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## Review of NZCCC Models and Modelling

Dear Anita

You have received individual reviews by Marc Hafstead, Adam Daigneault, and myself, and a joint review by Matthias Weitzel and Toon Vandyck. Reflecting our expertise in different areas, the individual reports focus on different aspects of the modelling system, but there are a few points that are raised in more than one review, as noted below. There are no points on which the reviewers disagree.

1. The models are sensible and fit for purpose.
2. There is nothing so seriously suspect about the modelling that it would impede the Commission from publishing the work done to date.
3. A general equilibrium model (C-PLAN) combined with bottom-up technology based modelling (ENZ) is supported by all reviewers.
4. The insensitivity of macroeconomic variables in C-PLAN to substantial changes in abatement and carbon prices: explanations are proposed and discussed in the various individual reviews.
5. Between the base year and 2050, in the Reference scenario, both models project the largest emission reductions to occur in road transport, pastoral agriculture, and electricity generation (in descending order). However, there are differences at the finer industry level between the models. Reasons have been largely explained, but harmonising the baseline or current-policy trajectory in terms of activity levels and emissions across the different models is encouraged. More explanation, such as on the effects of free allocation will be needed in background papers to published reports.
6. It is difficult at this stage to identify which assumptions are more important than others (commodity prices, EV capital cost penalty etc). Variations on the Reference case would more effectively communicate the level of uncertainty in the results. A summary on the

relative importance of each of the key differences across the scenario assumptions would be useful.

7. The distribution model DIM seems appropriate for what it is intended to do, but few results have been released to date. In future DIM should be able to simulate the impacts of policy-induced price changes on overall expenditure/income by different household groups and how different recycling schemes (in combination with reduction of other distortionary taxes) could affect different household groups.
8. As is well known GDP is a flawed measure of economic welfare costs. Somewhat better is RGNDI, but is it possible to extract utility based welfare measures from the modelling?
9. Electricity: exploration of storage options is recommended, especially in the context of the effect of electricity prices on important abatement opportunities such as electric vehicles.
10. Overall the results of the modelling system are heavily influenced by exogenous assumptions, whether about land use, industry survival (assumed exit years), vehicle travel, or new technologies (eg methane vaccine) and their uptake. This is probably unavoidable when dealing with economic responses to something as historically unprecedented as climate change.

It does imply, however, that sensitivity analysis is crucial. This should be a priority for future research.

11. Covid-19: all reviewers agree with the approach taken by the Commissions, but there is still interest in related issues such as lower demand for transport due to more use of videoconferencing.

In summary I would say that the review panel endorses the model and modelling efforts which provide a robust quantitative framework to support ambitious climate policy proposals.

I am happy to discuss any aspect of the above and I accept responsibility for any mis-interpretation of comments made by the other members of the review panel.

Yours faithfully

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