Updates to the New Zealand Emissions Trading Scheme Market Model

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Ministry for the Environment
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The New Zealand Emissions Trading Scheme Market Model was developed for the review of the New Zealand Emissions Trading Scheme (NZ ETS) in 2022/23. While the review has stopped, the model still plays a key role in analysing the potential market dynamics of the NZ ETS to support policy advice. Combined with other information, the outputs of the NZ ETS Market Model can inform assessments of whether a given combination of unit and price controls are in accordance with emissions budgets. The model also includes functionality to help test the sensitivity of outputs to changes in key assumptions, such as the size and liquidity of the stockpile, the responsiveness of emissions reductions and removals to NZ ETS prices, and the split between NZ ETS and non-ETS sectors.

This document outlines the main updates made to the model since it was published in August 2023. It should be read with the original documentation of the modelling made available in the *Review of the New Zealand Emissions Trading Scheme Summary of modelling*.

A new version of the NZ ETS Market Model is available from the Ministry for the Environment – please contact etsconsultations@mfe.govt.nz. Because the model is a macro-enabled spreadsheet we cannot make it available directly on our website.

Government supply

On the 'Model' tab, the 'current' unit settings option refers to the status quo settings (ie, as set in regulations in 2023) and 'other' refers to the settings proposed by the Climate Change Commission (the Commission). This toggles both the unit settings (auction volumes and cost containment reserve volumes) and the price controls[1] (auction floor price and cost containment reserve trigger prices). The auction volume as calculated under option 2 of step 5 of the unit settings methodology is included in the 'Govt Supply' tab but needs to be manually entered. The model has also been updated to reflect the two-tier cost containment reserve.

Industrial allocation volumes have been updated to reflect the latest estimates from the Commission. They do not reflect any changes to industrial allocation settings following the Climate Change Response (Late Payment Penalties and Industrial Allocation) Amendment Act 2023 as no decisions have been made.

Forestry data

The 2024 March Budget Update (MBU) projections are subject to Budget embargo and were therefore not available for this model update. This means that Ministry for Primary Industries' (MPI) removals and afforestation data has not yet been updated. The latest MPI ETS forestry data is from the 2023 MBU.

When undertaking analysis using the endogenous forestry response functionality ('Manley Model') the low specification is generally preferred. The 'low' specification has performed

[1] Price controls are expressed in 2023 dollars.

reasonably well at explaining recent afforestation rates and produces similar results to MPI afforestation projections. Using a conservative function also partly mitigates some of the concerns over how well the Manley Model performs for prices above historical ranges. In the short term (2024 and 2025) we have made an additional assumption of lower afforestation than would otherwise be implied by prices alone. This judgement is to reflect the impact of recent policy uncertainty on foresters' decisions, as well as the impact of natural events such as Cyclone Gabrielle.

The Government's proposed restrictions on highly productive farmland conversions to exotic forestry from registering in the NZ ETS[2] have not been included as the policy is still being developed and the magnitude of impacts on afforestation rates are therefore currently not clear. Cells B42 and B43 in the 'Model' tab can be used to set a limit on afforestation registered in the NZ ETS. You may need to iterate when doing this and cross check results appearing in the 'Afforestation' tab.

For the purposes of the model, only forestry units deemed 'low risk' are released into the market as a source for offsetting other emissions obligations. The model assumes 'low risk' units are mostly those units generated by forests under average accounting and by permanent forests, as the units generated from these sources are unlikely to be needed by foresters to meet future harvest liabilities. Other units generated by afforestation are assumed to be held by foresters against their future harvest liabilities (as part of the 'other' stockpile) and therefore are only available to the market under certain circumstances – see Stockpile section.

Stockpile

The latest estimates of the 'surplus' and total stockpile of New Zealand Units (NZUs) now refer to the 2023 year. The default starting point is to use the Commission's central estimate. Changing the stockpile estimates in cells B11 and B12 therefore affects the 2023 year.

The behaviour of holders of both 'surplus' and 'other' (non-surplus) stockpile units is a key source of uncertainty for NZ ETS market dynamics.

- The model assumes that surplus stockpile NZUs are drawn down first, and therefore the magnitude of the 'surplus' influences the dynamics.
- The 'other' stockpile can also be made available to meet NZU demand. This key modelling choice is determined by the parameter controlling the transfer of stockpiled units to the 'surplus' (liquid) stockpile (cell B13) and can be varied depending on expectations of how liquid or illiquid the stockpile is. We recommend using different values for this parameter as part of sensitivity analysis; values between 10–30 per cent usually generate plausible results.

NZU demand

Baseline NZU demand

The NZU demand baselines have not been updated because Greenhouse Gas Inventory data and latest Emissions in New Zealand (ENZ) modelling were not available at time of analysis. Baseline NZU demand will be updated for any new information available before final decisions.

[2] Reducing Agricultural Emissions, p7.

We do note however, that the model projects NZU demand of 36.75 million NZUs in 2023 after accounting for price effects ('revised demand' in the model). This is very close to actual net surrenders of 36.56 million NZUs in 2023.[3]

Responsiveness of NZU demand to prices

How responsive gross emissions (and therefore NZU demand) are to ETS prices causes uncertainty. The NZ ETS Market Model features an aggregate NZU demand function, which is derived from the emissions price responsiveness of the Emissions in New Zealand model. The ENZ model is a whole of economy, bottom-up model used by both the Ministry for the Environment and the Commission.

The parameters of the NZU demand function are estimated with 95 per cent confidence intervals. To simulate greater and lesser responsiveness to price, a feature has been added to the model to toggle between using the central estimates of the coefficients and the upper and lower estimates of the coefficients (cell B17). Using this functionality is recommended for conducting sensitivity checks of a central scenario, or for constructing alternative scenarios.

Methodology for estimating total net emissions

The NZ ETS Market Model was not designed to estimate total net emissions; its focus is on net emissions covered by the NZ ETS.

However, the projections from the model can be combined with other information to make a high-level projection of total net emissions. This can help with assessing whether a given combination of unit and price control settings are in accordance with emissions budgets. Two additional sources of information/assumptions are needed:

- **An estimate of emissions outside of the NZ ETS (mostly agriculture).**
  The default in the model is to use the Commission's projections from their settings advice. Note, these data predate the release of the 2024 Greenhouse Gas Inventory and do not include the upward revision to agricultural emissions from the methodological improvements. The implications of this revision can be explored by assuming that the same historical revision (approximately 1.775Mt, on average over 2019–21) also applies to the projections.
- **A conversion of 'low risk' forestry NZUs to total 'target' accounting removals.**
  Not all emissions removals are within the NZ ETS and the accounting treatment for some forestry units differs between the NZ ETS and 'target' accounting used for emissions budgets. This means the NZ ETS Market Model projections of 'low risk' forestry NZUs underestimate removals that contribute towards emissions budgets. To adjust for this, an estimate of total removals is made by scaling up projected NZ ETS 'low risk' forestry units. The scaling factor has been set by comparing MPI's ETS 'low risk' forestry removals projections with total removals projections (which are calculated with consistent information).

Net emissions are calculated as the total demand for NZUs (ie, gross emissions in NZ ETS sectors) plus non-ETS sector emissions less total removals.

[3] ETS Unit Movement Report April 2024.

Note, these point estimates are subject to a high degree of uncertainty. They should be tested in conjunction with sensitivity tests – varying the stockpile liquidity or the price responsiveness parameters are good ways of doing this.

Further updates between consultation and final settings

The NZ ETS Market Model is continually being reviewed and updated for new information as it becomes available. Key updates that will occur before final decisions are made include updates for:

- greenhouse gas inventory data, including understanding implications for base NZU demand projections
- information and insights received as part of the consultation process. This may be most relevant to assessments of the stockpile and its behaviour, and responsiveness of participants to prices. There are also consultation questions about the allocation of emissions budgets between NZ ETS and non-ETS sectors that will provide relevant information
- latest MPI forestry projections.

Analysis for final NZ ETS policy decisions will also be undertaken alongside modelling and analysis informing development the second emissions reduction plan.