

20 March 2024

Hugh Marshall-Tate
Senior Analyst
Climate Change Commission

By email: hugh.marshall-tate@climatecommission.govt.nz

Dear Hugh,

QA processes for the development of Concept's ENZ model

You asked what Quality Assurance processes have been undertaken for the ENZ model.

For the 2021 ENZ modelling for the Climate Change Commission (CCC), the CCC engaged several external experts to review the ENZ modelling suite. Those experts did not identify any material problems with the modelling approach, and overall regarded ENZ to be a sound approach to modelling New Zealand's emissions futures.

This time round, the CCC has not engaged such third-party review of model operation. However, the core ENZ modelling approach is fundamentally unchanged from the models reviewed by the original set of third-party experts.

That said, some new functionality has been developed within the ENZ models to model additional aspects of New Zealand's emissions-producing economy, plus various assumptions have been updated. The following processes have been undertaken to ensure such updates are modelling the dynamics of New Zealand's emissions-producing economy appropriately:

- **Comparison with government agency models.** A process has been undertaken whereby the outputs from ENZ are compared with the outputs from individual government agencies' models to ensure that both sets of models are producing sufficiently similar results when using the same set of key input assumptions. This process has been undertaken with:
 - MPI's projections of agricultural and forestry outcomes.
 - MoT's projection of land transport outcomes
 - MBIE's projections of non-transport Energy outcomes
 - MfE's projections of Waste-sector outcomes
- **Third-party review of ENZ model output.** Concept understands that in some areas, such as ENZ's electricity sector modelling, the CCC has engaged third-party experts to review the outputs from ENZ. Concept understands that this process did not identify any issues of concern.
- **Checking by CCC and MfE staff.** ENZ is being actively used by both CCC and MfE staff. In the course of using ENZ, CCC and MfE staff have occasionally highlighted outputs that potentially look incorrect. Concept has then reviewed such outputs to determine whether there is an issue with model functionality or assumptions, and applied corrections where appropriate. Furthermore, at least one CCC staff member has been assigned to each of the three main ENZ modules (LnW, Tpt, and HIP), and undertaken a process of reviewing the modelling functionality and assumptions and checking for any errors.

- **Internal Concept checking.** Sanity-checking is a significant part of ENZ development, in particular through numerous examples of a 'back-casting' approach whereby modelled ENZ output for historical years is compared with actual observations. In addition, while the vast majority of ENZ's development has been undertaken by Simon Coates, various areas of ENZ's development have had input / peer-review from Concept staff.

Yours sincerely

A handwritten signature in blue ink that reads 'S. B. Coates'.

Simon Coates

Director