He Pou a Rangi
Climate Change Commission

NZ ETS Forestry Model

Additional information

May 2024

About this document

This document provides information on the Commission's forestry model and data that has been used to assist analysis in the NZ ETS unit limits and price control settings advice. Additional information discussing the assumptions applied within the model is detailed in the 2024 Technical Annex 1: Unit Limit Settings.

The model has not previously been made available to the public by the Commission due to it containing Ministry for Primary Industries (MPI) data that was originally provided on a confidential basis. This data has now been approved for release based on an OIA request in May 2024.

The model projects allocations and surrenders of forestry NZUs since 2008, subject to user-variable assumptions. Within the Commission's analysis for NZ ETS settings advice it has been used to develop estimates of two key factors:

1. Units held for post-1989 forest harvest liabilities
2. Net forestry emissions outside of the NZ ETS

1. Units currently held for harvest liability

Estimates of the volume of units held for harvest liability are presented on the dashboard tab of the model. This information was used to inform a range of estimates of how many of the current units in the NZ ETS are surplus.

The estimate of units held for harvest is developed using data on the area of forests registered in the NZ ETS by planting year, species, accounting method and carbon yield tables to calculate the theoretical volume of post-1989 forestry allocations and surrenders that have occurred since the scheme was established in 2008.

The model shows estimates of the units theoretically earnt or surrendered in respect of a forest annually, although this often differs to the actual timing of unit allocations or surrenders. This is due to factors including that foresters are only required to submit emissions returns every few years in line with Mandatory Emissions Reporting Periods (MERPs).

Multiple input variables can be changed on the model dashboard to assess the impacts. In analysis of the 2024 NZ ETS settings advice, the key variables were:

- The assumed "low risk" carbon level[1] (minimum low risk units based on a forest portfolio of a single age class; maximum low risk units based on a forest portfolio of all ages; and central low risk units based on 85% of the maximum).
- Rotation length of *Pinus radiata* (28, 29, 30 & 31 years)
- The percentage of forests registered in the NZ ETS planted between 1990-2018 that will be harvested (70%, 80%, 90%).

Data on forests registered in the NZ ETS

Historical forestry unit allocation and surrender estimates are developed using data that contains a breakdown of post-1989 forests registered in the NZ ETS by:

- Hectare
- Species

[1] Low risk carbon refers to the units earned by a forest that are considered low risk to sells as they will likely never have to be surrendered if the forest is replanted.

- Year of planting
- MERP registration period
- Accounting method.

This data was provided by MPI on December 15, 2022. When the data was provided a portion of forests that had applied for registration in the NZ ETS were still in the process of receiving approval. At the time, MPI estimated that approximately 80% of the applications would be accepted.

In October 2023 MPI provided us with updated information on forests registered in the NZ ETS. However, the data provided did not record the original MERP registration period in the same format as before due to changes in MPI's systems, and so was no longer compatible for use in the model. We therefore used the data provided in December 2022, but with an updated assumption that 87% of the forests that were in the process of receiving approval to register would be accepted. We intend to work with MPI to ensure updated data in the required format can be used in the model in future.

The data currently used in the model assumes that all forests registered within MERP 3 (2018-2022) are registered under the stock change accounting methodology[2]. However, forests that registered within MERP 3 also had an option to change to being registered under the averaging accounting methodology and this was taken up by multiple participants. The use of averaging by these forests has not been implemented into the model yet but this will be reviewed in future updates. The assumed use of stock change accounting will not, however, currently impact on the output estimate of units held for harvest as the carbon stored under both accounting methodologies is the same until forests reach their average long term carbon stock (e.g. 16 years for *P. radiata*).

Yield tables

Forestry units earnt and surrendered within the NZ ETS are determined according to forestry yield tables containing information on the carbon stock stored in a forest per hectare. Standard carbon yield tables for forests under 100 hectares are publicly available in regulations for *P. radiata* broken down by region, as well as for Douglas fir, exotic softwoods, exotic hardwoods and indigenous forest. Alternatively, there are participant specific carbon yield tables for forests over 100 hectares that are developed to provide more accurate calculations of carbon stored. This is known as the Field Measurement Approach (FMA).

Yield tables within the model are based on an area-weighted average of the publicly available standard carbon yield tables, and large forests FMA average yield data provided by MPI (November 2023).

2. Future forestry net emissions outside of the NZ ETS

The second key factor that the model has been used for is estimating the volume of net forestry emissions outside of the NZ ETS. This has been used in step 2 of the unit limits methodology, allocating emissions volumes to NZ ETS and non-NZ ETS sectors (also known as setting the NZ ETS emissions cap). For an explanation of step 2, see page 43 of the 2024 NZ ETS settings advice report and pages 3-6 of the 2024 Technical Annex 1: Unit limit settings.

[2] For further information on forestry accounting methodologies refer to MPI website: www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/emissions-returns-and-carbon-units-nzus-for-forestry/accounting-for-carbon-in-the-ets/averaging-accounting.

As part of step 2, we use the forestry model to derive an estimate for the net emissions from forests and forest-related activities not covered by the NZ ETS.[3]

Estimates of net post-1989 forestry emissions outside the NZ ETS are developed by comparing the ENZ model forestry sub-target emissions level (including assumptions around deforestation), with currently registered forests in the NZ ETS.[4] The ENZ forestry data currently in the model is from June 2022. If Aotearoa New Zealand's emissions budgets are updated, the new data from ENZ will be used to reflect actual forestry emissions up to 2024, and the revised future forestry sub-target emissions level.

A challenge for making these estimates is the differences between target accounting and the NZ ETS. Aotearoa New Zealand's emissions reduction targets (emissions budgets, the 2050 target, and the nationally determined contribution for 2021-2030) and the ENZ model use the target accounting methodology for emissions based on guidelines set by the UNFCCC. This differs to how forestry emissions and removals are reported, and forestry units are allocated and surrendered, in the NZ ETS, particularly for forests using the stock change accounting methodology.

Therefore, in the forestry model a series of calculations are used to convert the estimates of NZ ETS forestry allocations and surrenders to an estimate of the equivalent target accounting emissions levels (see the Target accounting calculations tab and data on forests registered in the NZ ETS). This is then used to compare to the total ENZ forestry emissions pathway and make an estimate of the total level of forestry net emissions not covered by the NZ ETS. These emissions are then incorporated into the unit limits step 2 calculation to allocate emissions volumes to NZ ETS and non-NZ ETS sectors.

[3] Further details on ENZ results, methodology and assumptions used to develop emissions pathways under ENZ can be found in the Emissions in New Zealand Model Technical Manual.

[4] Within the model, the ENZ scenario can also be varied to show alternative impacts of comparing against the Current Policy Reference (CPR) scenario.