Transmission Pricing Advisory Group

Transmission pricing review: a roadmap

Background on process and work to date

9 February 2011

Note: This paper has been prepared to provide background on the transmission pricing review. Content should not be interpreted as representing the views or policy of the Electricity Authority.

Contents

Tables

Figures

1 Introduction

1.1.1 The Electricity Authority (Authority) is continuing the Transmission Pricing Review (Review) initiated by the Electricity Commission (Commission) in early 2009 to undertake a wide-ranging review of options for the allocation methodology for transmission costs. The Review is a multi-stage project, involving technical and economic analysis and stakeholder consultation. If the outcome of the Review is an alternative methodology, the Authority will publish an Issues Paper and draft guidelines for the Transmission Pricing Methodology (TPM).

1.1.2 The Authority has formed the Transmission Pricing Advisory Group (TPAG) to assist it in this, the third stage of the Review.

1.2 Purpose

1.2.1 The purpose of this Roadmap paper is to provide the TPAG with:

(a) an overview of the existing regime and of the Review to date;

(b) an understanding of the context for the Review and linkages with other work;

(c) a summary of the options and conclusions from earlier Review stages; and

(d) a list of Review documents with website links.

1.3 Existing transmission pricing regime

1.3.1 Transpower's transmission network is a natural monopoly and its revenue requirement is regulated by the Commerce Commission. The TPM determines how Transpower's total revenue is allocated between, and recovered from, its customers. Transpower develops the TPM in accordance with Part 12 of the Electricity Industry Participant Code (Code). The Authority sets guidelines for the development of, and approves, the TPM.

1.3.2 The level and structure of transmission charges under the TPM has the potential to influence the use of the network, operation of the power market and investment in the market. For example, transmission charges can influence the locational choices of generators and their bidding behaviour. The challenge is to allocate transmission costs in a way that encourages:

(a) efficient use of the transmission network and operation of the power market in real time; and

(b) efficient investment in new load and generation projects (including load management), which will influence future demand on the transmission network and the need for transmission investment.

1.3.3 The current TPM is based – with some refinements – on the TPM that was developed by Transpower and first applicable from 1 April 1999. The 1999 TPM represented a shift from the previous methodologies used by Transpower to allocate transmission costs. One of the key differences from earlier approaches was the introduction of three distinct charges: connection charges, interconnection charges and explicit High Voltage Direct Current (HVDC) charges for South Island generators only. The current TPM took effect on 1 April 2008 and is comprised of these three charges, but has introduced further refinements. These include a change to the allocation of interconnection charges according to the Regional Coincident Peak Demand (RCPD), and a deeper definition of connection assets.

1.3.4 During the development of the TPM the Commission considered whether to conduct a more comprehensive review of transmission pricing including whether enhanced locational signals to generation and load may be efficient. However, ultimately the Commission decided that it was preferable to implement a methodology in the short term and noted that a review was intended in the future.

1.3.5 The rationale at the time was that nodal pricing, the approval of transmission investment under the Grid Investment Test (GIT) and a deep definition of connection may be sufficient with respect to locational signalling. The Commission acknowledged that further analysis was required to confirm this, but in the meantime considered it was prudent to "postage stamp" the costs of providing interconnection assets. The final approach differed in respect of the HVDC link. In the case of this asset, the benefit of a locational signal appeared to be more compelling. This proved to be a controversial decision and parties requested that the Commission undertake a further review of the HVDC charge. The Commission noted that any future review should be "holistic, focusing on locational pricing", rather than merely focussing on allocating the costs of the HVDC link.

2 Overview of the Review to date

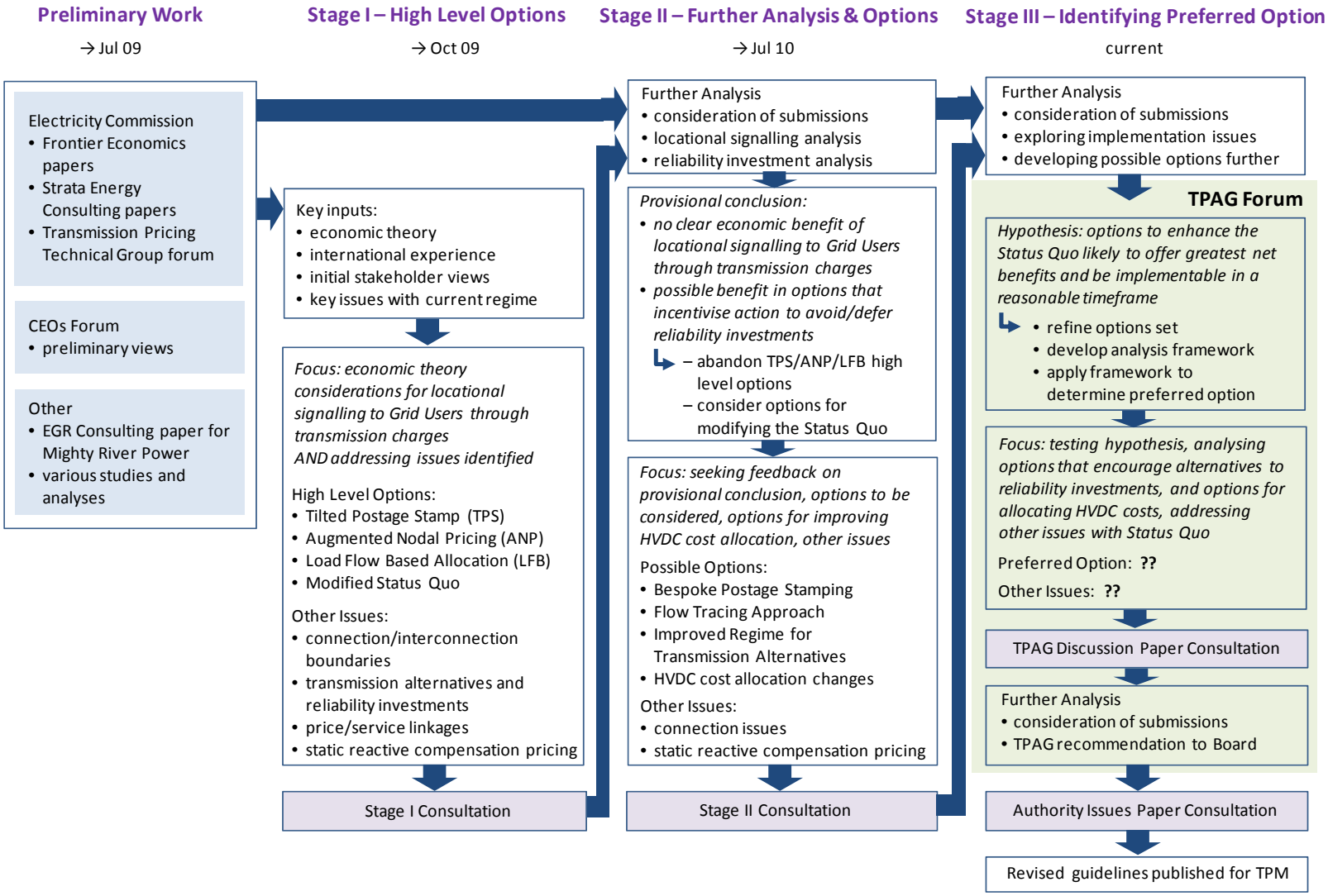
2.1.1 The Commission initiated the Review of the methodology for allocating transmission costs in April 2009.

2.1.2 Following preliminary work on transmission pricing by the Commission, the Commission published a High Level Options Paper for consultation (Stage I) in October 2009. It considered the submissions received and undertook further analysis, before publishing a second consultation paper (Stage II) in July 2010. The Commission's specially formed Transmission Pricing Technical Group (TPTG) provided advice during both these stages, as did its advisers, Frontier Economics and Strata Energy Consulting. Other stakeholders engaged their own advisers and provided input to the Review (for instance, the CEOs Forum engaged NERA and MEUG and Rio Tinto engaged NZIER).

2.1.3 The Authority came into being on 1 November 2010 and continued with the Review. Following the establishment of the Authority and in light of submissions from the second consultation paper, the Authority developed a revised plan. It also established the TPAG to assist it in this third stage of the Review.

2.1.4 A pictorial representation of the Review is set out in Figure 1, and described in more detail below. Appendix A contains a table setting out the key papers and reports referred to in the remainder of this section, together with a website address for each.

Figure 1 Overview of the transmission pricing review



2.2 Preliminary work

2.2.1 The Commission and a number of stakeholders undertook analysis and engaged advisers in the lead up to the Review's first formal consultation (Stage I). For the purposes of this Roadmap, this has been grouped together as "Preliminary Work", although some of it relates to the period before the Review was initiated, and some of it continued in parallel with Stage I of the Review. Of particular note:

2.2.2 **Commission work**: The Commission announced the Review in April 2009, established the Review project and work programme, and formed the TPTG made up of technical specialists nominated by interested parties. As well as drawing on earlier analysis and reports, the Commission engaged Frontier Economics to provide advice, including papers on the theory of efficient pricing of electricity transmission services (Jul09) and an international review of transmission pricing (Jul09). The Commission also engaged Strata Energy Consulting who prepared a summary of transmission pricing arrangements in NZ 1998 to 2008 (Jun09) and a report on the transmission pricing issues identified in the TPTG forum (Aug09). The Frontier and Strata papers were key inputs to the Stage I consultation, and are discussed further below.

2.2.3 **EGR Consulting Report**: Mighty River Power had earlier commissioned Dr Grant Read to provide a report on locational transmission pricing (Feb07). The report proposed a "Tilted Postage Stamp" (TPS) pricing regime for transmission system cost recovery in New Zealand. It was motivated by the belief that, given the existing approach to transmission system planning and cost recovery in New Zealand, the combination of nodal spot price differentials with a "Postage Stamp" (PS) cost recovery regime is unlikely to reflect the full extent of locational variations in the long run cost of servicing load and/or generation growth.

2.2.4 **CEOs Forum input**: NERA was engaged by the NZ Electricity Industry Steering Group (a group established by the CEOs Forum) to explore ways in which to improve the efficiency of electricity transmission pricing arrangements in the NZ market. The CEOs Forum provided preliminary views to the Commission during this time, with the formal NERA Report submitted shortly after the Stage I consultation process (refer later section of this Roadmap).

2.3 Stage I – High Level Options (to October 2009 consultation)

2.3.1 The preliminary work described in the previous section provided some of the key inputs to the Commission's work in establishing the high level options to consider and the key issues to also be addressed in the Review process, i.e:

- economic theory;
- international experience;
- stakeholder views; and
- key issues with current regime.

2.3.2 It also helped to frame the focus for the first stage of the Review:

- economic theory considerations in particular whether there was sufficient justification to consider enhanced locational signalling in addition to that provided by nodal pricing, deep connection and the grid investment test; and
- addressing the key issues identified.

2.3.3 The Commission analysis and thinking was set out in its Stage I Consultation Paper (Oct 2009)[1]. This was drawn from the key inputs described above, and further informed by the Commission's own analysis, feedback from the TPTG and the papers prepared by Frontier Economics (particularly its paper entitled "Identification of High Level Options and Filtering Criteria", Sep 09).

2.3.4 The high level options included in the Stage I Consultation were:

(a) **Status Quo** – the current transmission pricing arrangements were included as a high-level option. The stage 1 consultation paper also asked submitters if there were possible minor modifications that could be made to the current arrangements.

(b) **Tilted Postage Stamp** – this approach is intended to provide broadly appropriate locational signals to generators and loads. Assuming the historical pattern of network flows continues into the future, it would mean imposing comparatively higher charges on generators in the South Island and loads in the North Island and lower charges on generators in the North Island and loads in the South Island.

(c) **Augmented Nodal Pricing** – this approach seeks to directly address the deficiencies in nodal energy prices created by excessive or premature network investment; and the issue that the value of reliability is not signalled in nodal prices. Under this regime: transmission charges should be highest for those generators and loads that benefit most from excessive or premature network investment; and transmission charges should be lowest for those generators and loads that are made most worse off from excessive or premature network investment.

(d) **Load Flow Based Allocation** – these options involve a process of network analysis to attribute costs to participant connection points based on identification of the network assets 'used' to convey electricity from points of injection to points of withdrawal. Load flow approaches can be based on the topology of the existing network as in Australia (cost reflective network pricing (CRNP)) or on forward-looking network development costs, as in Great Britain (investment cost related pricing (ICRP)).

2.3.5 Further to these high-level options, the Consultation paper also set four other key issues arising in the consideration of transmission pricing during Stage I of the Review:

- the approach to setting connection charges;
- the treatment of transmission alternatives;
- linking transmission pricing with service quality; and
- static reactive power compensation.

2.4 Stage II – Further Analysis and Options (to July 2010 consultation)

2.4.1 Nineteen parties from across the electricity sector provided submissions on the Stage I Consultation Paper, as set out in Table 1. The Commission also received final reports and analysis from the CEO Forum including analysis from Transpower, and NZIER reports on behalf of MEUG and Rio Tinto:

[1] The paper was released together with two other Commission consultation papers on related issues: 'Scarcity Pricing and Compulsory Contracting : Options and

(a) **CEOs Forum input**: NERA considered that many features of the existing transmission pricing arrangements were fundamentally sound, but there were some potential problems (including issues relating to LRMC signalling, the GIT, HVDC charging, and deep connection). NERA considered a number of possible options for reform including introducing further locational signals (eg through a TPS approach), modifying the HVDC charging regime, and some relatively modest amendments to connection charge arrangements.

(b) **Transpower work**: Transpower undertook analysis at the request of the CEO Forum working group to determine whether there is an enduring grid characterisation that might support the introduction of a TPS pricing methodology and to assess the potential impact of a TPS on total costs.

(c) **NZIER**: NZIER was commissioned to undertake work for Rio Tinto and for the Major Energy Users' Group (MEUG) as input to the CEOs Forum and to the Commission's Review. NZIER completed three reports for MEUG:

- 'New Zealand Transmission Pricing Project – A Review of the NERA report to the Electricity Industry Steering Group'. This report was critical of NERAs analysis and of the basis for the NERA options.
- 'Alternative Options for Transmission Pricing – Suggestions for the Review by the CEOs Forum.' This report suggested a capacity rights or arbitrageur approach for the HVDC link and a deeper connection regime for charging for new assets (also known as 'but-for').
- Competitive Neutrality for connection of generation. This report contained a discussion about the TPM on generators decisions on where to connect.

NZIER also completed a report for Rio Tinto in the form of a letter on Capacity Rights.

Table 1 Submissions received on Stage I Consultation Paper

Generator/retailer	Large user	Distributor	Other
Contact Genesis Meridian Mighty River Power (MRP) Todd Energy (late submission)	Business New Zealand Major Energy Users' Group (MEUG) Norske Skog Pan Pac Rio Tinto Winstone Pulp International	Counties Power Northpower Orion Powerco Vector Electricity Networks Association (ENA)	Transpower Electricity Efficiency and Conservation Authority (EECA)

2.4.2 Views were mixed, and no clear favourite emerged from the consultation process. Some submitters supported a TPS approach, some preferred a modified status quo, and some proposed alternative options for the Commission to consider. The Commission published an initial summary of submissions in March 2010.

2.4.3 In parallel with its consideration of submissions, the Commission:

- reconsidered the economic theory arguments for further locational signalling to generation and load to encourage co-optimisation of investment in generation, load and transmission;
- undertook significant modelling and analysis work using its Generation Expansion Modelling tools (GEM) to consider the potential benefits of further locational signalling to generation and load from the perspective of signalling in respect of future economic transmission investments;
- considered the potential benefits of deferral of future reliability transmission investments.

2.4.4 Drawing from this work and its consideration of Stage I submissions, the Commission formed two important provisional conclusions:

- there does not appear to be a demonstrable economic benefit from enhanced locational signalling to grid users through transmission charges to defer economic transmission investments; and
- there appears to be a possible benefit in options that incentivise action to avoid or defer reliability-driven investments (eg through investment in generation and/or load management).

2.4.5 This analysis was set out in the Stage II Consultation Paper, and submitters' views were sought on the approach, the analysis and the Commission's provisional conclusions.

2.4.6 A key implication of the provisional conclusions, as noted in the Stage II Consultation Paper, was that there would be no merit in pursuing the three high level transmission pricing options aimed at enhancing locational signals for economically-driven transmission investments, ie Tilted Postage Stamp, Augmented Nodal Pricing, and Load Flow Based Allocation . Instead the Review should focus on options for modifying the Status Quo that might incentivise action to defer reliability-driven investments, options for HVDC charging, and addressing the other key issues identified. This framed the remainder of the Stage II work.

2.4.7 The Consultation Paper identified the following options, and sought submitters' views on each, noting that they were not mutually exclusive and could be implemented in some combination:

(a) Bespoke postage stamping option involving a higher charge on loads and credits to generators in particular regions – this is intended to provide localised signals for additional peaking plant and demand response in areas likely to require reliability transmission investment in the medium term, perhaps based on the use of an LRMC approach to determining locational charges.

(b) Flow tracing approach to allocating the costs of a portion of interconnection assets to specified parties, possibly coinciding with a shallower approach to defining connection assets.

(c) Improving the transmission alternatives regime – particularly by avoiding the perception of competing interests faced by Transpower as both the network owner and the party responsible for the RFP process and assessment of alternatives against transmission options.

2.4.8 The paper also set out a number of options for HVDC charging, and sought comments on each:

(a) status quo;

(b) continue to charge South Island generation plant, but with an allocation proportional to generation in MWh;

(c) continue to charge South Island generation plant, but with an incentive-free allocation, perhaps based on historical output; and

(d) postage stamp – spread costs widely over load and/or generation in both islands.

2.4.9 Finally, the paper addressed the "other issues" from the Stage I consultation, and considered two of the issues should be progressed further:

- connection issues
- static reactive compensation

2.4.10 The Stage II Consultation paper, including the appendices, provides a basis for the Stage III work the Authority, and the TPAG, are now embarking on. Accordingly, the paper is included with this package of documents for the TPAG.

2.5 Stage III – Modifying the Status Quo (current)

2.5.1 Eighteen parties from across the electricity sector provided submissions on the Stage II Consultation Paper, as set out in Table 2.

Table 2 Submissions received on Stage II Consultation Paper

Generator/retailer	Users	Distributor	Other
Contact Genesis Meridian Mighty River Power (MRP) Todd Energy Trustpower	Business New Zealand Major Energy Users' Group (MEUG) Norske Skog RTANZ	WEL Networks Northpower Powerco Vector Electricity Networks Association (ENA)	Transpower Electricity Efficiency and Conservation Authority (EECA) Opuha Water

2.5.2 The Authority has begun its consideration of the submissions received. In very brief terms, submitters' views on key matters set out in the Stage II paper can be summarised as follows:

Stage II analysis:

2.5.3 Submitters generally concurred with the economic theory analysis that the Commission presented in the consultation paper, agreeing that the consultation paper had identified the relevant factors in its assessment of whether nodal pricing provides adequate signals for efficient generation and load investment.

2.5.4 A minority of submitters questioned the Commission's modelling for assessing the benefits of locational signalling for economic transmission investments on the basis that the modelling was highly dependent on the input assumptions and that the use of the Generation Expansion Model (GEM) may not have been appropriate. Despite these concerns most submitters agreed with the results: that there is limited value in signalling economic transmission investments.

2.5.5 Submitters challenged the analysis of the potential benefits of signalling reliability investments more strongly.

Stage II Options:

2.5.6 The Commission had set out its decision not to pursue some high level options described during Stage I of the Review or previously suggested by submitters. Submitters generally supported the Commission decision not to further consider augmented nodal pricing and tilted postage stamp. Three large user representatives considered that the Commission should undertake further analysis on the 'but-for' approach and the capacity rights option suggested for the HVDC link.

2.5.7 Submitters were divided on the benefits of the incentives for deferring reliability investments, and gave arguments both for and against the three options suggested: bespoke pricing, flow tracing and improving the transmission alternatives regime.

HVDC Options:

2.5.8 The consultation paper set out costs and benefits of the existing HVDC charge and four possible options for the allocation of HVDC costs.

2.5.9 The three largest South Island generators all favour postage stamping the HVDC costs. Large user representatives support further consideration of an alternative option – capacity rights, as an alternative means of allocating costs to beneficiaries. Transpower considers that there appears to be a reasonable case for retaining the charge, but allocating it based on MWh. Meridian and Todd Energy suggest allocating the charge according to flows across the link.

2.5.10 Two submitters considered the existing charging is well-founded and inefficiencies are at worse, negligible, and there is no need to consider the efficiency implications of the charge any further.

Further Issues:

2.5.11 Submitters commented on arrangements for independently provided connection assets. Some have suggested that, although parties should in principle be able to mutually-negotiate shared arrangements for new connection assets, in practice there is a need for intervention as a backstop. Submitters have also raised other issues in relation to connection arrangements.

2.5.12 Of the three options presented in the consultation paper for the treatment of static reactive compensation, submitters generally favoured either "connection asset definition" or "kvar charging". Transpower presented an alternative variant of kvar charging for consideration. There were strong views against both the status quo and amended status quo which rely on the terms of the Connection Code.

2.6 Further Authority analysis following stage 2 submissions

2.6.1 The Authority has completed further work in response to submissions and in order to further refine the options for consideration during stage 3. Work includes:

Submitter concerns on the use of GEM for analysis of the benefits of locational signalling

2.6.2 The Authority has considered concerns particularly from Norske Skog and MEUG on the use of GEM and is completing a response on these concerns.

Flow tracing

2.6.3 The Authority has completed further analysis on flow tracing, particularly to investigate submitter concerns that a flow tracing approach would be unpredictable and unstable on a year-by-year basis. This work has been presented to TPTG.

Bespoke pricing

2.6.4 Covec has completed a paper that considers both submitter concerns and develops two models for bespoke pricing - a general and a specific version. This work has been presented to TPTG.

Capacity rights

2.6.5 The Authority has reviewed the NZIER capacity rights proposal in more detail and suggested design changes that might improve the proposal. This work was presented to TPTG, but elements of this work have been disputed by NZIER. The Authority is meeting with NZIER to come to a consensus view on a workable proposal for capacity rights.

HVDC options

2.6.6 The Authority has drafted responses to submitter comments on the HVDC options, but this work has not yet been discussed with stakeholders or the TPTG.

Appendix A Key reports and papers

Date	Document Title	Author	Location
Feb 07	Locational Transmission Pricing: A Formulaic Approach	Grant Read (for Mighty River Power)	http://www.ea.govt.nz/document/6615/download/our-work/programmes/priority-projects/transmission-pricing-review/
Jun 09	Report on Transmission Pricing Methodologies 1998 - 2008	Strata (for EC)	http://www.ea.govt.nz/document/6617/download/our-work/programmes/priority-projects/transmission-pricing-review/
Jul 09	Theory of Efficient Pricing of Electricity Transmission Services	Frontier (for EC)	http://www.ea.govt.nz/document/6613/download/our-work/programmes/priority-projects/transmission-pricing-review/
Jul 09	International Transmission Pricing Review	Frontier (for EC)	http://www.ea.govt.nz/document/6614/download/our-work/programmes/priority-projects/transmission-pricing-review/
Aug 09	Transmission Pricing Issues identified by TPTG	Strata (for EC)	http://www.ea.govt.nz/document/6618/download/our-work/programmes/priority-projects/transmission-pricing-review/
28 Aug 09	NZ Transmission Pricing Project: Report to NZ Electricity Industry Steering Group (subsequently considered in the CEOs Forum)	NERA (for NZEISG / CEOs Forum)	http://www.ea.govt.nz/document/6616/download/our-work/programmes/priority-projects/transmission-pricing-review/
Oct 09	Transmission Pricing Review: High Level Options (Stage I consultation)	EC	http://www.ea.govt.nz/document/12312/download/our-work/consultations/transmission/tpr/
Sep 09	Identification of High-level Options and Filtering Criteria (Appendix B of EC Stage I Consultation Paper)	Frontier (for EC)	http://www.ea.govt.nz/document/12313/download/our-work/consultations/transmission/tpr/
Mar 10	Transmission Pricing Review: High Level Options (Stage I consultation) Summary of Submissions	EC	http://www.ea.govt.nz/document/3727/download/our-work/programmes/priority-projects/transmission-pricing-review/
Jul 10	Transmission Pricing review: Stage II Options Consultation Paper	EC	http://www.ea.govt.nz/document/9992/download/our-work/consultations/transmission/tpr-stage2options/

Date	Document Title	Author	Location
Jul 10	Further analysis including consideration of Stage I submissions and assessment of high level options (Appendix 2, Stage II Consultation Paper)	EC	http://www.ea.govt.nz/document/9993/download/our-work/consultations/transmission/tpr-stage2options/
Jul 10	Analysis of the potential benefits of locational signalling for economic transmission investment (Appendix 3, Stage II Consultation Paper)	EC	http://www.ea.govt.nz/document/9995/download/our-work/consultations/transmission/tpr-stage2options/
Jul 10	HVDC charge analysis to support Transmission Pricing Review (Appendix 4, Stage II Consultation Paper)	EC	http://www.ea.govt.nz/document/9994/download/our-work/consultations/transmission/tpr-stage2options/
Jul 10	Static Reactive Power Compensation (Appendix 5, Stage II Consultation Paper)	EC	http://www.ea.govt.nz/document/9996/download/our-work/consultations/transmission/tpr-stage2options/
Oct 10	Transmission Pricing review: Stage II Options Consultation: Summary of Submissions	EC	http://www.ea.govt.nz/document/12634/download/our-work/consultations/transmission/tpr-stage2options/submissions/
11 Oct 10	Bespoke Pricing Signals	Covec (for EC)	A copy of this report that was reviewed by TPTG is available at: http://www.ea.govt.nz/document/11975/download/our-work/advisory-working-groups/tptg/tptg-meeting-21-october-2010/
28 Nov 10	Flow Tracing Analysis	EA	A copy of this report that was reviewed by TPTG is available at: http://www.ea.govt.nz/document/12160/download/our-work/advisory-working-groups/tptg/7Dec10/
30 Nov 10	NZIER Capacity Rights Proposal Implementation Issues	EA	A copy of this report that was reviewed by TPTG is available at: http://www.ea.govt.nz/document/12161/download/our-work/advisory-working-groups/tptg/7Dec10/