce emissions to 30% below 2005 levels by 2030 is not internationally legally binding: "there is no legally enforceable obligation on the Crown to spend resources to meet it" (MfE, 2016a, p. 27).¹¹

Moreover, the Kyoto units that backed the NZUs no longer have any market value. As MfE observes in its Annual Report: "New Zealand's CP1 [first commitment period] surplus units have no market value as they cannot be traded (2017/18: \$nil)" (MfE, 2019d, p. 126). Indeed, the legislative provisions that provided for NZUs to be backed by Kyoto units will be deleted entirely by the Climate Change Response Amendment Bill, introduced to Parliament on 24 October 2019.¹² This is the same Bill that provides for averaging accounting (other than for existing ETS forests).

Hence, post the Kyoto first commitment period, the Crown has no liabilities with respect to meeting international targets and no contingent liabilities with respect to NZUs held by post-1989 foresters. Therefore, the rationale of the Kyoto obligation identified by the Auditor General in 2011—that supported accounting for the issue of an NZU in the government's financial statements as an expense, and the surrender as revenue—no longer exists.¹³

2.4 The Treasury appears not to have reassessed its accounting approach

The existing accounting treatment of NZUs in the governments financial statements was adopted by the Treasury. There is no authoritative guidance on how to account for emissions trading schemes by either the International Public Sector Accounting Standards Board or the International Accounting Standards Board (IASB) (or its International Financial Reporting Interpretations Committee). We have not located any document indicating that The Treasury has reassessed its accounting treatment of NZUs issued to foresters to reflect changes in obligations post the Kyoto first commitment period.

With the Kyoto obligations lapsing, the current treatment of NZUs issued to foresters does not seem to fit well with the conceptual approaches expressed in The Government Finance Statistics Manual (GFSM) 2014, published by the International Monetary Fund, or the Conceptual Framework for Financial Reporting (Conceptual Framework), issued by the IASB (revised 2108). For instance, the GFSM explains that its framework is "designed to provide statistics that enable policymakers and analysts to study developments in the financial operations and financial position of government" (International Monetary Fund, 2014, p. 3). It defines an expense as "a decrease in net worth" and revenue as "an increase in net worth" resulting from a transaction (International Monetary Fund, 2014, p. 71).¹⁴

¹¹ In its 2018-19 annual report, MfE states that "given that targets in nationally determined commitments sit outside the [Paris] Agreement, the targets themselves are not legally binding" (MfE, 2019d, p. 127).

¹² See section 39 <http://www.legislation.govt.nz/bill/government/2019/0186/latest/whole.html>.

¹³ In papers released to New Zealand Carbon Farming under the Official Information Act, officials at MPI raise with The Treasury their conclusion (supported by officials at the Department of Prime Minister and Cabinet) that the issue of NZUs "are not real fiscal costs, as they will be backed by international savings". In its response, The Treasury appears to consider only whether additional planting of forests would reduce the costs of meeting international commitments, and not whether the accounting practice remains valid (OIA, 20190565 pages 23, 24).

¹⁴ The Conceptual Framework definitions are the same: ; expenses are defined as decreases in assets, or increases in liabilities and income is defined as increases in assets, or decreases in liabilities that result in decreases and increases in equity respectively (International Accounting Standards Board, 2018, p. A48).

It is not apparent how an issue of an NZU to a forester—certifying that the trees owned by the forester have sequestered a ton of carbon—and the surrender of that NZU when that carbon is released on harvest, first decreases and then increases the net worth of the government. For example, a forester who deforests and converts her land to dairy pasture, would be required to return NZUs to the government. The surrendered NZUs would be recorded in the Financial Statements as revenue. However, the Crown’s net worth is not, in substance, increased by deforestation and the surrendered NZUs cannot be on-sold by the government to other emitters (sensibly, as the carbon sequestration represented by the surrendered NZU no longer exists).¹⁵

2.5 Advice to Ministers did not adequately explain the fiscal cost estimates

Officials preparing the RIA, and assisting with drafting the Cabinet paper, are required to follow the accounting policies set by The Treasury when preparing advice on fiscal costings for Ministers. As the modelled impact showed a net 21.6 million addition units would remain with foresters over the modelling period (we address the weakness in this modelling below), officials correctly observed that the application of The Treasury accounting practice would result in a fiscal cost of \$540 million within the 10-year period (21.6m x \$25 = \$540m).

However, a mechanical application of the accounting practice is not sufficient, in our view, to meet Cabinet’s “expectation that agencies provide robust analysis and advice to Ministers before decisions are taken on regulatory change” (Cabinet Office Circular, 2017, para. 3). Officials’ advice to Ministers must identify and assess all material impacts of proposed actions (Cabinet Office Circular, 2017, para. 9.3).

Ministers appear not to have been advised on the implications of the accounting practice. That is, that a delay in the surrender of NZUs by foresters, as modelled in the RIA, will not reduce the resources available to the Government to provide public services, require additional taxes, nor impact on debt levels, either in the current period or any future period.¹⁶ In short, allowing existing forests to adopt averaging accounting would not “create significant extra financial costs to the Government (and taxpayers)” as Ministers were led to state in explaining their decision.

The introduction of auctioning of NZUs allocated to emitters may be a good opportunity to review how NZUs should be accounted for in the government’s financial statements. Such a review should consider whether the issue of NZUs to a forester—certifying that the investment by the forester in growing a forest sequesters carbon—can now realistically be viewed as an expense for the Crown and thus decreases the Crown’s net worth, and whether the surrender of NZUs when carbon is released on harvest is in substance revenue to the Crown increasing its net worth.

¹⁵ Section 18CA of the Climate Change Response Act 2002.

¹⁶ Because the current practice is to record the issue of an NZU as an expense and the surrender as revenue, the flows of NZUs will have implications for budget approvals within any given budget period, but that is a consequence of the accounting practice not a result of any change in underlying liabilities.

3. Cabinet was presented with truncated analysis

An important consideration in any robust analysis of a policy proposal is the period over which impacts are assessed. The Treasury, in its Best Practice Guidance for impact assessments, cross references its Guide to Social Cost Benefit Analysis and the OECD's Introductory Handbook for Undertaking RIA (The Treasury, 2017, p. 19). Both documents identify the need to assess impacts over a period of time that is sufficient to assess the costs and benefits that may occur at different times (OECD, 2008, p. 13; Treasury, 2015, p. 32).

The period of time sufficient to assess costs and benefits is not fixed and will vary with the policy proposal. As a matter of principle, robust analysis would not omit material costs or benefits. For example, The Treasury would be unlikely to accept an analysis by a department that estimated little or no fiscal cost in the short-term while ignoring material fiscal costs over the medium to longer term. The Treasury would likely require that these longer-term fiscal impacts be included in advice to Ministers before decisions are taken on regulatory change (Cabinet Office Circular, 2017).

In this section we consider whether the MPI estimate of an additional 21.6 million units over a ten-year period (2021 to 2030), which was presented to Cabinet, reflects the full impact of the policy on the government's accounts (taking as given the current approach of recording the issue of an NZU as an expense and the surrender as revenue).

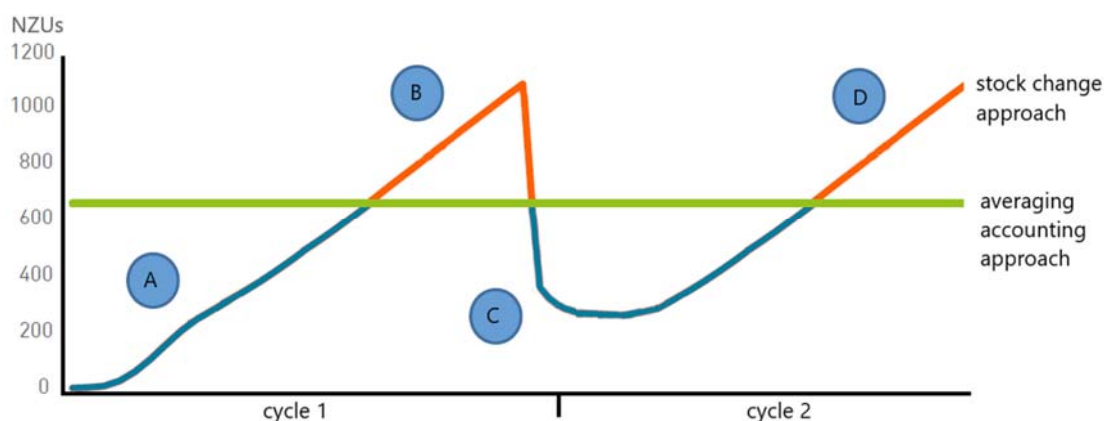
We begin by offering a conceptual framework to compare the allocation of units under a stock change and an averaging accounting approach. This is supplemented with some modelling of unit flows.

3.1 Averaging accounting—a conceptual framework

Under the averaging accounting approach, a forestry participant receives a level of units that is based on the average amount of carbon that the forest holds when multiple growth and rotation cycles are taken into account (Te Uru Rākau, 2018). At a given point in time, the number of units held under the averaging approach may be higher or lower than under the stock change approach, which follows the growth and harvest of a forest through the rotation cycle. However, across a full rotation cycle, following the transition to averaging accounting, the level of units held by a participant will be equivalent. That is, a participant would be neither better nor worse off at the completion of a full rotation cycle.

Similarly, from the government's perspective, it would neither issue more, nor receive fewer, NZUs under averaging accounting compared with the stock change approach for existing forests across a full rotation cycle. To illustrate why the government should be largely indifferent in terms of the quantum of NZUs issued and surrendered, **Figure 1** adapts and extends the diagram from the November 2018 consultation paper (Te Uru Rākau, 2018) to take in two cycles.

Figure 1 Units received under averaging and stock change accounting over two cycles



Source: adapted from Te Uru Rākau (2018); example extended to two cycles

- In period A, the government issues the same number of units under averaging accounting as would occur under the stock change approach, as carbon accumulates in the forest up to the average amount. However, in period B, the government no longer needs to issue units under averaging accounting as the average amount of stored carbon has been reached.
- Although the government would forgo the surrender of units from foresters as the forest is harvested, it would no longer re-issue units during the growth phase of the second cycle (the latter part of period C and during period D).

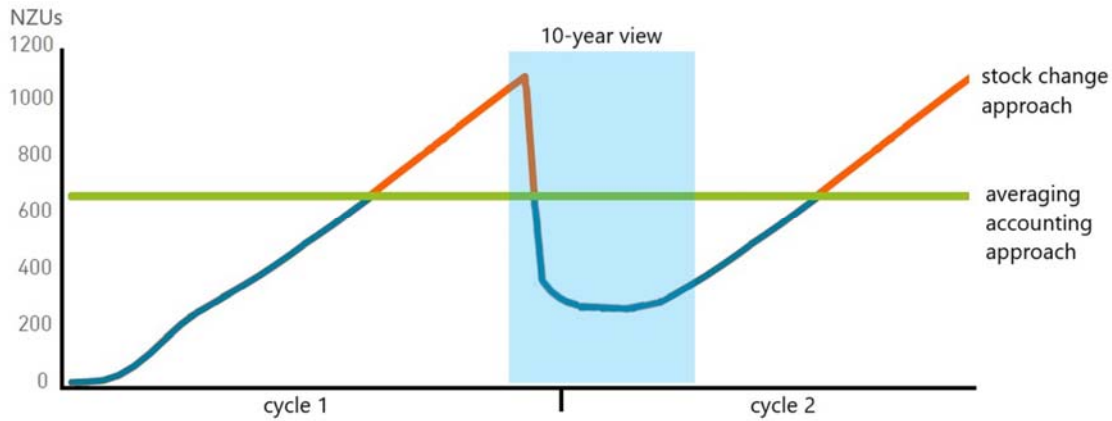
The net effect is that the government would not issue more units, across a full rotation cycle, under averaging accounting than it would under the stock change approach.

3.2 Ten years is insufficient to capture the full impact

However, the fiscal estimates presented to Cabinet focused on a ten-year period, from 2021 to 2030, as outlined above in section 1.3. **Figure 2** illustrates the approach taken to the estimating the fiscal impact from allowing registered forests to shift to averaging accounting. This illustration, for simplicity, assumes the distribution of forest age is uniform. In reality, the distribution of registered forests is across age groups but is skewed to older forests nearing harvest, as is shown in Appendix A.

As the analysis is truncated to a ten-year period, the government appears to be worse off under averaging accounting. This result occurs, in part, because the timeframe used places the focus on the reduction in surrendered units at harvest (i.e. a loss of revenue relative to forecast) while being insufficient to capture the upswing in government's favour in the second rotation cycle, following harvest at the end of the first cycle. This upswing arises, as under averaging, the government would no longer be required to pay out units annually as the forest grows and increases its carbon storage.

Figure 2 'Window' considered in fiscal estimate – illustrative



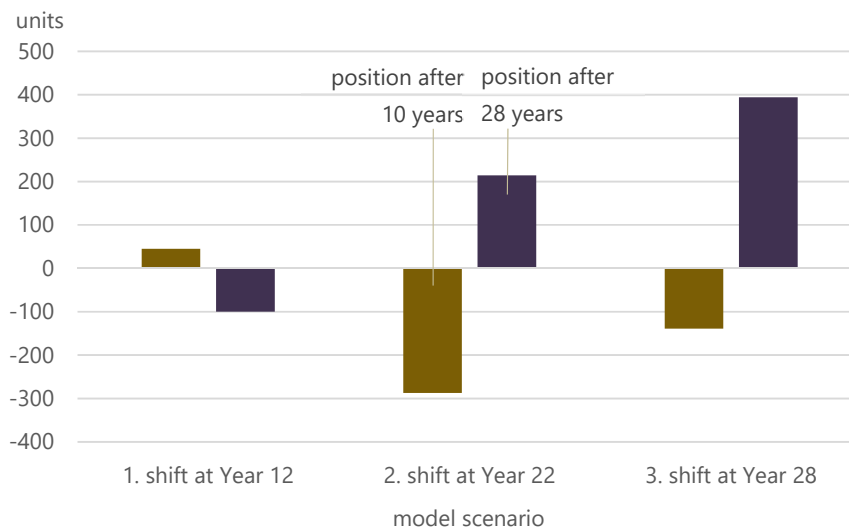
Source: adapted from Te Uru Rākau (2018); example extended to two cycles

3.3 The impact could be positive over a full cycle

We developed a model of unit flows to test these concepts formally. Firstly, that the impact of a shift to averaging can vary, from a government perspective, across the short and long term. Secondly, that the impact is also determined by the stage of the rotation cycle at which a forest shifts to averaging. The model is based on a hectare of pinus radiata forest with a rotation cycle of 28 years and compares the annual flow of units allocated by the government to a forester under stock change accounting and averaging accounting. Appendix B provides more detail on the method and the results.

Figure 3 summarises the net impact, from a government perspective, after 10 years and 28 years following the shift to averaging accounting. Three scenarios are included, with the shift to averaging occurring at a different point in the rotation cycle. It is clear that a ten-year timeframe is insufficient to capture the full impact of the shift to averaging accounting, from the perspective of the government.

Figure 3 Shift to averaging – modelled unit impact per hectare from government perspective



Source: Sapere Research Group

The results also show that the net position at 28 years following the shift can be positive for the government due to an upfront surrender of units as part of the shift to averaging. These variances are explained in the text box below. Consideration of the carbon price reinforces this positive position for the government. A rising carbon price, as assumed in the RIA, would mean that the government's long-term position under averaging is more favourable, as the rising price amplifies the effects that occur later when the value of units is higher (i.e. the avoided issue of units by the government).

If the timeframe for analysis is only ten years, then the point in the rotation cycle that the forest shifts to averaging matters, as do assumptions about the age of forests that are assumed to shift.

- If a forest has accumulated units above its average carbon storage, then the government is likely to be worse off in the short term (i.e. 10 years). This is because if the harvest occurs within that period, then the government would not receive a surrender of units that would otherwise have occurred under stock change accounting.
- Most forests registered in the ETS are relatively mature (see Appendix A), and therefore above their long-run average carbon storage. This skewed distribution, if applied to the proportion of forests assumed to shift to averaging, would increase the likelihood of the estimated short-term impact (i.e. 10 years) being negative for the government.

Taken together, these points suggest that the overall position for the government from allowing registered forests to shift to averaging may be positive when a long-term view is considered. Furthermore, it appears to us that these impacts would also depend on the detail of the policy design, for example, if a short-dated deadline was set for foresters to choose one method or the other. The impacts of such a design were not examined in the RIA; we consider these issues in section 5 below.

In conclusion, relying on an estimate of fiscal impact at a point in time or over a short period does not represent the full picture, as the ongoing impact of a shift to averaging accounting, relative to the counterfactual, does not reach a steady state. These flows largely net out to a neutral position in units issued and surrendered over a full rotation cycle.

An explanation of the modelled net position after 28 years

If the forest is above its long-run average at the time of the shift to averaging (as in Scenarios 2 and 3 and Figure 3), there is a one-off transition, in which the forester surrenders sufficient units so that the long-run average is reached. This upfront windfall for the government is visible after the full cycle of 28 years, but is masked at the 10-year point, at which the government appears worse off because it does not receive a surrender of units at harvest that would otherwise have occurred in that period. Conversely, the government is better off after a full cycle of 28 years as it has not been required to issue units annually, post-harvest, that would otherwise be allocated to a growing forest under the stock change approach. Scenario 3 has a similar pattern to Scenario 2, with the position being more favourable, as a result of the number of units surrendered at the transition to averaging being higher at Year 28 than at Year 22 of the rotation cycle.

In contrast, if the forest is below its long-run average at the time of the shift to averaging (as in Scenario 1), the forest continues to receive the annual flow of units that would be allocated under stock change approach until the average is reached. This accounts for the net position after 10 years being close to neutral. The government appears worse off after 28 years, as it does not receive a surrender of units that would otherwise occur at harvest under the stock change approach.

4. There is no incentive to defer harvest

As discussed above, the estimated fiscal cost in the Cabinet paper is based on the modelled net change in units, in the near term. That modelled impact, of 21.6 million units over the period 2021-2030, included 8.3 million units on the assumption that some foresters would extend their rotation cycle (i.e. defer harvest) to increase the average amount of carbon stored, thereby increasing their unit entitlement in the next cycle. This section explores the case for this assumed behavioural change.

4.1 Basis for the estimated impact

The forest carbon calculation method that MPI used to determine ETS unit flows is based on a forest growth simulation model (Ministry for Primary Industries, 2019, para. 523). Key inputs into this model include research contained in two technical working papers by Professor Bruce Manley of the School of Forestry at the University of Canterbury (Ministry for Primary Industries, 2019, para. 529). We take a closer look at these two papers (Manley, 2019(a); Manley, 2019(b)).

4.2 The research is conflicting

The paper by Manley (2019b, p. 1) presents the results of a telephone-based industry survey of 26 current and potential forest growers and concludes that averaging accounting will have “a limited impact on harvest intentions”.¹⁷ Of the 14 responses to the question “Will averaging have an impact on harvest intentions?”, only 1 responded “yes” (7%) with the balance responding either “no” (11 or 78%), “possibly” (1 or 7%) or “depends” (1 or 7%). This finding suggests that a shift to averaging accounting would not cause forest growers to extend rotation cycles.

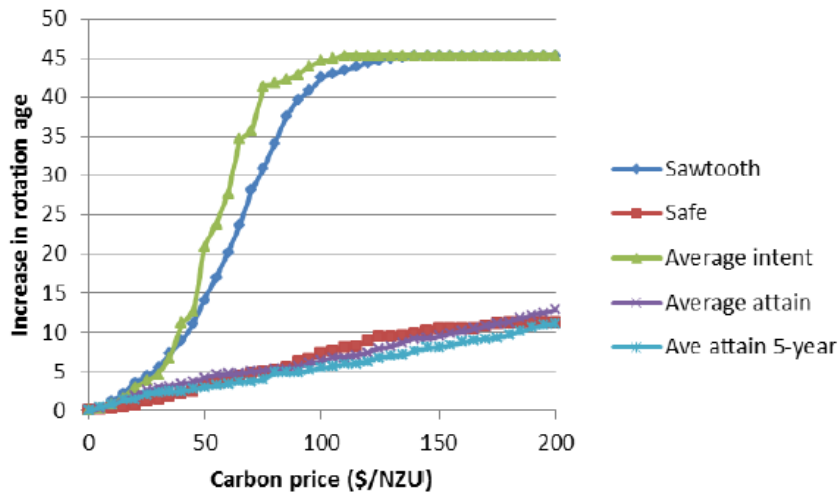
The other paper by Manley (2019a) presents the results of an afforestation model under different accounting approaches, with multiple scenarios that vary the assumptions of carbon price, log price, pruning approach, site quality and harvest difficulty. Several approaches to averaging accounting are tested and we focus on two approaches that are relevant to the estimate of the fiscal impact:

- the ‘age band’ version of average accounting, which is similar to the version proposed for forests that first register with the ETS in 2019 or later (Te Uru Rākau, 2019); and
- ‘safe carbon’, in which foresters can trade up to a safe level of units; that is, the carbon remaining after harvesting, if they continue to use the stock change accounting approach.

Figure 4 (Figure 20, Manley 2019a) summarises the model results, as a weighted average across multiple scenarios, to show the sensitivity of the ‘rotation age’ to an increase in the carbon price under each accounting approach. The differences between the average accounting approach (labelled as “ave attain 5-year”) and the status quo a (labelled as “safe”) are minimal at a carbon price of \$25, which is the price used in the advice on fiscal impact. The difference in rotation cycle appears to be approximately one year higher for averaging accounting than under the current approach.

¹⁷ Comprising forestry consultants and managers [12], forest owners [5], carbon specialists [3], iwi/Māori entities [3], farmer/farming entities [3].

Figure 4 Weighted average results for each ETS accounting approach

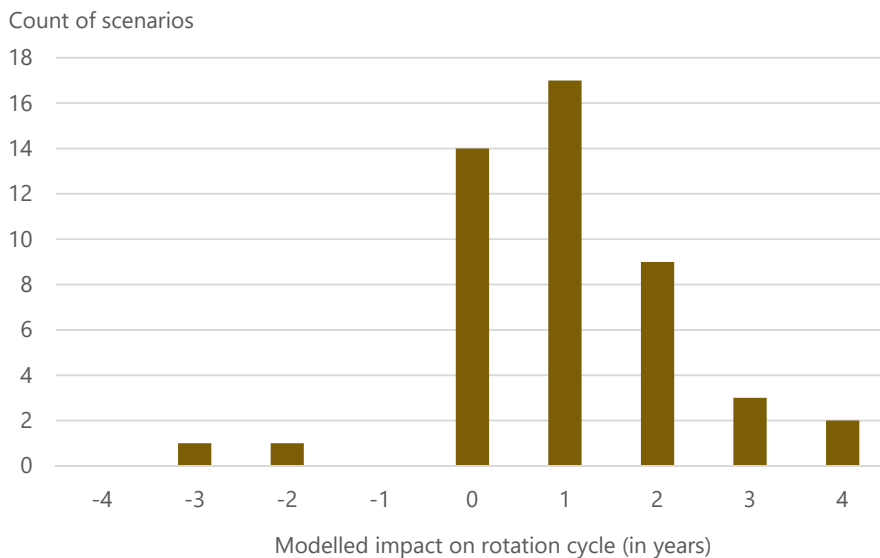


Source: Manley (2019a), Figure 20

The individual scenarios, reported in chart form, can also be examined to compare the modelled rotation age under the two relevant accounting approaches. In each case, any modelled difference in the rotation age at a carbon price of \$25 per unit is identified and then collated. Figure 5 shows the distribution of these modelled effects among the 47 relevant scenarios, with the average modelled effect being an extension of approximately one year (0.97 years). This finding is similar finding to that observed within the weighted average results, examined above.

As a next step, we consider whether this modelled effect, of an increase to the rotation cycle, holds up under a calculation that accounts for the opportunity cost of harvest deferral.

Figure 5 Distribution of modelled effects on rotation cycle among scenarios



Source: Sapere Research Group, based on results in Manley (2019a)

4.3 Deferring harvest has an opportunity cost

Foresters plant and harvest forests for profit. Foresters could be expected to extend their rotation cycle—that is, to defer harvest—to accumulate additional units only if it is profitable to do so. A deferral of the harvest has an opportunity cost as revenue from the harvest is also delayed.

Table 1 models the impact of deferring a harvest of pinus radiata by six years, from Year 28 to Year 34, in line with the example in the November 2019 discussion paper on the ETS changes for forestry (Te Uru Rākau, 2019). The harvest value per hectare is assumed to lie between \$28,765 (Scenario A) and \$32,991 (Scenario B).¹⁸ The opportunity cost, in net present value terms, of forgoing that revenue for six years ranges from \$12,784 to \$14,663 per hectare, using a discount rate of 8%.¹⁹ Following the harvest in Year 34, the unit entitlement for the next cycle would increase in line with the higher average amount of carbon that was stored over the extended rotation cycle. That additional allocation of units would have a net present value of \$1,255, given a carbon price of \$25 per unit. The net financial impact of this deferral of the harvest would therefore be range from -\$11,530 to -\$13,408, depending on the harvest value. The conclusion is that it would not be rational to defer the harvest to qualify for additional units.

The harvest value would have to fall below \$2,823 per hectare for the value of the additional units to be higher than the opportunity cost of delaying the harvest (Scenario C). This value would be considerably lower than that recently obtained by foresters.

Alternatively, the carbon price would need to rise higher than \$254 per unit, under a low harvest value per hectare (Scenario D) or higher than \$292 per unit, under a high harvest value. Such a rise would be unexpected, given that the assumption used in the modelling for the RIA is a rise to \$50 by 2050.²⁰

Table 1 Financial impact of extending a rotation cycle from 28 to 34 years (net present values)

Scenario – all pinus radiata	Harvest revenue per hectare	Opportunity cost of forgone revenue over six years at 8%	Value of extra units received for a longer rotation cycle ²	Net financial impact from extending rotation cycle
A. 'Low harvest' value	\$28,765 ¹	-\$12,784	\$1,255	-\$11,530
B. 'High harvest' value	\$32,991 ¹	-\$14,663	\$1,255	-\$13,408
C. Breakeven – low harvest value	\$2,823	-\$1,255	\$1,255	\$0
D. Breakeven – high carbon price	\$28,765	-\$12,784	\$12,784 ³	\$0

Source: Sapere Research Group

¹⁸ These low and high values represent a 95% confidence interval around an area-weighted mean of \$30,878 per hectare for New Zealand forests, derived by Mark Morrice, a Registered Valuer & Forestry Consultant, using 12 months of log prices.

¹⁹ Crighton and Anderson estimate an implied discount rate for forestry at 7.8%, see <http://www.capi.co.nz/wp-content/uploads/2014/07/FVQno3-web.pdf>

²⁰ As per footnote 102, p.115 “The net present value calculation completed by NZIER assumed a carbon price increasing to \$50 by 2050, and a discount rate of 6 percent ”

Notes to Table 1: (1) low and high values represent a 95% confidence interval around an area-weighted mean of \$30,878 per hectare for New Zealand forests, derived by Mark Morrice, a Registered Valuer & Forestry Consultant, using 12 months of log prices; (2) averaging accounting means the allocation increases by 86 units, from 309 to 395 units at harvest in year 34, derived from MPI carbon look-up tables, 2017, Schedule 6, Table 1 (cross-region averages); (3) the carbon price would need to be \$254.77 for the low harvest value and \$292.20 for the high harvest value.

4.4 The conclusion is that harvest deferral is not rational

The calculation above weighs up the opportunity cost of deferring harvest for six years against the receipt of additional units for the subsequent cycle and concludes that harvest deferral would not be rational. This finding is consistent with the reported results of the survey of current and potential forest growers. Therefore, in the absence of an incentive to change harvest intentions, the portion of the estimated fiscal cost related to extended rotation cycles following a shift to averaging accounting (i.e. 8.3 million units to 2030) can be eliminated.

5. Impacts on surrendered units would be small

This section focuses on the potential impact on units surrendered by foresters from allowing forests registered in the ETS to shift to averaging accounting. This component represents the largest portion of the estimated fiscal cost of this proposal over the period 2021-30, as advised to Cabinet.

5.1 Cabinet was advised of a range

In April 2019, the Ministers for Climate Change and Forestry took a paper to Cabinet entitled: "Introduction of averaging accounting into the New Zealand Emissions Trading Scheme". The Ministers advised Cabinet on the potential reduction in surrendered units in the near term.

- Under "business as usual" accounting, the Crown expects surrenders of 91.9 million units from 2021-2030, but under a transition to averaging this reduces to 78.6 million units because foresters that transition to averaging accounting will have lower unit surrender liabilities at harvest.
- The Crown would therefore receive 13.3 million fewer units than expected from harvest liabilities, and this was estimated to have a fiscal cost of approximately \$332.5 million (undiscounted) across 10 years.

The paper acknowledged that the estimated 13.3 million reduction in units surrendered was a "conservative estimate" and based on assumptions about participant's behaviour. The assumption appears to be that foresters would tend to wait until harvest to elect into averaging accounting. The paper also acknowledged that if foresters shifted to averaging sooner, then the reduction in surrendered units could be as few as 1.9 million units. This lower estimate appears to allow for a near-term transition, such as a short-dated averaging election deadline.

Nevertheless, subsequent advice to Cabinet, in June 2019, focused on the higher estimate of the reduction in surrenders. Table 2 provides an overview of the estimated fiscal impact from 2021-30 that was advised to Cabinet in June 2019 and shows that this higher estimate of the reduction in surrendered units is the substantive component.

Table 2 Summary of estimated fiscal impact, 2021-2030, provided to Cabinet

Component of estimate	Impact in NZUs (millions)	Fiscal impact (\$ million)	Cabinet paper
Transition to averaging accounting	-21.6	-\$540.0	June 2019, p.3
<i>comprising</i>			
extension to rotation cycle	-8.3	-207.5	RIA June 2019, p.41
<i>and</i>			
reduction in surrendered units (high)	-13.3	-332.5	April 2019, p.9
<i>also noting</i>			
reduction in surrendered units (low)	-1.9	-47.5	April 2019, p.9

Note: fiscal impact is on nominal basis, costed using a carbon price of \$25 per unit

Source: Sapere Research Group; collated from Cabinet papers

5.2 Subsequent decision-making means that the lower figure is more relevant

On 25 March 2019, the Cabinet Business Committee agreed that existing ETS forestry participants with post-1989 forests registered in the ETS after 31 December 2018 will have the ability to use the averaging accounting approach (CBC-19-MIN-0008 refers). Forests registered in the ETS in 2019 or 2020, will use stock-change when first registered, and have the option of transitioning to averaging accounting up until 2022.²¹ (ENV-19-MIN-0035 refers).

In effect, Cabinet has set a precedent of a time-limited transition to averaging, for those newly registered forests. It is arguable, therefore, that in the interests of regulatory consistency, that if forests registered in the ETS in 2018 or earlier were given the option of shifting to averaging accounting, the most likely option would be a time-limited period to make a one-way choice to shift to averaging. In any event, Cabinet has control over this feature to ensure that it is only exposed to the lower cost, i.e. it could approve allow for existing ETS foresters to shift to averaging accounting on condition that election must be made by 2022.

Given that Cabinet has made a decision to set that short-dated election deadline for newly-registered forests, it is no longer valid to assume the higher fiscal cost for the reduction in surrendered units for existing forests. Instead, a short-dated election deadline is now the more appropriate assumption, and this dramatically reduces the impact estimated over 2021-30, from 13.3m units (\$332.5 million) to 1.9m units (\$47.5 million).

5.3 Incentives to shift to averaging

Alongside the question of how to design a time-limited transition to averaging, consideration needs to be given to the incentives that foresters face. The incentives to shift to averaging accounting appear to be mixed, with some foresters being unlikely to shift if given the option, whereas others would opt to transition in the near term.

Large corporate forest growers tend to have forests across multiple age bands and this allows them to run their own carbon rotation programme under stock change accounting. Therefore, the current situation would be more beneficial to them than to shift to averaging accounting.

For other forest growers, with forests across fewer age bands, the incentive would, arguably, be to shift to averaging sooner rather than delay to harvest. The incentive arises from a desire for certainty, with respect to the number of units they can hold over the long term, without facing a surrender liability. There could also be an incentive, given the prior sequence of regulatory changes, and the uncertainty that this creates, to take the opportunity to shift to averaging while it is available.

²¹ The participant must notify the Environmental Protection Authority when submitting the Mandatory Emissions Return (MER) which covers the Mandatory Emissions Return Period 2018-2022;

6. Fiscal impact of offset planting

As part of its package of reforms for improving the ETS for forestry, the Government has considered whether post-1989 forest owners should be able to offset their deforestation liability by planting a forest elsewhere. Under the proposed amendments to Climate Change Response Act, offsetting is called “carbon forestry land swap.” This section considers whether the estimation issues discussed above in relation to averaging accounting also arise for estimating the fiscal impact of offsetting.

6.1 The policy option

For the last 6 years, pre-1990 foresters have had the option to offset deforestation emissions by establishing a carbon equivalent forest in another location. MPI explored several variants of a policy option that would extend that option to post-1989 forests (Ministry for Primary Industries, 2019, pp. 90 - 97). The detailed design of the policy will be important to foresters and, potentially, the broader objectives of policy-makers. The potential policy benefits would include:

- freeing up land for more productive, higher value, use and consequently boosting economic growth and employment, especially in rural regions
- stimulating additional planting as foresters deploy their capital more effectively—New Zealand Carbon has advised us that it would commit to very large-scale planting on marginal land if offsetting permitted for post-1989 forests
- aligning domestic rules with how carbon sequestration is measured internationally (Flexible Land Use rules are now recognised internationally); achieving this alignment is a stated objective of the current ETS amendments
- reducing the deforestation emissions risk to the Crown, as the international deforestation liability is higher than the number of NZUs required to be surrendered on deforestation (as the surrender obligation is capped at the number of NZUs received by the foresters)
- providing landowners, including iwi, greater self-determination over the use of their land in the long-term.

6.2 The same fiscal considerations arise

Under current accounting practice for the preparation of the government’s financial statements, the direct fiscal impacts of allowing offsetting for registered forests that use stock change accounting would involve:

- a delay in the surrender of NZUs by foresters that would otherwise occur upon harvesting
- a gradual offsetting against that delayed surrender. This takes the form of the government no longer needing to issue NZUs to the forester during the growth phase of the new forest, until the new forest achieves an equivalent level of carbon sequestration as the harvested forest.

In evaluating the fiscal impact of this change in timing of the surrender and issue of NZUs the same conceptual considerations arise as discussed above.

- A delay in the surrender of NZUs by foresters will not reduce the resources available to the government to provide public services, require additional taxes, nor impact on debt levels, either in the current period or any future period; the entry in the government's financial statements would result from an accounting treatment designed in the context of the Kyoto Protocol obligations and that appears not to have been reviewed with the lapsing of those obligations (see section 2 above).
- The net effect of a well-designed offset policy is that the government would not issue more units, across a full rotation cycle, than it would absent that policy (for the same conceptual reasons as discussed in section 3 above).
- A short-term modelling horizon (say ten years) would be insufficient to capture the full impact of the offset policy from the perspective of the government (for the same conceptual reasons as discussed in section 3 above).

Within any short-term horizon, the modelling result would likely be sensitive to the detail of the policy design, the distribution of the age of existing forests, and the opportunities available to foresters to make more productive use of their land. For the purpose of our analysis, we have assumed that the offsetting settings proposed for averaging will likewise apply to post-1989 offsetting.

6.3 Modelling suggests the unit impact varies over time

We extend our earlier model of unit flows to test the impacts of allowing existing forests, using stock change accounting, to offset deforestation. Appendix C provides more detail on the results. The impacts are estimated both in unit and dollar terms.

We model two business-as-usual scenarios: one where deforestation only occurs with offsetting, and another where deforestation would occur anyway. The first scenario reflects the objective of the offset policy (to facilitate effective land use by removing a barrier to more effective land use). The second scenario checks the impact on the government of the policy change when land owners would have deforested and planted elsewhere in any event. In each case we assume that the existing forest is on its first rotation cycle.

In the offsetting scenario, a new forest is planted elsewhere immediately after the offsetting is approved, which we assume to be right after year 28 of the old forest. Upon offsetting, the:

- unit balance of the old forest at the time of deforestation is transferred to the new forest
- government issues no further units until the new forest has stored the equivalent amount of carbon to the old forest.

The results show that allowing the deforestation of a post-1989 forest to be offset with the planting of a new forest, under stock change accounting, would see the government's net position in units being neutral or positive after 28 years (i.e. when an equivalent level of carbon storage is attained). This result arises because the government avoids issuing units as the new forest grows to maturity, which offsets the forgone receipt of the harvesting or deforestation liability.

The range of the result is dependent on assumptions about the counterfactual, in terms of whether the post-1989 forest would have been deforested or merely harvested (and replanted) in the absence of the offset policy option.

In monetary terms, under the assumption of a carbon price that rises at 2.27% annually, in line with the assumptions used in the RIA,²² the government's position would be positive under either counterfactual scenario. The modelling suggests that, given a rising carbon price, the net position for the government after 28 years could be as high as \$7,900 per hectare (in the case where the counterfactual was deforestation) or \$12,200 per hectare (in the case where harvesting and replanting would otherwise have occurred).

We also model a variation to reflect the fact that planting and replanting delays can be caused by lags in harvesting and planting consents, the timing of receipt of post-harvest cashflows, challenges in securing and preparing land, distribution constraints and constraints on the planting programme (i.e. labour, seasons). We therefore model a delay of 4 years that affects the BAU scenarios and the planting of the offset forest. The results are somewhat more positive for the modelled variation in monetary terms, under the assumption of a rising carbon price, because the gain for the government (i.e. the avoided issue of units) occurs at a later point when the carbon price is higher still.

²² Ministry for Primary Industries (2019). p.115, footnote 102: "The net present value calculation completed by NZIER assumed a carbon price increasing to \$50 by 2050, and a discount rate of 6 percent "

7. Conclusions

7.1 Averaging accounting

Cabinet has decided not to allow existing ETS forests to take advantage of a new accounting method called 'averaging'. Forests that are not currently registered in the ETS will be permitted to use averaging accounting upon registering while new forests will be required to use this method.

The principal reason for the decision by Cabinet not to extend averaging accounting to existing ETS forests was the advice by officials that the policy would "create significant extra financial costs to the Government (and taxpayers)" of \$540m over the period 2021-30. Unfortunately, the analysis presented to Cabinet is fundamentally flawed in four ways.

1. The NZU accounting treatment, which involves recording the issue of an NZU as an expense, and the surrender of an NZU as revenue, is no longer appropriate as it is based on commitments that applied only during the first commitment period of the Kyoto Protocol. The issue and surrender of NZUs no longer have the potential to affect the resources available to the government; no taxpayer will ever be asked to pay more tax if existing ETS forests were permitted to adopt averaging accounting.
2. Even if the above point is set aside, Cabinet was presented with analysis over a 10-year period that does not consider the long-term impacts of the policy. When analysed over a full rotation cycle, a shift to averaging accounting results in a neutral or, potentially positive, net position for the government.
3. Furthermore, the modelled near-term impact presented to Cabinet relied on invalid assumptions.
 - a. Nearly 40% (\$207 million) of the 10-year fiscal estimate presented to Cabinet resulted from an assumption that foresters would extend their rotation cycle under averaging to obtain more NZUs. That assumption is not valid as the deferral of harvest would create a material net cost to foresters, who therefore have no incentive to do so.
 - b. The remaining 60% (\$285 million) of the 10-year fiscal estimate results from officials assuming that foresters would wait until harvest to elect into averaging, if given an option. The government can control this possible response by offering a time-limited transition to averaging, as it has shown with this transition policy being offered for existing forests that are not already registered in the ETS.

We conclude that a more robust assessment would have considered the fiscal impact of permitting existing forests registered in the ETS to shift to averaging accounting over a full rotation cycle, and concluded that the impact would be neutral or, potentially, positive for the government.

7.2 Offset planting

The same conceptual issues would arise in evaluating the fiscal impact of a proposal to allow post-1989 forest owners to offset a deforestation liability by planting a forest elsewhere.

Looking out over a full rotation cycle, after 28 years, the net position for the government would be neutral or positive in unit terms. In monetary terms, the government would be neutral or positive over the long term if the carbon price is fixed and in a net positive position if the carbon prices rise. The modelling suggests that, given a rising carbon price, the net position for the government after a full cycle of 28 years could be as high as \$7,900 per hectare (in the case where the counterfactual was deforestation) or \$12,200 per hectare (in the case where harvesting and replanting would otherwise have occurred).

7.3 Overall conclusion

The accounting treatment underlying the fiscal impact assessments appears to be an uncorrected legacy of the Kyoto obligations as the issue and surrender of NZUs by foresters no longer impact the Crown's net worth in substance. If the accounting treatment is retained, relying on an estimate of fiscal impact at a point-in-time or over a short period does not represent the full picture, as the ongoing impact of a shift to averaging accounting, or permitting offsetting, relative to the counterfactual, does not reach a steady state. These flows largely net out to a neutral position in units issued and surrendered over a full rotation cycle. With a rising carbon price, permitting offsetting would produce a fiscally positive impact over a full rotation cycle under current accounting policies.

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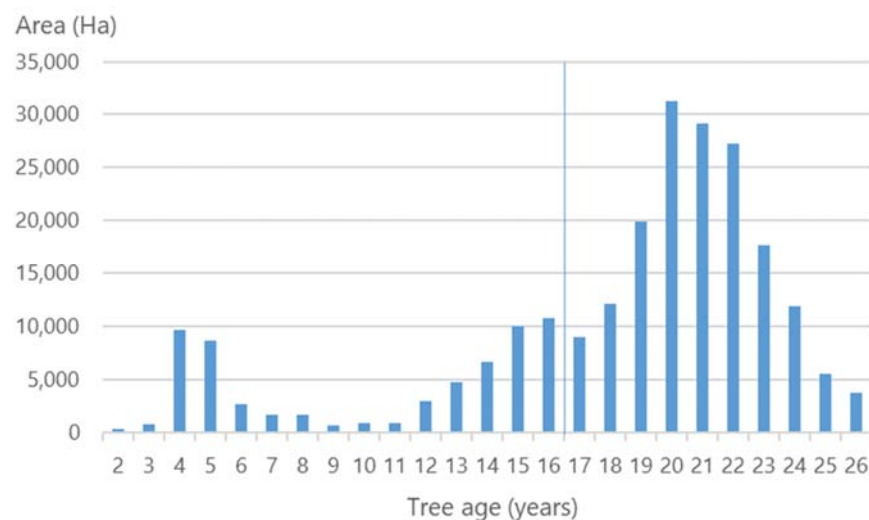
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Appendix A: Distribution of forest ages

Pinus radiata is the dominant species, representing approximately 76% of post-1989 forests in New Zealand by area.²³ The typical age of harvest is 28 years.

Most of the *pinus radiata* forests, in terms of area (in hectares), are towards the latter half of the 28-year rotation cycle in terms. Figure A1 presents data, from 2016, that shows how this stock of forests is skewed in age – towards the time at which they will be harvested. It is clear that the majority of the forests in this snapshot – 73% – would likely be harvested within the next decade.

Figure A1 Distribution of *pinus radiata* by age and area, 2016



Source: Official Information Act request (OIA16-0167) released by MPI to Motu, 2016

²³ Derived from Official Information Act request (OIA16-0167) See <https://motu.nz/our-work/environment-and-resources/emission-mitigation/emissions-trading/emissions-trading-scheme-forecasting-data/>

Appendix B: Modelling unit flows

We developed a model to show how the impact of a shift to averaging accounting can vary, from a government perspective, across the short and long term. Three scenarios are included to show how the impact is also determined by the stage of the rotation cycle at which the forest shifts to averaging.

Method

The model is based on a hectare of pinus radiata forest with a rotation cycle of 28 years.

The first step is to model the annual flow of units allocated by the government to a forester, on a per hectare basis, under the stock change accounting approach. The units represent the accumulated carbon stock per hectare, as derived from the relevant carbon look-up table, using a cross-region average of carbon accumulated at each year of forest age.²⁴ The model assumes that the forest is required to surrender approximately 76% of units at harvest, with the remaining portion of 24% representing the “risk-free” level of units that are without a harvest liability.²⁵ This first step provides the annual flow and accumulated stock of units held by the forester in each year of the cycle.

The second step is to model the flow of units under the averaging accounting approach. The average is derived from the number of units held each year across the rotation cycle under the stock change approach, as modelled above. This step includes the initial flow of units resulting from the shift from stock change to averaging accounting. This transitional flow differs according to the year in the rotation cycle that the shift occurs.

- If the units allocated to the forest are below its long-run average at the time of the shift, the model continues to allocate the annual flow of units, in line with the look-up table, until the average level is reached. The forest remains at that average level of units thereafter.
- If the units allocated to the forest are above its long-run average at the time of the shift, then the model assumes that there is a one-off transition, in which the forester immediately surrenders the number of units so that the long-run average is reached. The forest remains at that average level of units thereafter.

Three scenarios are run, with the shift to averaging occurring at a different point in the rotation cycle in each scenario. In the first scenario, the forest shifts to averaging accounting in Year 12, i.e. when the forest is below the average level of units. In the second and third scenarios, in which the forest shifts to averaging in Year 22 and Year 28, respectively, the forest is above the average level of units.

The third step is to identify the impact, from a government perspective, by comparing the variance in the annual flow of units, between averaging and stock change accounting. These annual variances can be summed to provide a cumulative variance, which is the net position at each year following the shift.

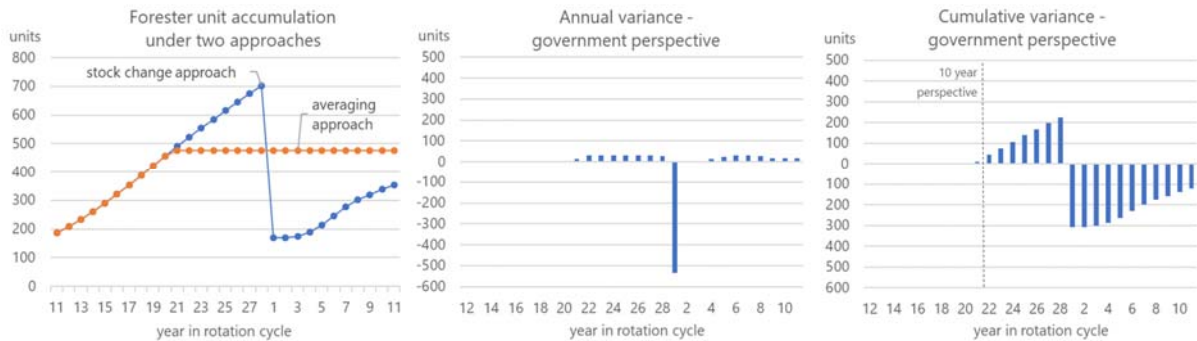
²⁴ Ministry for Primary Industries (2017) *A Guide to Carbon Look-up Tables for Forestry in the Emissions Trading Scheme*, Schedule 6, Table 1, p. 39

²⁵ This post-harvest “floor” is derived from the example in the August 2018 discussion paper (Te Uru Rākau, 2018, Figure 2, p.9) which showed a forest earning 1080 NZUs per hectare that would be required to surrender 820 NZUs at harvest, with 260 NZUs being without a harvest liability.

Results

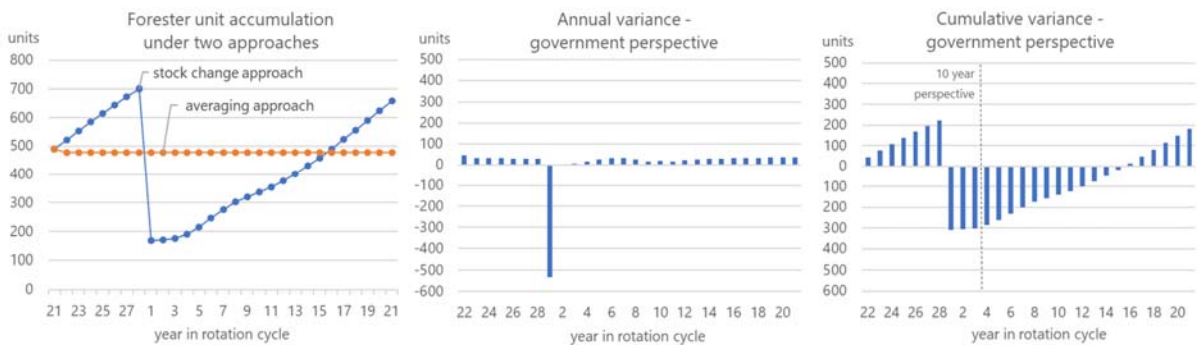
The results are charted in Figures B1 to B3. In each scenario, the first pane compares the accumulation of units, from the forester perspective, under the stock change and averaging accounting approaches. The second pane shows the annual variance in the flow of units from the government perspective, following the shift to averaging accounting. The third pane show the cumulative variance from the government perspective – i.e. the net position at each year following the shift to averaging.

Figure B1: Unit accumulation and variances – modelled shift at Year 12 (scenario 1)



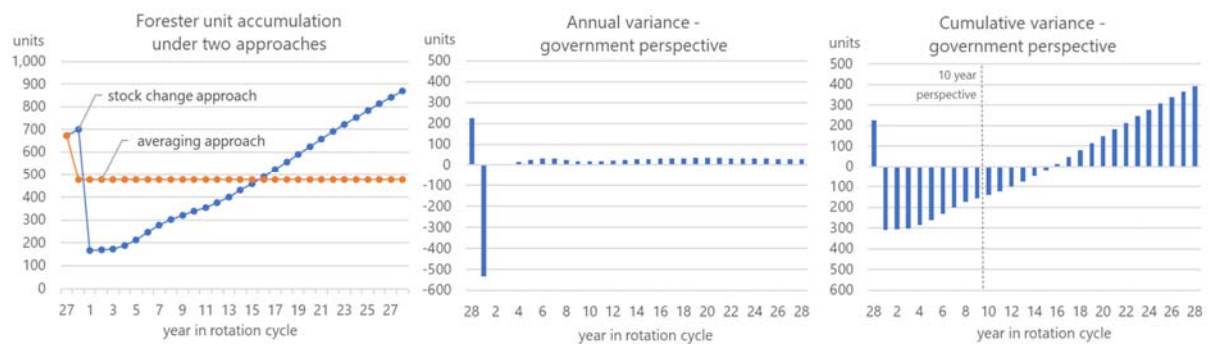
Source: Sapere Research Group

Figure B2: Unit accumulation and variances – modelled shift at Year 22 (scenario 2)



Source: Sapere Research Group

Figure B3: Unit accumulation and variances – modelled shift at Year 28 (scenario 3)



Source: Sapere Research Group

We focus on the net position for the government at two points following the transition to averaging accounting: after 10 years (i.e. the timeframe of the advice to Cabinet) and after 28 years (i.e. allowing for a full rotation cycle) following the shift. Table B1 summarises the results for these timeframes.

- In Scenario 1 (a shift in Year 12), the government is better off after 10 years (+45 units). This is because the allocation of units is initially the same as that under stock change accounting, and then, after the average level of carbon storage has been reached, includes a year in which the government is no longer required to issue units. Conversely, the government is worse off after 28 years (-100 units) because it does not receive a surrender of units at harvest in Year 28 (i.e. approximately 16 years after the shift to averaging accounting).
- In Scenario 2 (a shift in Year 22) the government is worse off after 10 years (-287 units) as it does not receive a surrender of units at harvest. Conversely, the government is better off after 28 years (+214 units) as it is not required to issue units annually, post-harvest, that would be otherwise by allocated to a growing forest under the stock change approach.
- In Scenario 3 (a shift in Year 28), the pattern is similar to Scenario 2, albeit the position is more favourable after 10 years (-139 units) and 28 years (+394 units). This more favourable position is driven by the upfront transition to averaging, as a higher number of units would be surrendered to the government at Year 28 (+225 units) than at Year 22 (+45 units).

Table B3 Shift to averaging – modelled unit impact per hectare from government perspective

Scenario	Impact in units	Transitional flow to averaging	Impact after 10 years	Impact after 28 years (full cycle)
Scenario 1 – shift at Year 12		0	45	-100
Scenario 2 – shift at Year 22		45	-287	214
Scenario 3 – shift at Year 28		225	-139	394

Source: Sapere Research Group

Conclusions

It is clear that a ten-year timeframe is insufficient to capture the full impact of the shift to averaging accounting—from the perspective of the government or the forester. An estimate of fiscal impact at a point-in-time or over a short period does not represent the full picture, as the ongoing impact of a shift to averaging accounting, relative to the counterfactual, does not reach a steady state. These flows largely net out to a neutral position in units issued and surrendered over a full rotation cycle.

A further insight is that, if the timeframe for analysis is only ten years, then the point in the rotation cycle that the forester shifts to averaging matters from the government perspective. If a forest has accumulated units above its average carbon storage, then the government is likely to be worse off, in the short term (i.e. 10 years) and better off in the long term (i.e. 28 years). As most forests registered in the ETS are relatively mature (see Appendix A), and therefore above their long-run average carbon storage, the overall position for the government may be positive when a long-term view is considered.

Appendix C: Modelling forest offsetting

We extend the modelling in Appendix B to allow for the deforestation of a post-1989 forest to be offset with the planting of a new forest, where both forests use stock change accounting. The aim is to show the impact of forest offsetting, from the government perspective, relative to a counterfactual.

Method

The model is based on a hectare of *pinus radiata* forest with a rotation cycle of 28 years. The first step is to model the annual flow of units allocated by the government to a forester under a business-as-usual (BAU) scenario. This represents the counterfactual, or what would have happened in the absence of an offsetting policy being available. The units represent the accumulated carbon stock per hectare, derived from the relevant carbon look-up table, using a cross-region average at each year of age.²⁶ We model two BAU scenarios where the existing forest is on its first rotation.

- BAU scenario 1: in which the forester has no incentive to deforest a registered plantation, in the absence of the offsetting policy. The forester's plantation has reached 28 years, and is harvested (and replanted with a second-rotation forest). The forester incurs a harvesting liability equal to the accumulated carbon stock less the risk-free units.
- BAU scenario 2: in which a registered forest reaches 28 years and is deforested so that the land can be used for another purpose. Alongside this, the forester plants an equivalent area with a new forest. Given deforestation, the forester surrenders a number of units equivalent to the stock of carbon stored in the "old" forest. The government then issues units annually to the new forest equivalent to the additional carbon accumulated. At harvest, the forester surrenders units equivalent to the carbon accumulated, less the risk-free "floor" of units.

The second step is to model the flow of units under an extension of the "offsetting" policy, in which the unit surrender obligation is transferred to an unregistered "new" forest. For this alternate scenario, we assume that: (1) the unit balance of the old forest at the time of deforestation is transferred to this new forest; and (2) that the government issues no additional units until the new forest reaches the surrender obligation of the old forest at 28 years (i.e. the carbon storage is equivalent). We model the scenario where this new offsetting forest is planted immediately after the offset is approved.

The third step is to identify the impact, from the government's perspective, by comparing the variance in the annual flow of units under the BAU and offsetting scenarios. These annual variances can be summed to provide a cumulative variance, which is the net position at each year following the shift.

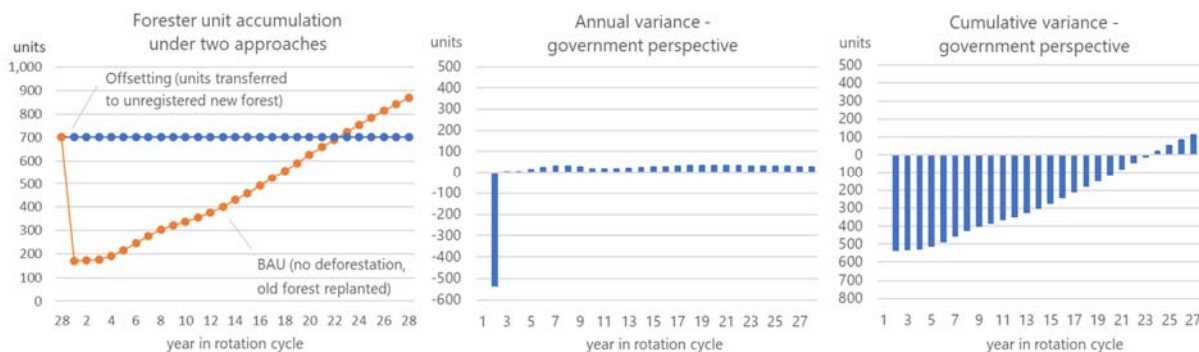
We also model a variation to reflect the fact that planting and replanting delays can be caused by lags in harvesting and planting consents, the timing of receipt of post-harvest cashflows, challenges in securing and preparing land, distribution constraints and constraints on the planting programme (i.e. labour, seasons). We therefore add a delay of 4 years that affects the BAU scenarios and the planting of the offset forest. The analysis period is extended from 28 to 32 years, when the carbon storage of the offset forest will be equivalent to that attained in the old forest.

²⁶ Ministry for Primary Industries (2017) *A Guide to Carbon Look-up Tables for Forestry in the Emissions Trading Scheme*, Schedule 6, Table 1, p. 39

Results

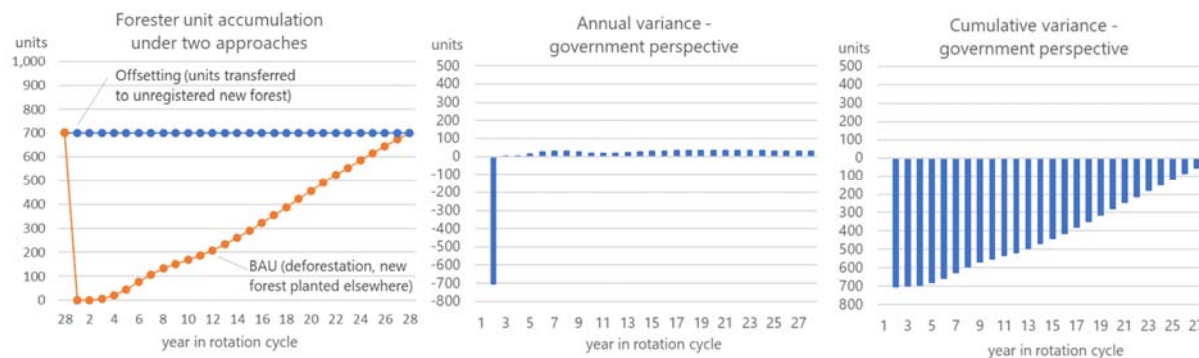
The results for the two main offset scenarios are charted in Figures C1 and C2. Similar to the presentation of the analysis in Appendix B, the first pane compares the accumulation of units from the forester perspective, under the BAU and offsetting scenarios. The second pane shows the annual variance in the flow of units from the government perspective following the shift to offsetting. The third pane shows the cumulative variance from the government perspective – i.e. the net position at each year following the shift to offsetting.

Figure C1: Impact of offsetting – deforestation would not otherwise occur (scenario 1) ²⁷



Source: Sapere Research Group

Figure C2: Impact of offsetting – deforestation would otherwise occur (scenario 2)



Source: Sapere Research Group

We focus on the net position for the government after 28 years. The net position for the government at these points is determined by two factors.

1. An upfront loss, as the forester is not required to surrender the harvest (or deforestation), liability (i.e. a forgone receipt of units)²⁸
2. A benefit from not having to issue units annually to the forester, as the new offset forest grows and matures (i.e. an “avoided issue” effect).

²⁷ i.e. in the year subsequent to that in which the old forest was deforested

²⁸ The harvest liability is equal to the deforestation liability less the risk-free units.

Table C1 summarises the results for these timeframes. With respect to the two offset scenarios, in which the planting of the offset forest occurs straight after the old forest is harvested (or deforested), the government position is either neutral or positive after 28 years (i.e. when an equivalent level of carbon storage is attained). In each scenario the government avoids issuing units as the new forest grows to maturity, which offsets the forgone receipt of the harvesting or deforestation liability.

The following observations are also relevant to these results.

- These two scenarios differ in the values of the unit liabilities that would be surrendered under business as usual. Under BAU scenario 1 (i.e. harvesting and replanting rather than deforestation) the forester is able to retain the “risk free” level of units and so fewer units are required to be surrendered to the government. Under BAU scenario 2 (i.e. deforestation occurs), the forester surrenders the total stock of units.
- The above point means that, in BAU scenario 1, the government’s forgone receipt of units is smaller than in BAU scenario 2. Therefore, as the government avoids issuing units under each scenario until the new offsetting forest reaches 28 years, its position gradually becomes positive in BAU scenario 1.
- If a 10-year time timeframe is used, as was the case in official advice on shifting to averaging accounting, then the government would appear to be worse off. This is because the avoided issue of units over the first 10 years of the new forest would be insufficient to offset the forgone harvest or deforestation liabilities that the government would otherwise have received in the absence of offsetting. As noted earlier in this report, this timeframe is insufficient to capture the long-term impact and is therefore also less appropriate here.
- In the modelled variation, in which the planting of the offset forest occurs 4 years after the old forest is harvested, the government position in units after 32 years, is the same as in the above scenarios. The government is no worse off during the delay in the planting of the offset forest because the counterfactual replanting (or planting) in the BAU scenarios is also assumed to be delayed by 4 years.

Table C1 Shift to offsetting – modelled unit impact per hectare from government perspective

Impact in units/ha	Impact after 28 years (offset forest planted immediately)	Variation: Impact after 32 years (offset forest planted after 4 years)
BAU scenario		
Scenario 1 – no deforestation in the absence of policy	169	169
Scenario 2 – deforestation occurs anyway	0	0

Note: the deforestation of the old forest occurs at 28 years and is offset with a new forest

Source: Sapere Research Group

Monetising the results

Table C2 presents the monetary impacts of the unit-based results in Table C1. These impacts are estimated under assumptions of a fixed carbon price (i.e. \$25) and a carbon price that rises at 2.27% annually, in line with the assumptions used in the RIA.²⁹

Under the assumption of a fixed carbon price, the pattern of the monetised results mirrors that observed in the unit-based results in Table C1. The government position is either neutral or positive at 28 years in two offset scenarios, in which the offset forest is planted straight after the old forest is harvested (or deforested). In the modelled variation, in which the planting of the offset forest is delayed by 4 years, the results are the same as the above scenarios.

The assumption of a rising carbon price amplifies the effects that occur late in the cycle, when the value of units is higher (i.e. the avoided issue of units by the government). The main change from the fixed-price result is that both scenarios are positive. The results are somewhat more positive for the modelled variation, in which the planting of the offset forest is delayed by 4 years, as the gain for the government (i.e. avoided issue of units) occurs at a later point when the carbon price is higher still.

Table C2 Shift to offsetting – modelled \$ impact per hectare from government perspective

Impact in NZD/ha	Impact after 28 years (offset forest planted immediately)		Variation: Impact after 32 years (offset forest planted after 4 years)	
Carbon price – annual growth	0%	2.27%	0%	2.27%
Scenario 1 – no deforestation in the absence of policy	\$4,225	\$12,235	\$4,225	\$14,664
Scenario 2 – deforestation occurs anyway	\$0	\$7,914	\$0	\$10,343

Note: deforestation of forest occurs at 28 years and offset with a new forest

Source: Sapere Research Group

Conclusion

Allowing the deforestation of a post-1989 forest to be offset with the planting of a new forest, under stock change accounting, would see the government’s net position in terms of units being neutral or positive after 28 years (i.e. when an equivalent level of carbon storage is attained). This result arises because the government avoids issuing units as the new forest grows to maturity, which offsets the forgone receipt of the harvesting or deforestation liability. The range of the result is dependent on assumptions about the counterfactual, in terms of whether the post-1989 forest would have been deforested or merely harvested (and replanted) in the absence of the offset policy option.

In monetary terms, under the assumption of a rising carbon price, the government’s position would be positive under either counterfactual scenario. This result holds if the planting of the offset forest, and the replanting (or planting) in the BAU scenarios, are assumed to be delayed by 4 years.

²⁹ Ministry for Primary Industries (2019). p.115, footnote 102: “The net present value calculation completed by NZIER assumed a carbon price increasing to \$50 by 2050, and a discount rate of 6 percent ”

About us

Sapere Research Group is one of the largest expert consulting firms in Australasia, and a leader in the provision of independent economic, forensic accounting and public policy services. We provide independent expert testimony, strategic advisory services, data analytics and other advice to Australasia's private sector corporate clients, major law firms, government agencies, and regulatory bodies.

'Sapere' comes from Latin (to be wise) and the phrase 'sapere aude' (dare to be wise). The phrase is associated with German philosopher Immanuel Kant, who promoted the use of reason as a tool of thought; an approach that underpins all Sapere's practice groups.

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