Ministry for the Environment
Manatū Mō Te Taiao

Modelling for ETS Review

27th July 2023

This webinar will begin at 3pm

Webinar Components

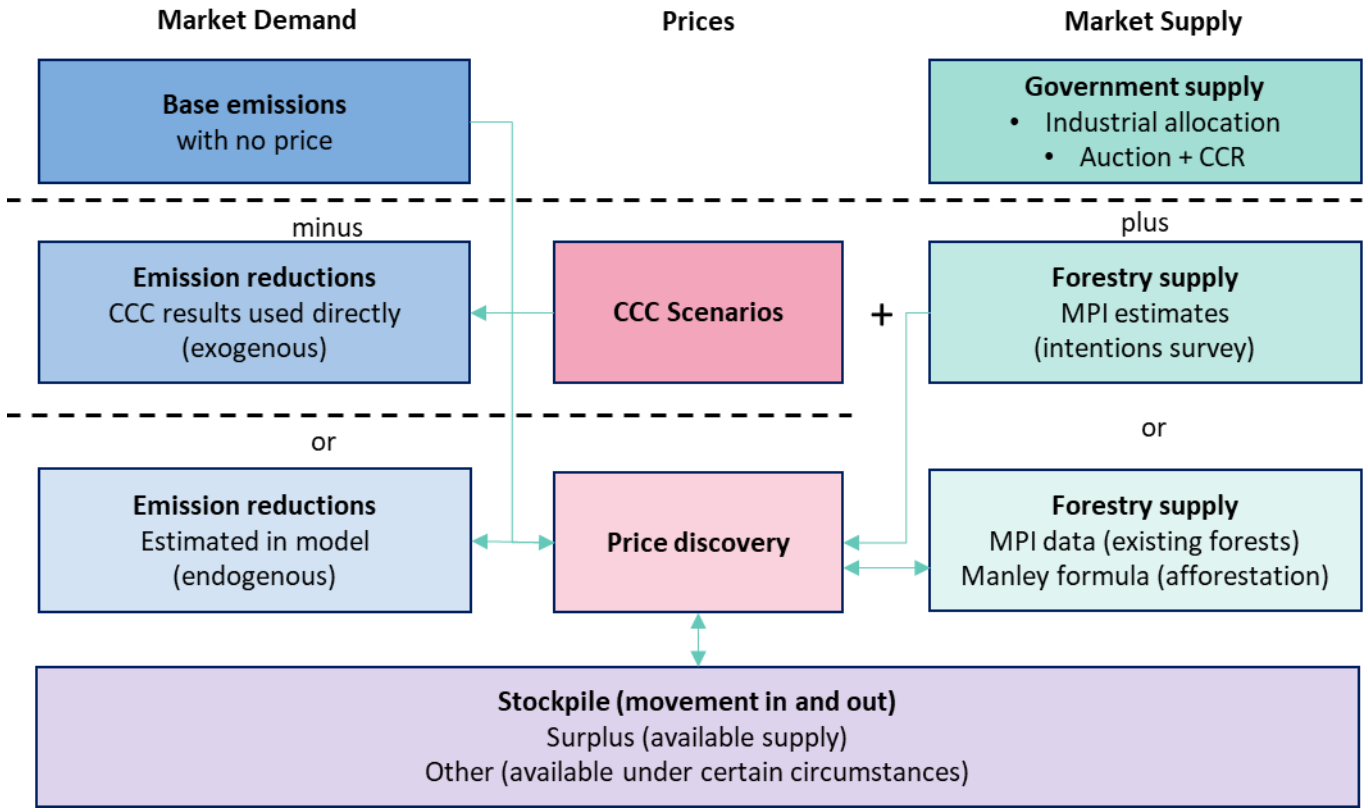
- Background – why are we doing the modelling
- Modelling approach
- Results
- Conclusions & Next steps

Background

- Market modelling is required to understand the implications of different ETS reform options. The modelling is not the reason for the work.
  - The first Emission Reduction Plan (ERP1) noted as a key action: "*Adjust the NZ ETS to drive an appropriate balance of gross and net emissions reductions*"; and
  - the Climate Change Commission has recommended for ERP2 "*an amended NZ ETS that separates the incentives for gross emissions reductions from those applying to forestry*"
- The balance between reductions and removals (gross/net) is also being addressed in the 2nd ERP, including via cost modelling
- Analysis is required to estimate the impacts of different settings on market supply, demand and price, including the contributions of reductions and forestry removals
- The options have not been fully specified currently so the analysis is limited to the implications of the current settings

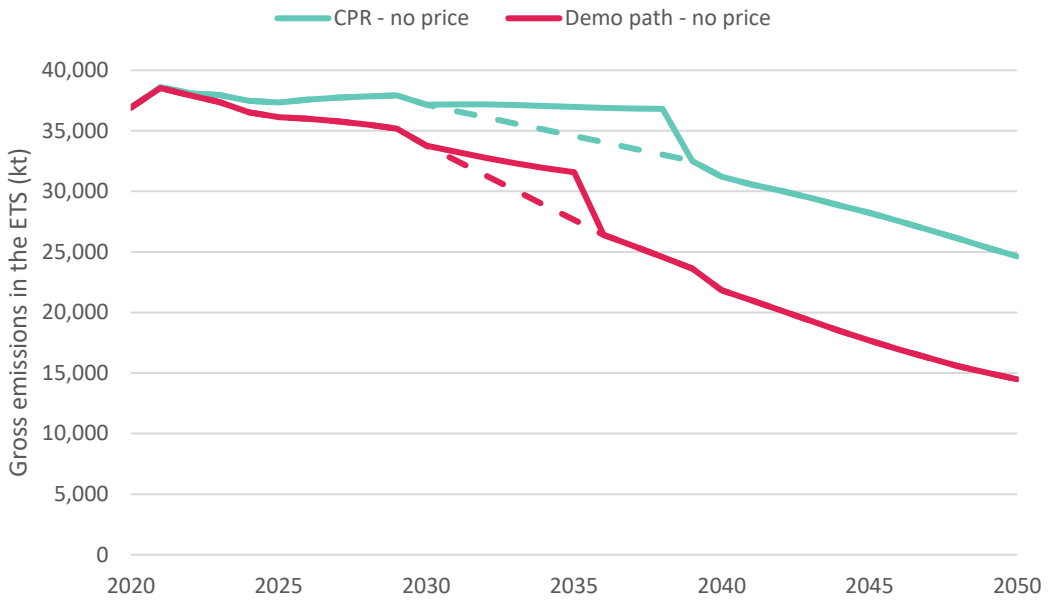
Modelling approach

- Modelling uses either (or both)
  - external assumptions or
  - it calculates reductions, removals and price
- Demand
  - baseline emissions with no price
  - reduced emissions in response to price
- Supply
  - Government supply (auction etc)
  - Forestry removals
- Stockpile can be source of demand and supply



Base Case Demand is Falling

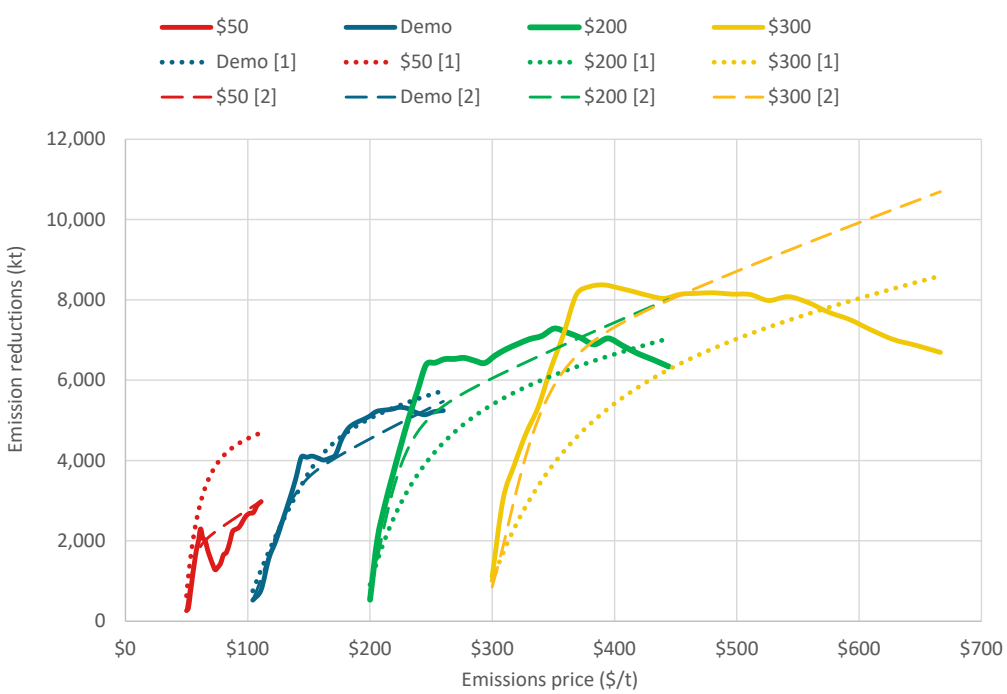
- The base case demand is defined as the NZU surrender requirement of gross emitters
- The Commission provides price paths based on a zero price from 2023
- A demonstration path variant (with zero price) is used as the gross emissions base case – it includes additional non-price policies

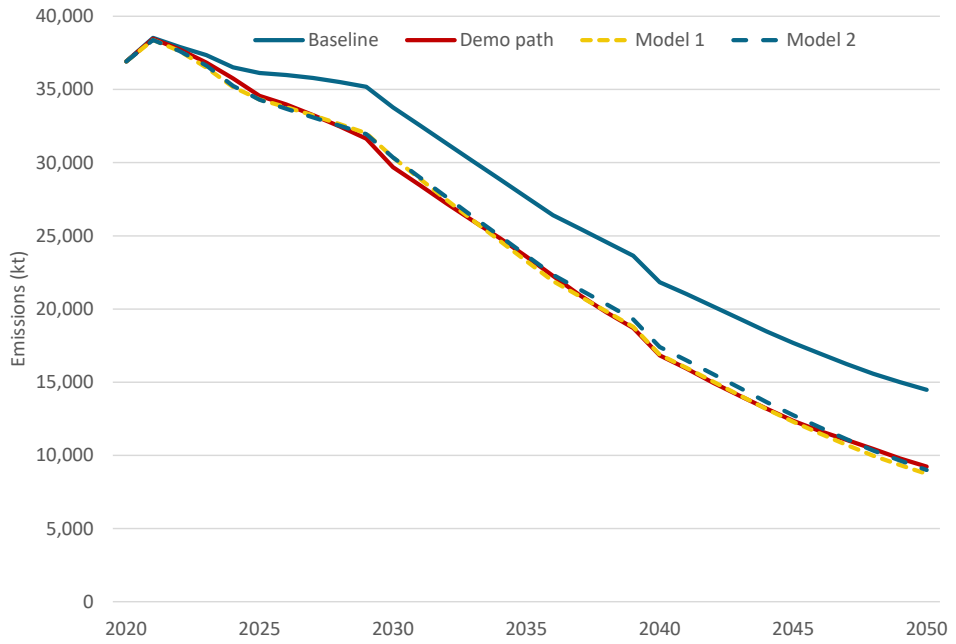


- Demand is forecast to fall because of EVs, renewable energy etc
- All other things equal – price would be expected to fall also

Demand reductions

- External: using the Commission's price path results (eg demonstration path increasing to $260 in 2050 in 2019$) – *red line in bottom figure*
- Calculated (endogenous):
  - model estimated to simulate the Commission's results at different prices – *see top chart*
  - A statistically significant relationship developed based on price and emission reductions to date
  - Bottom chart shows how the models reproduce the demonstration path results well
- Note: this is still developing a model to reproduce the results of a model rather than estimating observed price responses





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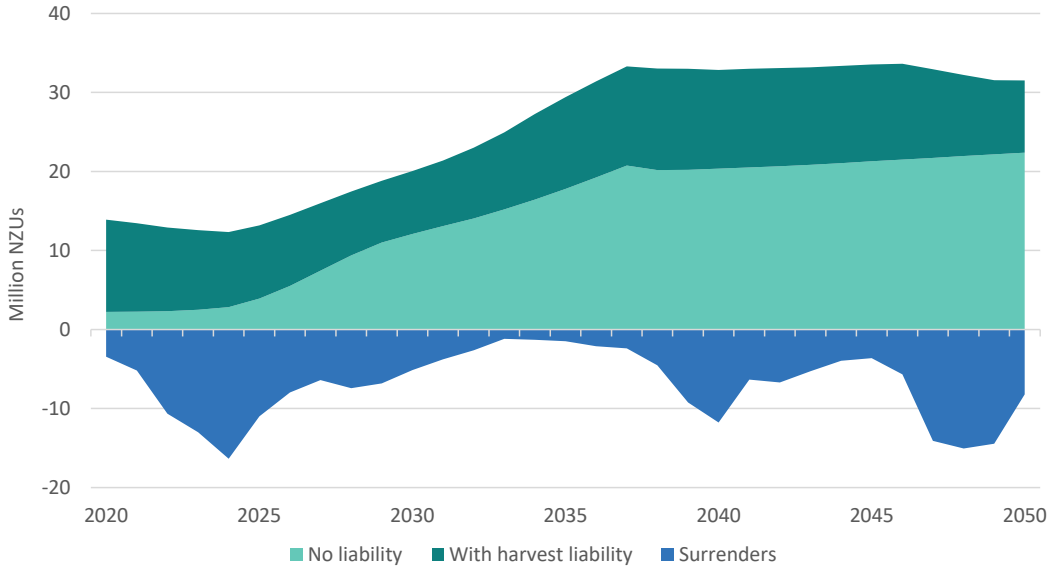
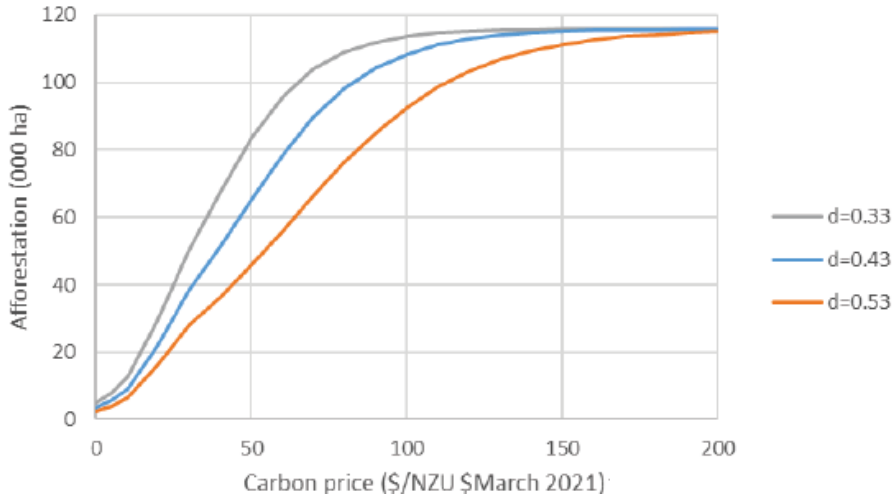
Forestry projections - exogenous

- Regular afforestation and deforestation intentions surveys
- 2021 survey results used by U of Cant to produce forward projections. These are used by MPI to produce low, central, and high projections
- Removals include
  - Those held against future harvest liabilities
  - Those without, eg permanent forestry or averaging

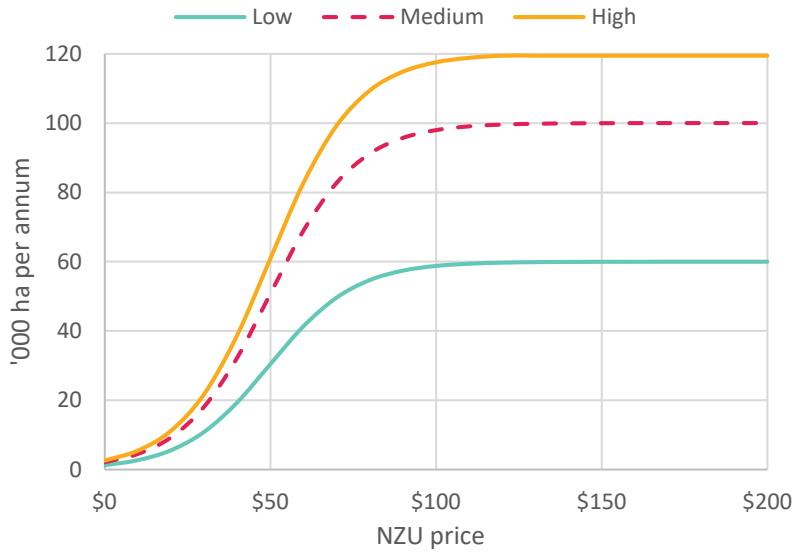


Forestry projections - endogenous

- Afforestation response to price based on Manley 2021
- He developed relationships between NZU price, log price, land price and afforestation for different regions [but at a time when prices were lower than now]
- The modelling here uses a stylised version that is not region-specific and that effectively fixes log and land prices



Manley B (2021) *Afforestation Economic Modelling Final Report*. MPI Technical Paper No: 2022/02



Stockpile behaviour

- The stockpile includes
  - units held against future obligations (c.95 million in mid 2022)
  - “surplus” units (as defined by the Commission) that are likely to be a more ‘liquid’ source of supply to the market (c. 49 million)
- Modelling assumes
  - “Surplus” units
    - stay in the stockpile unless the NZU price increase is less than opportunity cost of capital (discount rate)
    - are released if there is a short-run supply shortfall
  - Other stockpile units
    - A small percentage may be released if price is not rising at the discount rate (as it will be lower cost to buy later)
  - Excess market supply in any year is added to the stockpile

Optimisation

- Prices are defined for 2023 and as a constant annual percentage change from 2023, such that:
  - Demand is met in every year
  - There is minimum excess of units over the period to 2050
    [this is on the assumption that there will be little demand for units in 2050 so there will be little value in a large “surplus” stockpile]

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Status Quo Results

Demonstration path

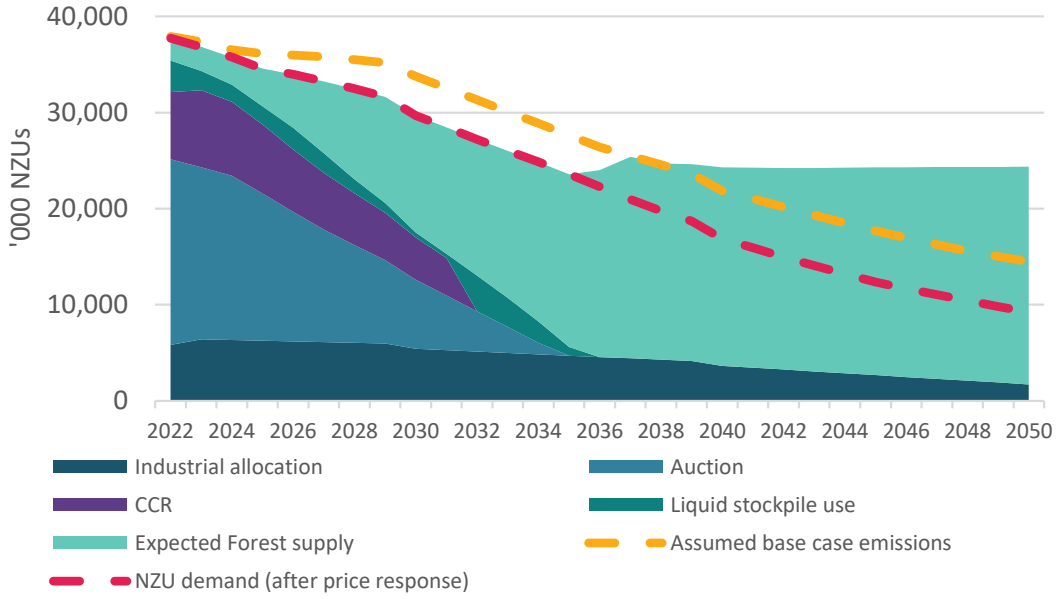
- If we assume
  1) the gross emissions under the demonstration path and
  2) the central MPI forestry supply,

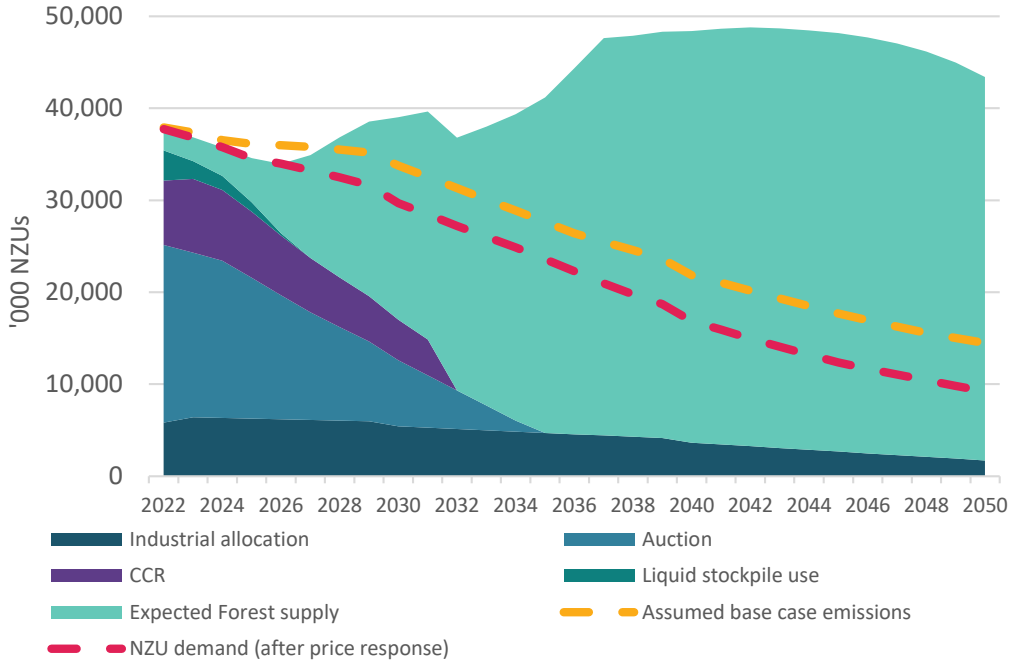
  there are excess units from mid-2030s (top figure)

- If we assume (1) and
  3) endogenous forestry supply

  the excess starts much earlier

- The excess stockpile would be c.600mt. This result is not credible.





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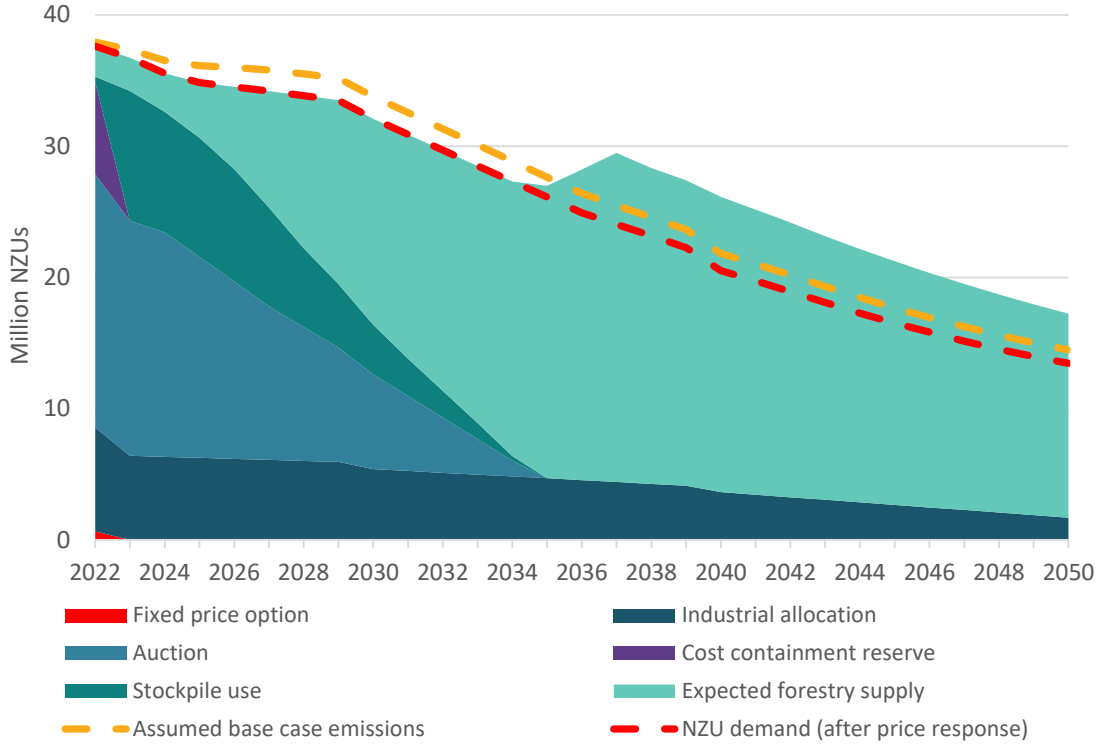
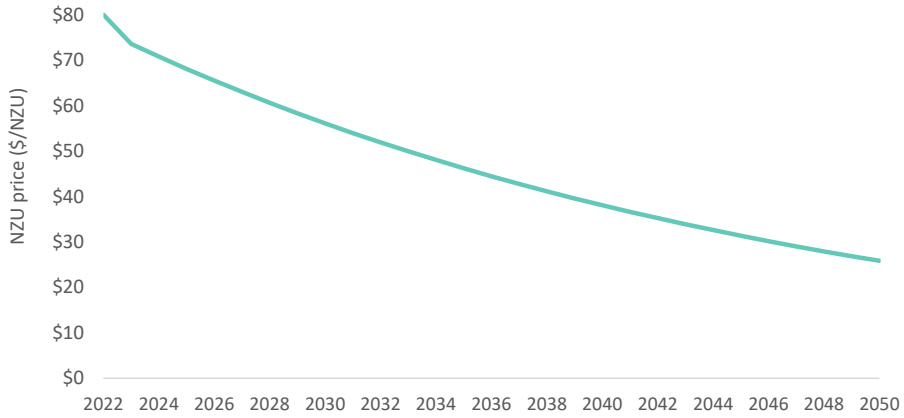
Endogenous demand, supply & price

- If we allow the model to resolve the supply, demand and price:
  - Price falls
  - The excess is limited



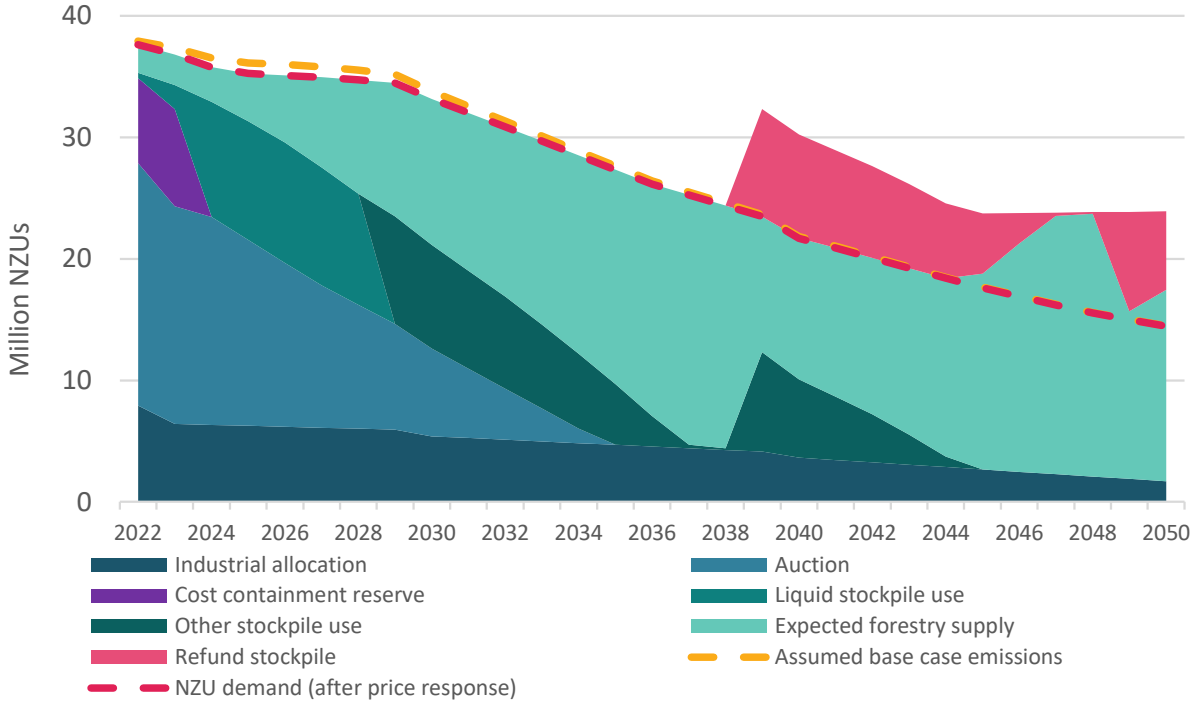


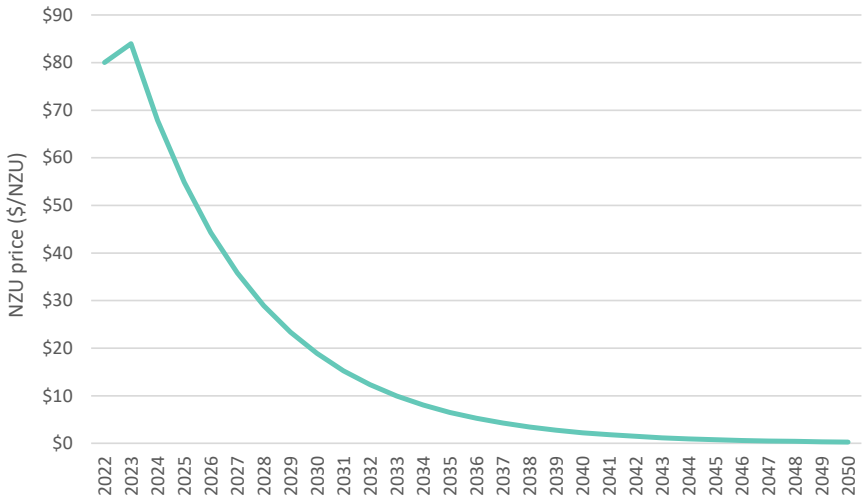
Sensitivity analysis

- If we
  1. assume MPI central projection (rather than Manley equation) for forestry supply [noting this is not strictly valid as price will be different from that assumed by survey participants]

  2. relax the assumptions on movement out of the “non-surplus” stockpile, eg up to 10% is sold each year (and paid back later) then:

- Prices are forecast to fall





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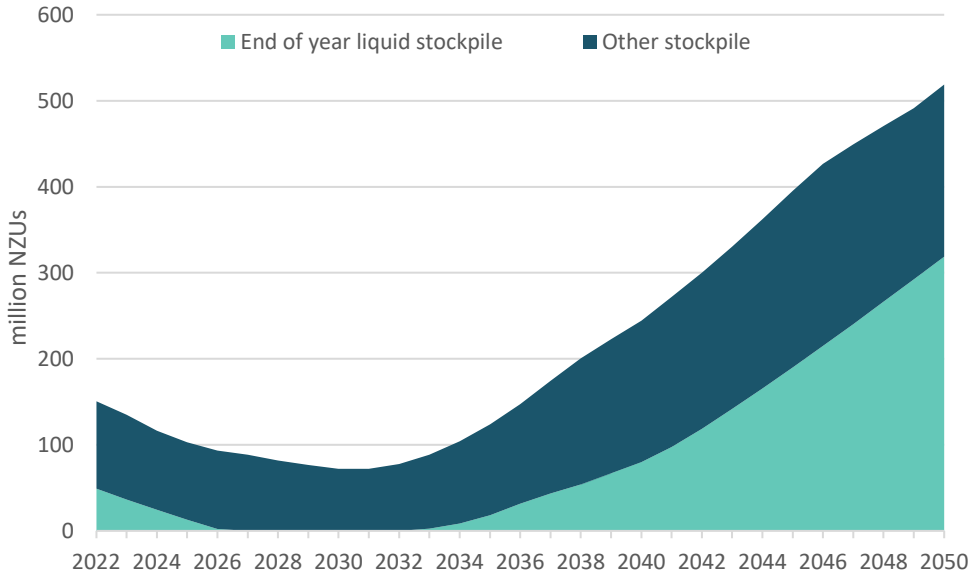
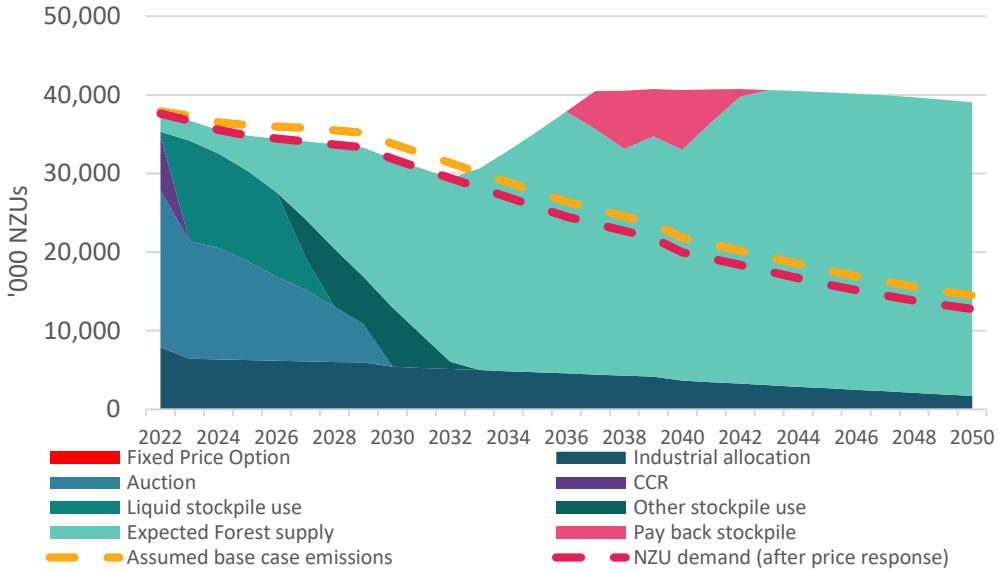
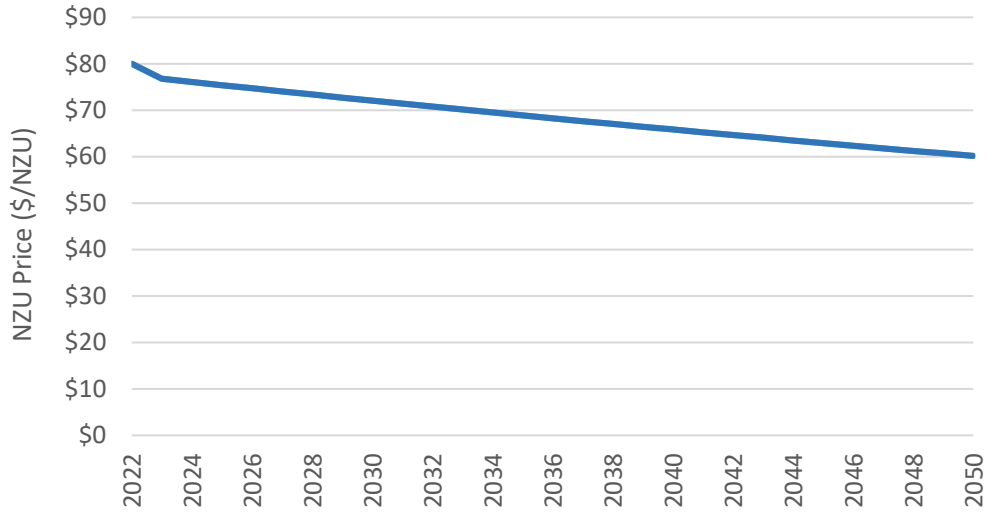
New Unit Settings

- New unit settings reduce supply
- Price still projected to fall but not by as much and stockpile rises unsustainably
- Model adjustment probably required







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Conclusions

- Modelling ETS supply and demand is
  - Uncertain because of the uncertainties over price response. The modelling includes model-derived values for emission reductions and price responses for afforestation developed in period with lower emission prices
  - complicated because of the size and possible behaviour of the stockpile

- However, the analysis suggests:
  - Prices that would result in emission reductions equivalent to the demonstration path would incentivise a significant afforestation response that would “over-supply” the market
  - There is a significant risk that, under current settings, prices will be too low (or even falling) such that there will be little gross emission reduction

Next steps

- Continue to modify the modelling in response to
  - Feedback
  - New information

- Develop modelling capability to analyse ETS reform options as these are better defined

Questions