

# NZ ETS prices

Don't bank on the bull run  
continuing

February 2022

## Summary

With the passage of the Emissions Trading Reform Amendment Bill through Parliament in 2020, the New Zealand Emissions Trading Scheme (NZ ETS) has moved into a new phase of its life. These changes have raised new questions about how to approach price forecasting for New Zealand Units (NZUs - the unit of trade within the NZ ETS). Many of the strongest price signals that have driven NZU prices in the past, including prices in the Kyoto global marketplace and the fixed price option, have now been removed.

With these strong external price signals gone, this article argues that the volumes of supply and demand within the scheme should now matter more. While we no longer have easy external price signals to guide our views on NZU prices, we do have a clearer idea about where NZU volumes are coming from and going to than we did in the past. It is our forecasts about these volume flows that we should increasingly look to for a view on where NZU prices might go in the future.

While NZU prices have risen nearly continuously for a decade, the analysis in this paper suggests that we shouldn't assume that this bull run will continue. This is because the NZU market would be well-supplied in both the short term and medium term if NZU prices were to remain at their current \$75 price level. The short-term supply comes from the existing stockpile of more than 120 million NZUs in private accounts. The most notable source of medium-term supply is NZUs available from the planting of new exotic forests, which are expected to be economically beneficial in significant volumes at current NZU prices.

The NZU stockpile is bigger than you might think. While many commentators have pointed out that 120 million units could meet roughly three years of non-forestry compliance demand, it will, in reality, last for much longer than this. When we include all the sources of NZU supply entering the scheme over the coming years, the current NZU stockpile could last for more than a decade, as is evident in Figure 1 below. It is this volume of potential supply that should give market participants pause for thought as they consider whether to take NZU prices even further upwards.

The NZU marketplace is small by international standards, and this means that it has lower liquidity levels and participation than overseas markets. This makes it more at risk from market manipulation or the actions of a smaller number of participants. These issues, combined with the very recent policy changes that have been made, mean that there are a lot of drivers at play other than the supply and demand fundamentals.

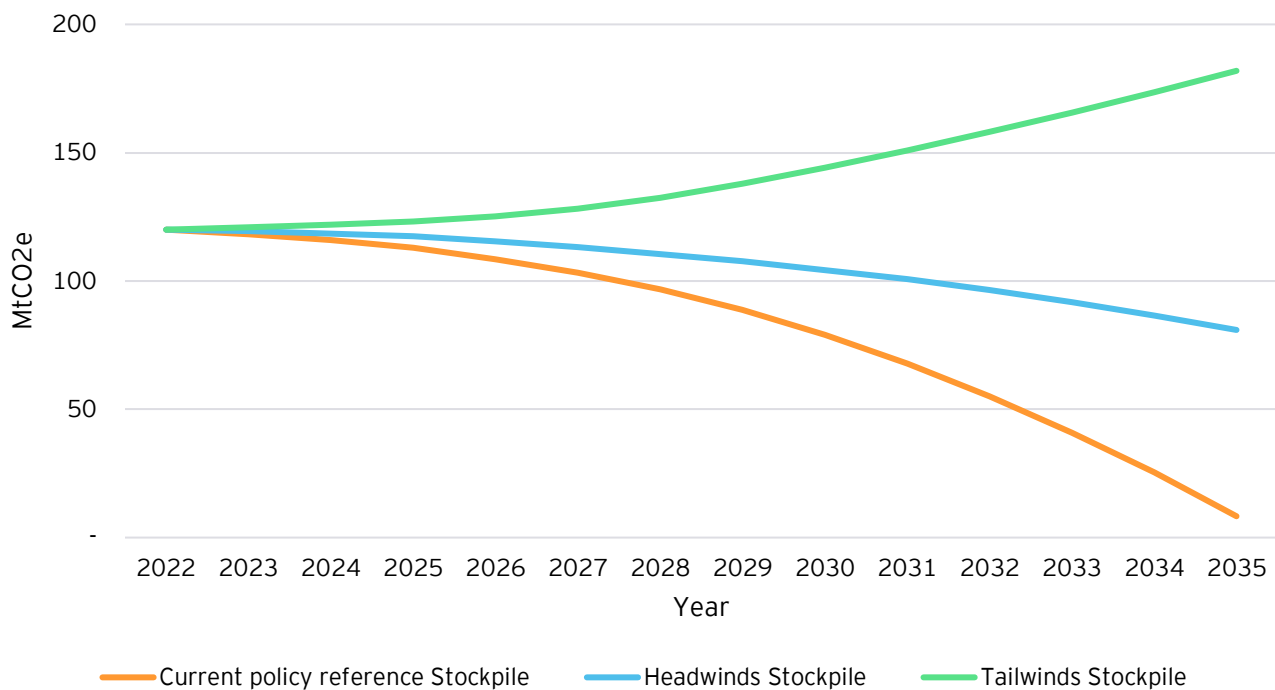


Figure 1 Forecast NZU Stockpile

## NZU price history

Before looking at the potential drivers of the future price of NZUs, it is useful to look backwards at the price drivers we have seen historically in this market. The price history of NZUs has been one of almost constant growth over the last 10 years. NZUs have risen from their all-time low in early 2013, when prices sunk under \$2, to grow to prices above \$75 in January 2022, as seen in Figure 2.

We have broken the NZU pricing history into three periods in which different drivers were in play:

- ▶ **International carbon pricing influence (2008-2015)**  
Over this period, the prices for international units within the Kyoto marketplace were the most influential drivers of the NZU price. This is because NZ ETS participants could use these international units for all/any of their compliance needs. This period only ended when the NZ Government decided to de-link the NZ ETS from these overseas markets.
- ▶ **Fixed price option influence (2015-2020)**  
Once the NZ ETS was de-linked from international markets, demand arising from NZ ETS compliance requirements could only be met by the purchase of NZUs. This change, along with a package of other domestic changes (such as the removal of the one-for-two provision) increased the demand and consequently the price of NZUs. Once prices hit the \$25 fixed price option (FPO), more supply was available, and prices stabilised around this level. The FPO was increased to \$35 for 2020, which was the last year that it was available.
- ▶ **Post NZ ETS reform pricing (2020-present)**  
The passing of the Emissions Trading Reform Amendment Bill in the middle of 2020 signalled the beginning of the most recent phase of NZU pricing. These reforms introduced a cap on emissions within the NZ ETS, planned reductions of this cap to ensure alignment with the government's emission budgets, and an auction platform to align the supply of NZUs with the target. Together, these new features of the NZ ETS are designed to align the supply of NZUs with our emission reduction targets over time.



Figure 2 NZU price history showing the different influence phase

The NZ ETS reforms have put the NZU market and its participants into uncharted territory. This is because the price drivers that market participants have previously used to form their price expectations have been removed. There is currently no access to international units and the fixed price option has been retired. In place of these drivers, commentary on the future of the NZU price has covered a range of different topics. Examples of common NZU price narratives include:

- ▶ **Extrapolation of historical price rises out into the future** - As NZU prices have risen almost continuously for a decade, the historical trend provides a powerful upwards momentum to market participants' price expectations.
- ▶ **A comparison with price movements and levels in carbon markets overseas** - Carbon pricing in several overseas markets has risen strongly over the past couple of years. These markets aren't linked directly to the NZ ETS as international carbon trading isn't currently possible via the NZ ETS. Further, most overseas carbon markets do not include forestry as a unit supply option, unlike the NZ ETS. However, increases in offshore carbon prices have also raised NZU price expectations.
- ▶ **The price settings for the price floor and the Cost Containment Reserve (CCR)** - The price settings within the NZ ETS are currently set to increase. These guide rails provide another reason to forecast an upward trajectory to NZU prices over time.
- ▶ **The emission price trajectories used by the Climate Change Commission (CCC) to model forecasted emissions under different scenarios used increasing prices out to 2050** - While emission prices were not a forecast of the NZU price, they have been used by many people as indicative of the requirements of NZU prices in order to deliver the outcomes recommended by the CCC.

This article hopes to add to these perspectives by analysing the future supply and demand "volume fundamentals" of the NZ ETS.

# Emission modelling work carried out by the CCC

This analysis will draw on the emissions modelling work carried out by the CCC. We, therefore, need to begin by unpacking what the CCC did and didn't do in its analysis. Most critically for our forecasting of future NZU prices, we need to appreciate that the emission prices that were used in CCC modelling were hard-coded inputs of emission prices, not an output forecast of NZU prices.

The release of the CCC's advice in 2021 provided a wealth of granular modelling data relating to the potential future emissions from the NZ economy. The projections, which extend out to 2050, were released with detailed input assumptions and modelled outputs for eight different scenarios (link [here](#)). Given how far forward the modelling was being projected into the future and the substantial uncertainty present over these extended time periods, a range of scenarios is needed to cover the wide range of possible outcomes.

The CCC released its draft advice in early 2021 during a public consultation period. Feedback from submissions, workshops and external reviews was used by the CCC to refine their modelling work. The modelling data that they released alongside their finalised advice, following their refined process, is the data that we have used as the starting point for our analysis within this report.

We have used three of the CCC scenarios in our analysis:

Table 1: Description of CCC scenarios

Scenario	Description
Current Policy Reference	An estimation of NZ's emission profile if we carry on our current trajectory from a behavioural, technology, and policy perspective.
Headwinds	An estimation of NZ's emission profile assuming a conservative improvement in technology and modest behaviour changes relative to the Current policy reference case.
Tailwinds	An estimation of NZ's emission profile assuming an aggressive improvement in technology and large behaviour changes relative to the Current policy reference case.

A full description of the inputs and assumptions used in each scenario is available [here](#).

As is explained in more detail in the following section, the CCC used a range of different emission price assumptions within its modelling. Within the Current Policy Reference, CCC assumed that a fixed emission price of \$35/tCO<sub>2e</sub> (in NZD as of 2020) was applied to both gross and net emissions from the period 2021 to 2035. In both the Headwinds and Tailwinds scenarios, the emission price assumption for gross emissions was \$35/tCO<sub>2e</sub> in 2021, increasing to \$160/tCO<sub>2e</sub> in 2035. There were very similar afforestation assumptions across all three scenarios.

The emission price assumptions used were simply inputs to the model, and do not reflect a forecasted emission/NZU price-output from the model. The focus of the analysis in this paper is therefore how we can use the CCC's modelling of emission volumes to understand what future pressures might exist for the NZU price.

## CCC Carbon Price Parameters

- ▶ Emission price assumptions were external inputs to the CCC modelling - not an NZU price forecast output
- ▶ The emission price applied to their policy reference scenario was \$35/tCO<sub>2e</sub> out to 2035
- ▶ The emission price applied to their Headwinds and Tailwinds scenarios increased from \$35/tCO<sub>2e</sub> in 2021 to \$160/tCO<sub>2e</sub> in 2035

## Supply and demand analysis

Our analysis of the supply and demand volume fundamentals of the NZ ETS will be split into two sections:

- Forecast of national demand for abatement** - This section will analyse the difference between the emission budgets recommended by the CCC and forecasted emissions in different scenarios.
- Forecast of the supply and demand of NZUs** - This section will analyse the future supply and demand balance for the NZ ETS and relate this to the scale of the existing NZU stockpile.

The national demand for abatement is likely to be governed by the difference between the emission budgets (Supply) and the forecasted emissions (Demand).

## National demand - Forecast emissions

Figure 3 below shows the gross and net emissions forecasted in the three CCC scenarios included in our analysis.

The forecasted gross emissions all decrease over time, with the Tailwinds and Headwinds scenarios dropping faster than the Current Policy Reference scenario. The more dramatic decreases in the Tailwinds and Headwinds scenarios are due to both scenarios including the impact of a much higher emission price signal, as well as a wide range of non-price abatement policy measures and further behavioural changes.

Some examples of differences between the scenarios include:

- ▶ In the Tailwinds and Headwinds scenarios, the energy efficiency of light passenger vehicles in 2035 is assumed to be 32% better than in 2019. In the Current Policy Reference scenario, this improvement is only 20%.
- ▶ The total number of household passenger kilometres by 2035 is expected to be 67.6 billion in the Current Policy Reference case, but only 63.9 billion in the Headwinds scenario and 60.3 billion in the Tailwinds scenario.
- ▶ In the Current Policy Reference scenario, the average number of dairy cows per hectare by 2035 is expected to show a 7.9% reduction on a 2019 baseline. This reduction is 8.9% in the Headwinds scenario and 15% in the Tailwinds scenario.

In all cases, the net emissions are lower than the gross emissions due to the impact of afforestation, which acts to lower overall emissions. The volume of afforestation is very similar in all three scenarios, meaning that the offset between gross and net emissions is also nearly the same in all three scenarios.

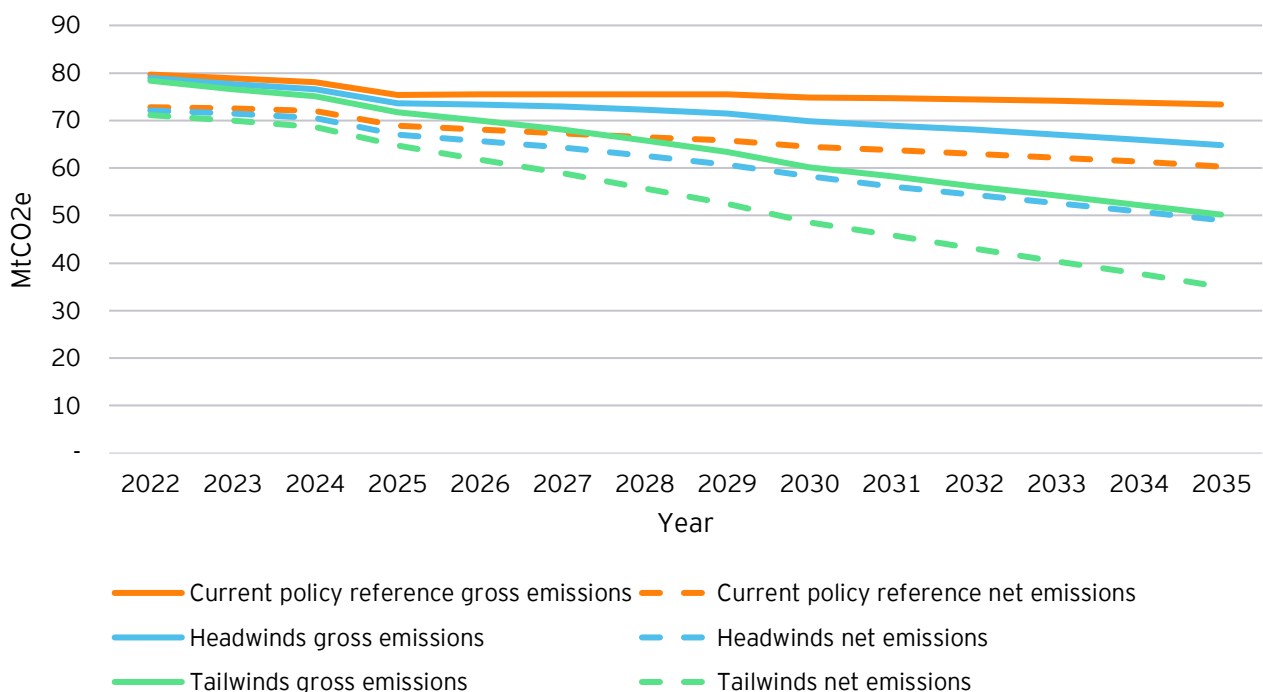


Figure 3: CCC forecast gross emissions against net emission by year

The CCC has forecasted forestry emissions for the Current Policy Reference scenario by working with the forestry modellers at the Ministry for Primary Industries and assuming that an emission price of \$35/tCO<sub>2e</sub> is available to incentivise new forest planting. As can be seen in Table 2 below, this emission price incentive was modelled as generating a planting rate for exotic forests of 26,804 hectares per year over the period from 2021 to 2035.

Table 2: Selected scenario input assumptions for forestry modelling

Scenario	Emission price assumption for gross emissions	Emission price assumption for exotic forestry removals	Rates of exotic afforestation
Current Policy reference	\$35 from 2021 to 2050	\$35 from 2021 to 2050	26,804 hectares per year from 2021 to 2035
Headwinds	\$35 in 2021 to \$160 in 2035	No explicit emission price assumption	28,020 hectares per year from 2021 to 2035
Tailwinds			24,937 hectares per year from 2021 to 2035

The approach taken to model the rates of exotic afforestation in the Headwinds and Tailwinds scenarios did not use an explicit emission price assumption for exotic forestry removals. However, Table 2 shows that the rates of exotic afforestation assumed in both the Headwinds and Tailwinds scenarios remain very similar to the Current Policy Reference scenario with its \$35/tCO<sub>2e</sub> price assumption.

The afforestation rates that the CCC modelled are therefore not the same as what we might expect from the NZ ETS under its current design. If the current settings of the NZ ETS were retained and NZU prices remained at or above their current levels of \$75 (as at the time of writing), we would expect a greater area of land conversion to forestry than was modelled by the CCC.

## National Supply - Emission budget

In this section, we have converted the emission budgets recommended by the CCC into an annualised “emission budget trajectory”. Emission budgets will be set by the New Zealand government and represent our domestic emission goals under the Climate Change Response Act.

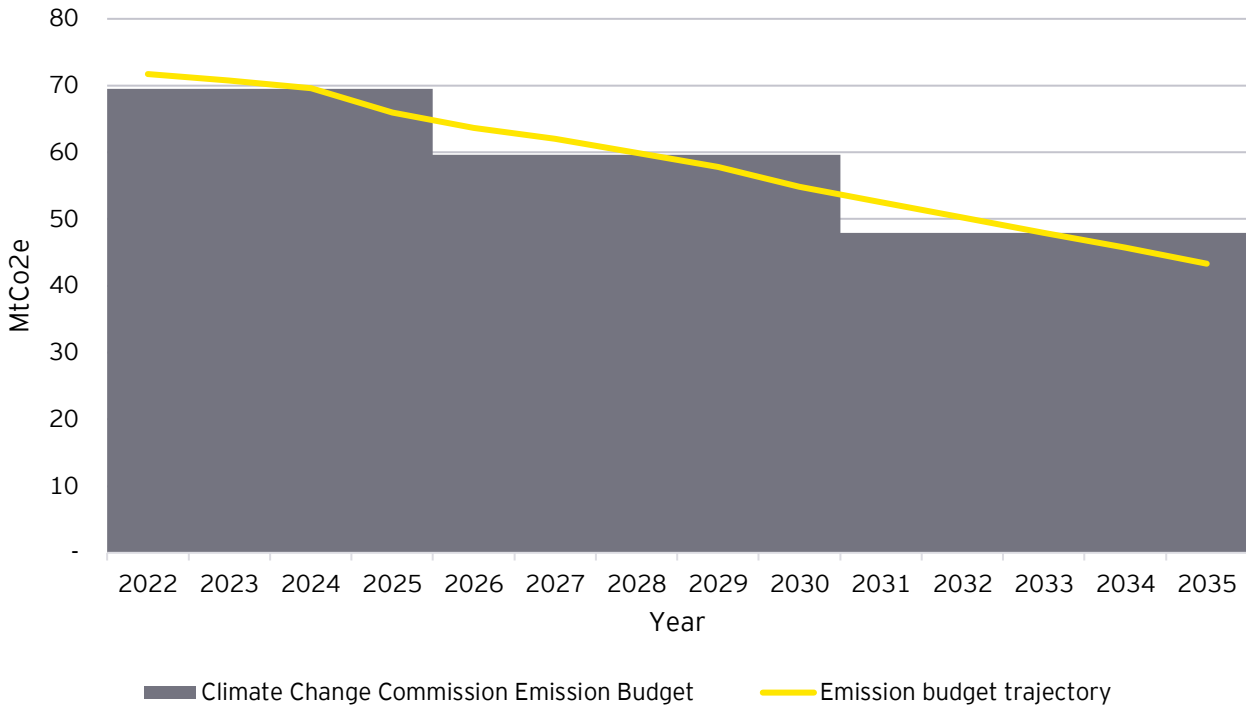


Figure 4: CCC emission budget against emission budget trajectory

## Bringing it together - Supply and demand

Comparing the forecasted net emissions for the three scenarios against the emission budget trajectory shows that demand for abatement is highest under the Current Policy Reference scenario, as can be seen in Figure 5.

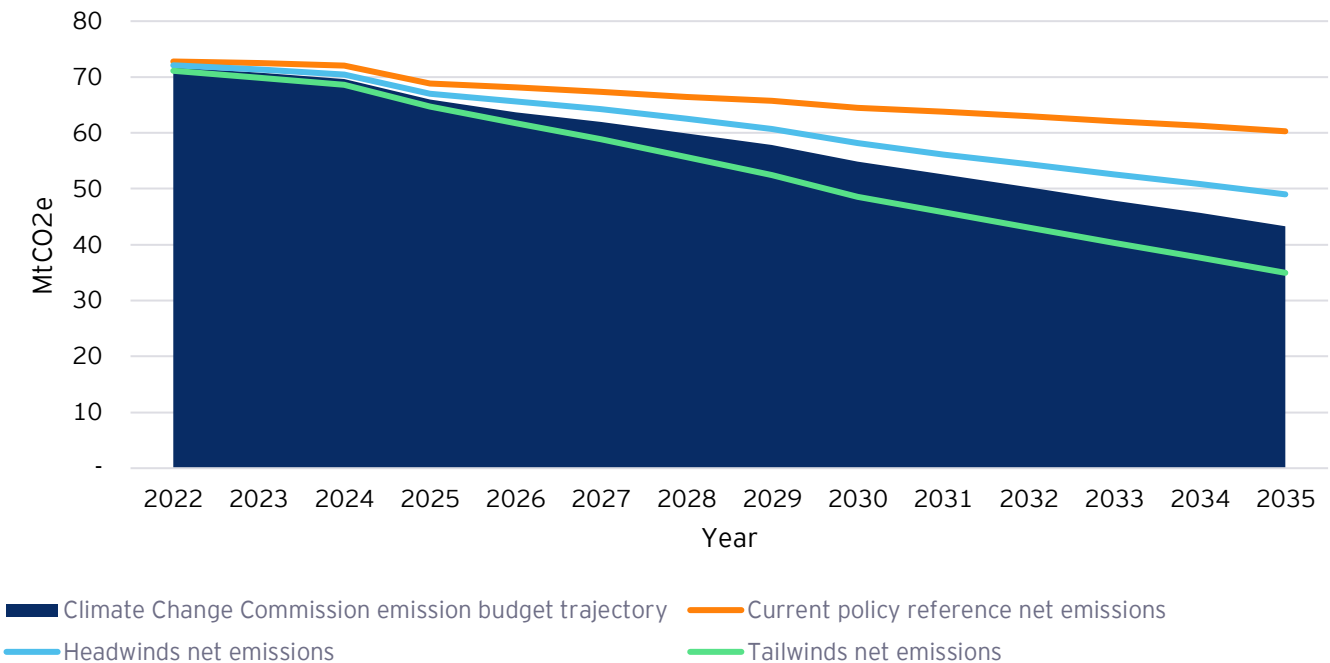


Figure 5: National annual demand for abatement

The difference between supply (the emission budget trajectory) and demand (forecasted net emissions) can be described as the “annual abatement gap”, shown in Figure 6 below. Under the Current Policy Reference scenario, the annual abatement gap is mostly positive and steadily increases over time. The abatement gap for the Headwinds scenario is reasonably evenly balanced across the period from 2021 to 2035, but under the Tailwinds scenario, there is a continuous annual surplus of abatement demand.

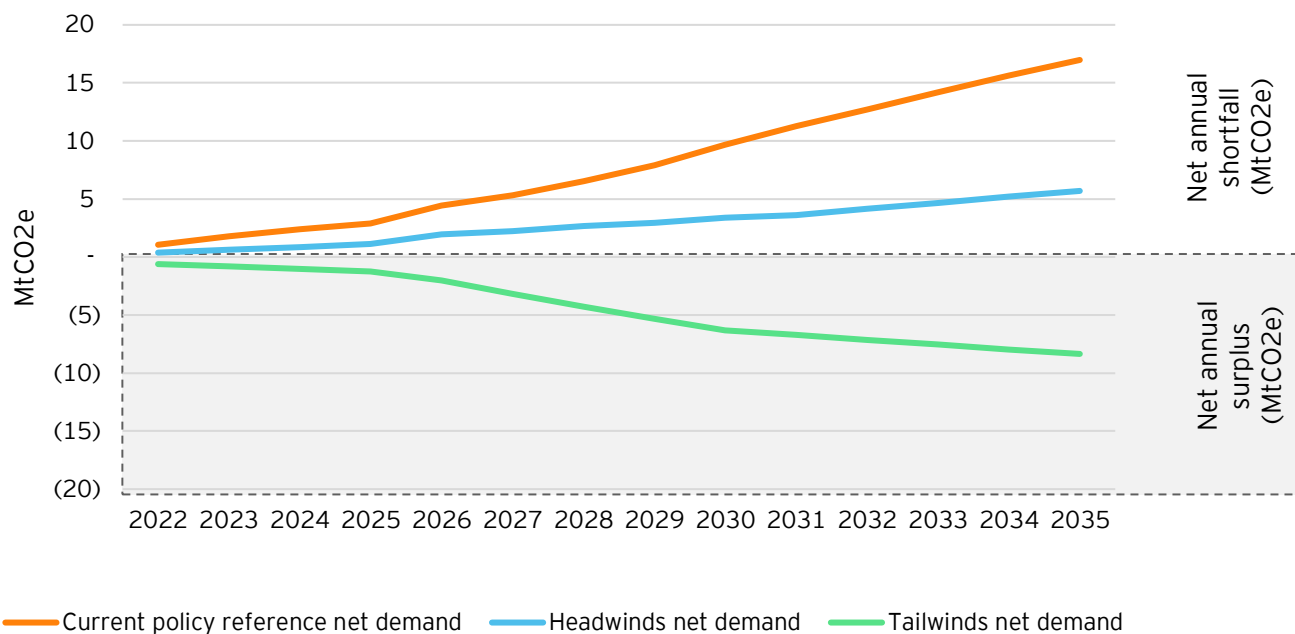


Figure 6: National annual demand for abatement



## Forecast of the supply and demand of NZUs

Now that we have built up a forecast of the national net annual demand, we can use this information to make forecasts about supply and demand forces within the NZ ETS.

It is critical to understand that the role of the NZ ETS is to balance the overall national supply and demand position. This means that any shortfall or surplus at a national level is likely to materialise as a surplus or shortfall within the NZ ETS.

In addition to the net annual national demand for abatement, we need to consider the volume of NZUs that are already available within private accounts in the NZ ETS Register. These NZUs are normally referred to as the “NZU stockpile”. The most recent figures (September 2021) from the New Zealand Environmental Protection Agency (EPA) indicate that there are 151 million NZUs in the stockpile. This figure is subject to a cyclical annual pattern, based on the compliance calendar. Accordingly, approximately 40 million of these NZUs will need to be surrendered to meet compliance obligations in May 2022 for the non-forestry sectors covered by the NZ ETS.

Because it is difficult to accurately assess the total available stockpile volume, our analysis will assume that the NZU stockpile is currently approximately 120 million units. This figure allows for expansion to the NZU stockpile from additional forestry supply over the period since September 2021, as well as the May 2022 compliance demand.

Figure 7 below combines the annual national net demand results (shown previously in Figure 6) with the estimated NZU stockpile of 120 million units. The chart shows the cumulative impact of net demand on the NZU stockpile over the period from 2022 to 2035. The outcomes in each scenario are:

- ▶ In the Current Policy Reference scenario, the NZU stockpile drops consistently over the analysis period, with 8.3 million units still available in 2035.
- ▶ In the Headwinds scenario, the stockpile initially remains stable and then starts to decline after 2029, with 81 million units still available in 2035.
- ▶ In the Tailwinds scenario, the stockpile continues to grow over the period from 2021 to 2035, as there is an annual net surplus of NZUs available within the NZ ETS.

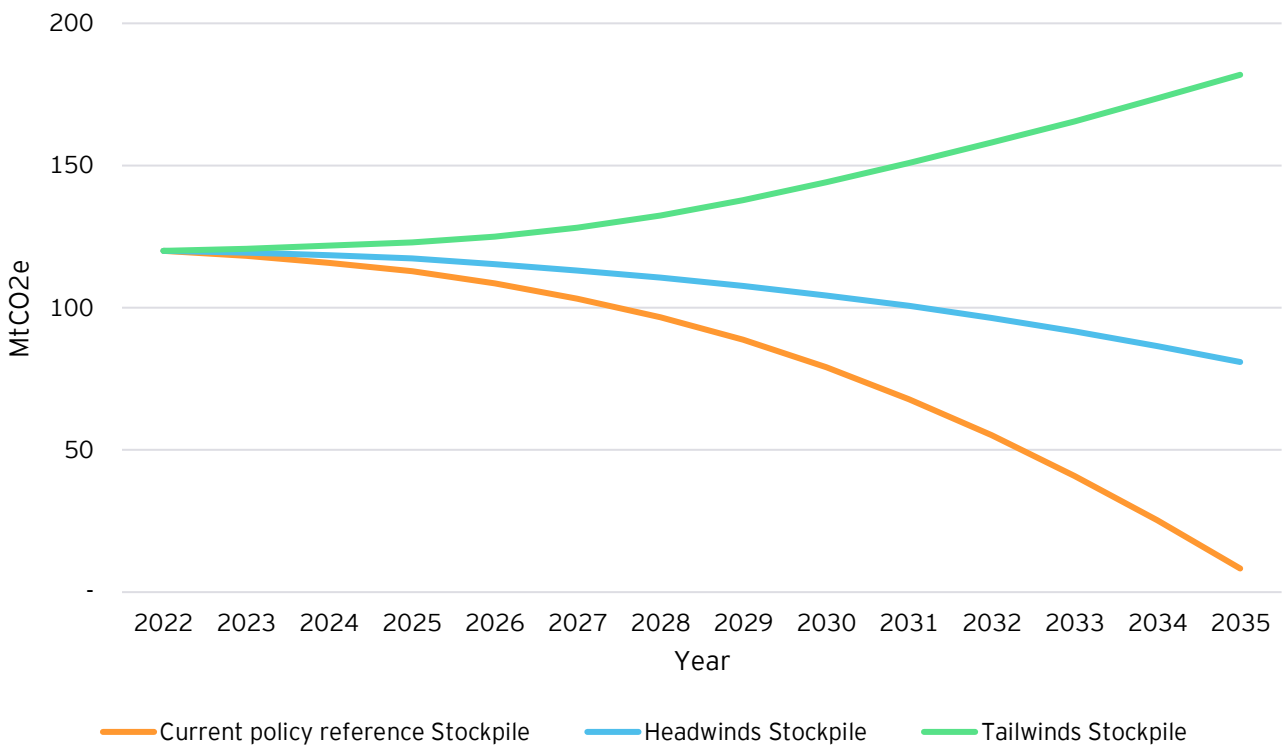


Figure 7: Forecast NZU stockpile

The growth in the stockpile under the Tailwinds scenario is driven by the impact of a much higher emission price signal, along with a wide range of non-price abatement policy measures and some behavioural changes which would reduce emissions and thus the need for NZUs.

## The NZU stockpile and forestry demand

Any analysis of the NZU stockpile needs to take into consideration the future harvest liabilities of some forestry participants. Foresters that opt into the NZ ETS have historically received units as their forests grow but need to return many of these units if and when they choose to harvest their trees. This means that some of the volume within the NZ ETS stockpile is stored for use against this future liability and probably isn't available for sale.

Assessing how to make this adjustment is complex because a detailed dataset of the forests within the NZ ETS and information about their plans for future harvest isn't available to analyse. Consideration of this issue also needs to take into account that if the owners of these forests decided not to harvest their forests for lumber, but instead were happy to keep them growing just for the NZ ETS benefits, more units would be freed up for sale. It is therefore too narrow a statement to say that these harvest volumes aren't available for sale under any circumstances.

Some indication of the scale of forestry units that may be held for future liabilities can be gained from looking at information about the stockpile that is published regularly by the NZ EPA. The EPA quantifies how many Post-89 and Permanent Forest Sink Initiative (PFSI) units are held by different types of account holders. For example, as of 31 September 2021, 65 million forestry units are held in forestry accounts.

If we withheld these 65 million forestry units for sale from the stockpile, which would consist of 54% of current stockpile reserves, stockpile reserves would only be exhausted under the Current Policy Reference scenario in 2032, while reserves under both the Headwinds and Tailwinds scenarios would remain in surplus. This illustrates the large scale of the NZU stockpile, whereby less than half of the currently stockpiled units would be sufficient to fill the abatement gap across all scenarios for more than a decade.

## The NZU stockpile and additional forestry supply

As highlighted earlier in this article, higher levels of forestry NZU supply could arrive within the NZ ETS than suggested by the CCC modelling. This is because the CCC modelling didn't give more than a \$35/tCO<sub>2</sub>e incentive to exotic forestry planting. With NZU prices trading above \$75 at the time of writing, this price incentive is already more than double the levels assumed by the CCC in their emissions modelling.

To illustrate the materiality of a \$75/tCO<sub>2</sub>e price incentive on changing land use in NZ, we can turn to the marginal abatement cost curve (MACC) analysis carried out by the Ministry for the Environment. This work was published in January 2020 and is available [here](#). We have reproduced one of the MACCs from this work that focuses on the abatement volumes available from land-use change - see Figure 8 below.

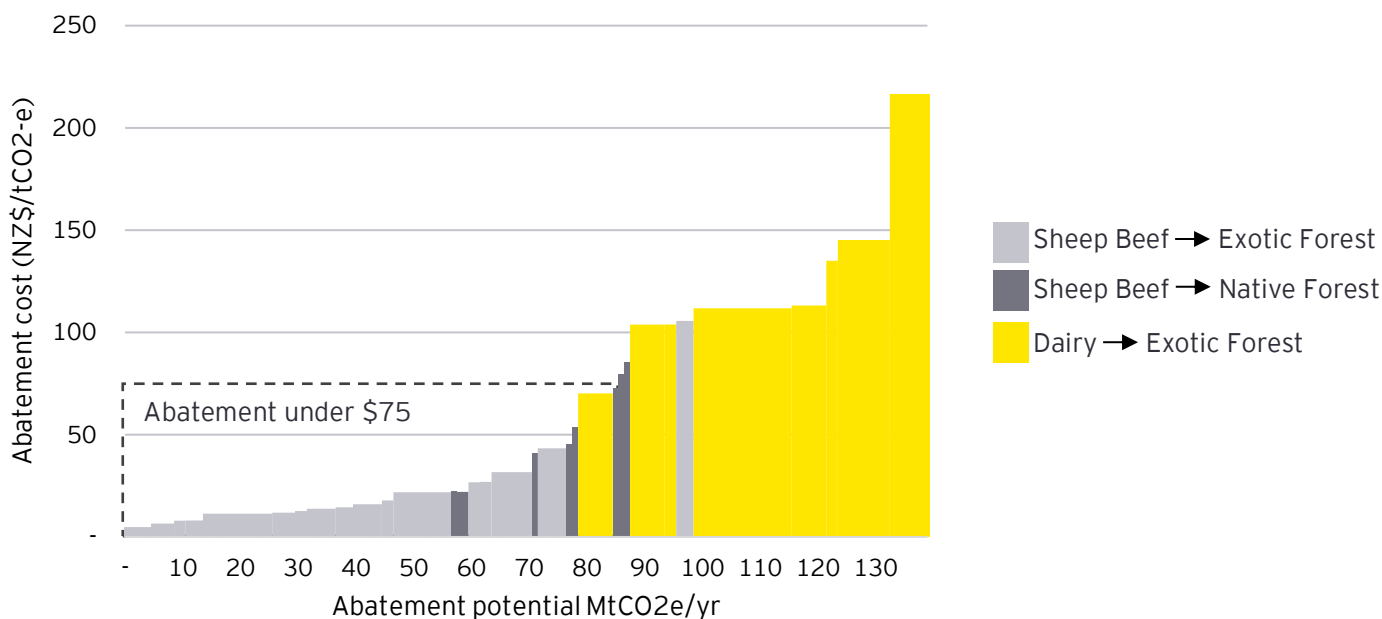


Figure 8: Marginal abatement cost curve for land-use change (MfE analysis)

Figure 8 illustrates that an NZU price of \$75 is likely to be a strong driver of additional afforestation, particularly from the conversion of land currently used for sheep and beef farming. While this MACC analysis from the Ministry for the Environment helps to give some perspective of the scale of abatement that could be possible through new forest planting, the precise impact on NZU supply volumes is more complicated to analyse. This MACC analysis is carried out from a national economic perspective, as opposed to the perspective of a private sector participant. The realisable volume of abatement may be substantially below the technical potential shown in the MACCs.

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## The NZU stockpile and auction volume choices

While the Government is reducing auction volumes to try to bring the stockpile volume down, the Cost Containment Reserve (CCR) sales have so far disrupted these plans.

The auction volumes that were originally set by the Government over the 2021 to 2025 period were reduced by 5.4 million NZUs each year. This auction volume reduction had the objective of reducing the NZU stockpile volume in a stable, long-term manner. However, in 2021, all 7 million NZUs in the CCR were sold due to auction prices rising above \$50, which was the CCR trigger price level. The overall impact of these two counteracting drivers was that 1.6 million additional NZUs were sold than would have been if aligned with the underlying emission budget target.

There is uncertainty about how the interplay between actions to reduce the auction volume and the CCR will impact the NZU stockpile volume going forward. Our analysis does not attempt to build scenarios for different outcomes in this area, but if NZU prices remain above the trigger price for 2022 (\$70), then a similar volume-outcome to what was experienced in 2021 may be expected.

The NZU marketplace is small by international standards and this means that it has lower liquidity levels and participation than overseas markets. This makes it at higher risk of market manipulation, or the actions of a smaller number of participants having a significant effect on the market. These issues, combined with the very recent policy changes, mean that there are a lot of drivers outside of supply and demand fundamentals that may have an effect.

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## Conclusion - what might this analysis mean for NZU prices?

The quantitative analysis in this report has focussed on the outlook for supply and demand fundamentals within the NZ ETS over the period from 2021 to 2035. This report has analysed what these fundamentals might look like for the scheme as it is currently designed and operating, without considering scenarios where substantial changes are made to its design or operation. Our analysis does not attempt to build in assumptions of the impacts of any speculative demand within the system. However, these impacts could be overlaid on our analysis if this perspective was sought. The most influential speculative activity in the NZU market is the choices to be made by those parties already holding NZUs in private accounts, who do not have a compliance obligation to meet in the future.

The analysis set out in this report suggests that, as the NZ ETS is currently designed, NZU prices may not need to rise higher than their current levels for supply to meet demand in the coming years. There are three main reasons for this:

1. **There is already a substantial stockpile of NZUs available in private accounts.** If these were hypothetically the only NZUs that were available to the market because all other sources of supply stopped, then the stockpile could meet about three years' worth of compliance demand.
2. **When we take into account the likely future sources of supply, the NZU stockpile could last for more than a decade.** If we use the CCC's recommended emission budgets and factor in all the sources of supply that are likely to be available under the current NZ ETS settings (at an NZU price of \$35 or above), the NZU stockpile would not be exhausted until well after 2030.
3. **We are unlikely to need NZU prices higher than current levels to incentivise sufficient volumes of exotic forest planting.** NZU prices at their current levels are likely to be a sufficient incentive to drive higher volumes of new exotic forests, which could contribute to a further expansion of the NZU stockpile.

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## Contact us

For a confidential discussion on how we can help you, please contact:



**Pip Best**  
EY Oceania Partner  
Climate Change and Sustainability Services  
[pip.best@nz.ey.com](mailto:pip.best@nz.ey.com)



**Matthew Cowie**  
EY New Zealand Associate Director  
Climate Change and Sustainability Services  
[matthew.cowie@nz.ey.com](mailto:matthew.cowie@nz.ey.com)

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