**TPM CBA review reports**

The framework and methods for the cost benefit analysis (CBA) of the proposed transmission pricing methodology (TPM) (TPM CBA) are very similar to those used in the Authority's CBA of the TPM Guidelines in 2020 (Guidelines CBA), though changes were made to reflect new information and design detail of the proposed TPM.

The Authority sought independent review of the changes from the Guidelines CBA. The changes and the reviewers were:

- grid use model code changes (reviewed by NR Porter Energy Analytics Ltd)
- baseline demand and cost assumptions (Reviewed by Concept Consulting Ltd (Concept)).

**Grid use model, code change review**

The code change review was iterative, with an initial review of the code suggesting amendments that were implemented in updated model code.

A second review was completed with only one minor data input issue identified and subsequently rectified.[1]

**Baseline demand and cost assumptions review**

Input assumptions in the TPM CBA were changed significantly relative to the Guidelines CBA. These changes were the result of a shift from using the MBIE (2016) electricity demand and generation scenarios (EDGS) as a basis for core baseline assumptions to using the Climate Change Commission's (CCC's) demonstration pathway in its 2021 advice to government, supplemented by information from a series of reports commissioned by MBIE (2020) into future potential electricity generation investment projects (collectively referred to as the 'stack update')[2].

Concept reviewed the new assumptions, at a high level, and raised a number of issues where Concept's views differed from the new assumptions.

The Authority considered Concept's views and:

- altered input assumptions where a sound case was made for change
- did not change input assumptions where:
    - Concept's views came down to a difference of opinion as between Concept's and the other sources used to inform the input assumptions
    - the suggested changes were not material or were uncertain.

Given that the input assumptions were based on publicly available information and expert opinion there had to be a threshold of materiality or reasonableness to be crossed before changes would be made. Furthermore, some of Concept's observations were based on new information available after the baseline assumptions and databases were completed. Ideally, assumptions and databases should be finalised at a given point in time (i.e. collectively), rather than adapted ad hoc for new pieces of information. But new information should reasonably be included if it is practical to do so and if the new information has material implications for the modelling.

[1] Specifically, the model input data was changed to include a placeholder for grid-connected generation at Otahuhu and Marsden.

[2] https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-publications-and-technical-papers/nz-generation-data-updates/

The following input assumptions were changed, or at least adapted, following review by Concept:

- forecast gas prices were increased to reflect the levels of gas prices assumed in the CCC's electricity market modelling rather than the CCC's 'Scenarios dataset' where gas prices appear to be more closely associated with baseload prices
- sensitivity analyses were amended to allow for wider bands of uncertainty around generation costs in the long run
- the impact of a policy of 100% renewable generation by 2030 was considered
    - the modelling was changed to assume a ban on new fossil fuel generation after 2030
    - however, it was considered inappropriate to try and model a significant and not yet concrete policy change – 100% renewable generation by 2030 – when the purpose of the analysis was to evaluate the impacts of the TPM proposal. Modelling the possible policy levers and outcomes of 100% renewables by 2030 would have been a substantial and complicated task on its own.

Areas in which Concept's opinion provided insufficient reason to change were:

- future path of battery costs:
    - these were considered in some detail in the Guidelines CBA and based on a wide reading of the literature. Concept's opinion did not provide sufficient basis for changing these assumptions.
- the scale of future supply of renewable generation (referred to as the "steepness" of the renewable generation supply curve)
    - we rely on detailed publicly available information about the scale of renewable generation in future from MBIE's stack update report, as there is no other publicly available information that we can rely on regarding where and how much to scale up potential investment
    - Concept's view was not formed from its review of the Authority's assumptions per se, but rather a review of the MBIE stack update reports
    - a minor amendment was made to the grid use model to allow for some (limited) increases in the size of wind farms.
- inclusion of the Northland Kaiwaikawe/Omamari windfarm as a committed generation project
    - the purchase agreement for Kaiwaikawe output was announced on 3 August and did not necessarily constitute an irrevocable commitment to commissioning the wind farm
    - the implications for the modelling are not material
    - the grid use model did, in any case, predict investment in wind farms in Northland in the next 5 years
- reduction in demand at Marsden, to account for repurposing of the refinery at Marsden point
    - at the time of the review there had been in-principle decisions (made during the month of August 2021) to repurpose the refinery, though not a final binding decision
    - the size of the impact of the repurposing on energy demand is uncertain considering the possibility of repurposing the refinery for biofuel production
    - the overall impact of complete removal of the refinery's demand is not material to projected/modelled impacts of changes to the TPM given that:
        - refinery demand is not grid-connected so, in the grid use model, is part of overall mass-market demand at the Marsden backbone node, as opposed to

being directly connected industrial load as is the case for e.g. Norske Skog and Tiwai

- high rates of exogenous demand growth, at Marsden and across NZ more generally, will rapidly replace any one-off reductions in demand.

Concept considered that additional thought should be put into the potential for large load to replace NZAS (Tiwai) load. This was considered in sensitivity analysis, rather than as a central assumption.

Concept's review also considered there were inconsistencies in the calculation of emissions price growth rates. This was checked and the Authority confirmed there was no inconsistency and that the calculation was accurate.