



Addendum: Analysis of Transpower's Proposed Variations to the Transmission Pricing Methodology

14 July 2015

1 Introduction

This note serves as an addendum to our 2 July 2015 “Analysis of Transpower’s Proposed (Initial) Variations to the Transmission Pricing Methodology”. This addendum follows the Electricity Authority (the Authority) releasing its separate 23 June 2015 consultation paper on the high voltage direct current (HVDC) component of Transpower’s proposed variation to the electricity Transmission Pricing Methodology (TPM). The HVDC component (the HVDC proposal) proposes charging HVDC customers based on the MWh they inject into the grid (averaged over the previous 5 years). Transpower would also further analyse the potential to later lower (de-rate) charges for the Upper South Island (USI).

This addendum highlights that the HVDC proposal produces net benefits of between \$1.2 million per annum and \$11.3 million per annum, by addressing identified problems that are specific to the HVDC charge. The proposal further reduces the size of the wider inefficiencies of the TPM, previously estimated by the Authority in its 16 September 2014 Problem Definition Working Paper (PDWP). The process for implementing the proposal allows benefits to be realised, while the complexities of potentially de-rating the USI are investigated further.

This remainder of this addendum assesses in greater detail:

- The benefits of the HVDC proposal
- The extent to which the HDVC proposal would address the wider problems the Authority has identified with the TPM
- The proposed process for making changes under the HVDC proposal.

2 The HVDC Proposal Provides Net Benefits

Transpower’s proposal to amend the Electricity Industry Participation Code 2010 (the Code) to allocate HVDC charges on a per-MWh basis (using South Island Mean Injection) would provide net benefits of between \$1.2 million per annum and \$11.3 million per annum. The range results from differences in the approaches used by the Authority and Transpower as well as sensitivity analysis undertaken by Scientia for

Transpower following discussion with the Authority.¹ In present value terms, benefits would be between \$12 million and \$111 million.²

The HVDC proposal provides benefits that exceed alternative options considered under every approach or scenario modelled. The proposal improves on the status quo because it:

- Promotes wholesale market competition by reducing the incentive on South Island generators to withhold generation capacity
- Promotes reliability by reducing the incentive on South Island generators to withhold generation capacity when supply conditions are tight
- Potentially promotes dynamic efficiency by promoting efficient investment in South Island embedded generation and grid-connected wind generation.

The Authority's analysis also establishes that the HVDC proposal appears to comply with section 32(1) of the Electricity Industry Act 2010 and with Code amendment principles.

3 The HVDC Proposal Addresses Wider TPM Problems

The proposal addresses two problems with the current historical anytime maximum injection (HAMI) allocation of the HVDC charge identified in the Authority's PDWP. The two problems the proposal addresses are:

- Incentives for South Island generators to withhold existing capacity, leading to out-of-merit dispatch. The Authority estimates this results in an inefficiency of around \$12 million in present value terms. Transpower and Scientia Consulting's analysis suggests the problem may be even greater (consistent with their estimates of benefits in Section 2). Under either case, the proposed variation would considerably reduce this inefficiency.³
- Disincentives to invest in South Island generation capacity. The Authority has not quantified this inefficiency. However, it notes that the proposed variation would considerably reduce the disincentive to invest in South Island embedded generation and could reduce the disincentive to invest in South Island grid-connected wind generation

Our updated analysis of the Authority's problem definition finds the proposed move to a per-MWh charge, along with Transpower's other proposed variations, would reduce the scale of problems with the TPM. Specifically, the scale of remaining problems would be between a present value of \$3 million in benefits and \$52 million in costs. This is shown

¹ See: <https://www.ea.govt.nz/dmsdocument/19325>. Differences in approach primarily relate to how the opportunity cost for additional capacity is determined, when it is applied, and the time period modelled.

² The present value is calculated using the same approach as the Authority's Problem Definition Working papers of modelling impacts for 20 years and using a discount rate of 8 percent.

³ There may be a minor remaining incentive to for South Island generators to withhold capacity. However, the disincentive for peak capacity would be more than any other period. Further, any remaining disincentive is likely to be offset by a reduction in the estimated disincentives to upgrade South Island generation capacity.

in Table 1 where the proposed changes to HVDC charges are in bold (keeping with the Authority's figures).⁴

4 The Process for Applying the HVDC Proposal Allows Benefits to be Realised Immediately

Transpower's proposal to investigate USI derating separately and to transition to a per-MWh HVDC charge allows benefits to be realised while allowing adjustments to be signalled and managed. Transpower and the Authority note that significant design issues would need to be addressed for an option involving USI derating. Indeed, the Authority states that it is not clear that a per-MWh charge plus USI derating would better promote the statutory objective. The proposed approach, therefore, keeps this option open while ensuring it does not delay the benefits that have been shown from moving to a per-MWh charge.

Following Transpower's investigation of USI derating, it would be useful to reassess the extent of remaining problems with the HVDC charge. This will allow for an early assessment of the impact of initial changes. Depending on the outcome of the investigation, it will also ensure that any further changes are focused on remaining problems and that associated costs are justified.

Transitioning to the per-MWh approach retains intended signals and may aid adjustment. Transpower's HVDC proposal includes transitional arrangements where the per-MWh approach is phased in by 2020/21. The Authority assesses that removing this transition period would have no incremental efficiency benefits and the transition may be appropriate to provide lead time for the introduction of the new approach.

⁴ Scientia and Transpower's analysis suggests greater benefits from addressing incentives for South Island generators to withhold existing capacity. Using their analysis, the initial problem to be addressed (in bold) may be larger but the updated estimate would still be close to zero as reflected in the far column of the table. The main reasons for differences are highlighted in footnote 1.

Table 1: Summary of Estimated Scale of TPM Inefficiencies (millions)

Inefficiency		Authority's Estimate	Further Factors Incorporated by Castalia (blue) and that Transpower's Proposed Variations address (red)	Updated Inefficiency Estimate
RCPD	Over-signals the need for load shedding during peak periods	\$11 benefit –\$96 cost	<ul style="list-style-type: none"> EDBs controlling load for distribution capex deferral Direct connects avoiding the spot price on reduced peak load N=100 discourages high cost load control 	\$7 benefit – \$13 cost
	Over-signals the need for overall reductions in consumption	\$3-\$40 cost	<ul style="list-style-type: none"> Removes large direct connected industrial load Analyses the link with distribution pricing for mass market consumers N=100 reduces incentive to reduce consumption 	<\$0-\$30 cost
	Over-signals the cost of increasing Tiwai smelter's summer production	\$4-\$32 cost	Disregarding extra summer load removes extra cost	\$0
HVDC	Incentivises South Island generators to withhold existing capacity	\$12 cost	<ul style="list-style-type: none"> Examines whether existing HAMI causes generation to offer at higher prices Per-MWh charge reflected in all SI bids (not just peak) 	\$0² (generation investment)
	Disincentivises upgrades or new investment in SI generation	\$25 cost	Examines merit order with and without HAMI, adjusting for lower forecast demand growth	<\$4-\$9 cost ² (generation investment)
	Brings forward the need for USI transmission investment	\$2-\$6 cost	Need for new transmission investment due to deferred USI plants	\$0
Total Inefficient Market Operation		\$35-\$211 cost	<i>Incorporates the role of other parties and processes and limits to inefficiencies caused by the TPM (as indicated above)</i> <i>Removes problems addressed by Transpower's Proposed Variations</i>	\$3 benefit-\$52 cost
Inefficient Transmission Investment		\$43.5 cost (illustrative only)	<i>Excludes problems already accounted for under inefficient market operation</i>	\$0 ¹
Poor durability		\$36.5	<i>Excludes from analysis due to lack of credibility as separate problem able to be addressed through alternative options</i>	\$0 ¹
Total		\$115-\$291 cost		\$3 benefit-\$52 cost

Source: Castalia analysis of Electricity Authority "Transmission Pricing Methodology: Problem definition relating to interconnection and HVDC assets" (PDWP), incorporating information from Transpower's proposed Code amendment documents, and the Authority's 21 April 2015 consultation paper on the Initial Proposal.

Notes: ¹ Our analysis follows the PDWP characterisation, incorporating inefficiencies in generation investment as relating to market operations when considering the impact of RCPD and HVDC charges. To avoid double-counting we exclude these impacts from the figure for inefficient investment. ² There is still some remaining incentive to withhold South Island generation capacity from a per-MWh-allocated charge (as there is still some disincentive, only this is no stronger than at any other period/capacity). However, a per-MWh-allocated charge is also likely to reduce the disincentive to upgrade South Island generation capacity (which is not quantified).