

31 October 2019

Jean-Pierre De Raad
Manager, Network Pricing
Electricity Authority
By email to submissions@ea.govt.nz

Dear Jean-Pierre

Transmission pricing review – cross-submission

1. This is a cross-submission by the Major Electricity Users' Group (MEUG) on the submissions of the 92 other parties that closed 1st October on the Electricity Authority consultation paper "Transmission pricing review, 2019 issues paper" dated 23rd July 2019 (the "2019 proposal").¹
2. MEUG members have been consulted in the preparation of this submission. This submission is not confidential. Some members may make separate submissions.
3. Attached and to be read as part of this submission is a report by Mike Hensen of NZIER "TPM 2019, Review of expert submissions on the CBA" dated 30th October 2019.
4. References to paragraphs and page numbers in submissions are enclosed in square brackets.

The cost benefit analysis (CBA)

5. In our submission on 1st October we stated [9]:

"The intention of MEUG is to make a cross-submission by the 31st October due date with a view at that date on whether we think the CBA is robust considering advice from NZIER and other submitters."
6. Following publication of the submissions of other parties we met with most submitters that had tabled reports by independent experts that commented on the CBA.² The expert reports by those other parties and the attached advice from NZIER has led MEUG to defer forming a view in this cross-submission.

¹ Refer [Electricity Authority TPM web page](#).

² We meet with Axiom for Transpower, Houston Kemp and John Culy for Trustpower and NERA for Meridian Energy.

7. There remain a number of key questions which remain unanswered, or where clarity is needed. These questions or points are noted in the earlier NZIER advice attached to our submission on 1st October and those identified in the NZIER advice attached to this cross-submission.
8. MEUG suggests the most efficient way forward is for the Authority to hold a conference with expert advisors to submitters. Those expert advisors should be subject to the High Court rules of conduct for expert witnesses.
9. A conference would be an opportunity for the Authority to put on the record the questions or objections of expert witnesses and the response to those experts by the Authority. This will assist the Authority retain or amend the CBA and/or proposed draft TPM guidelines. The conference is also an opportunity to demystify the complexity of the CBA that has caused uncertainty for MEUG and many other parties.
10. MEUG's suggestion for a conference aligns, apart from one point of difference, with the submission by Transpower [p3]:

“We consider such a material change in approach to transmission pricing should be supported by a CBA that achieves a high level of acceptance from the experts who review it. We are therefore interested to hear the opinion of experts commissioned by other submitters, and from the Authority as to its confidence in how its proposal would benefit consumers over these timeframes. We repeat our recommendation that these views could be effectively and efficiently tested through an industry-wide conference.”
11. The point of difference is that MEUG recommends the conference be conducted under the High Court protocol for expert witnesses and therefore only expert advisors be invited to answer questions by the Authority on the CBA. The conference should not be a popularity contest nor should its scope be wider than the CBA. The conference should be public and open to all interested parties to attend.

Direction versus details of the draft guidelines

12. Until we can have confidence that the CBA is robust, we have not invested a lot of time on the details of the draft guidelines in this cross-submission. If the CBA is not robust then the debate on the details is premature. What matters is whether the direction and timing of changes proposed in the draft guidelines is supported by a CBA.
13. MEUG agrees with the expert advice of The Lantau Group (p10) to The TPM Group:

“We agree with the Authority insofar as there is an emerging case for change from the status quo. There is logic to reducing avoidance behaviour to some degree, as well as the possibility of some pragmatic progress in aligning payments to beneficiaries over time.”

14. We interpret the advice of The Lantau Group as being it's not a matter of if there should be a change to a benefit-based charge, the question is when? That much is clear for new grid investments.³ A secondary question is whether a shift to benefit-based charges is the way to reduce avoidance behaviour for existing sunk assets also? Clarifying the CBA as proposed above is therefore the first and necessary step to ensure the draft TPM guidelines will set the direction and give flexibility to Transpower to propose and implement changes to the TPM that will lead to outcomes in the best long-term benefit of consumers.

Yours sincerely



Ralph Matthes
Executive Director

³ Coincidentally the final report of the Electricity Price Review dated 21st May and published 3rd October 2019 also reached this conclusion when recommending a Government Policy Statement on transmission pricing include the policy to “allocate the costs of future grid investments on a beneficiaries-pays basis.” Refer <https://www.mbie.govt.nz/assets/electricity-price-review-final-report.pdf> p48.

TPM 2019

Review of expert submissions on the CBA

NZIER report to MEUG

30 October 2019

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Key points

Focus on expert reports

This report reviews eight independent expert reports (five quantitative and three qualitative) which were submissions on the Transmission Pricing Methodology Issues Paper¹(TPM 2019) and the supporting cost benefit analysis² (CBA).

Three of the quantitative reports (HoustonKemp and John Culy Consulting for Trustpower and Axiom for Transpower) are critical of the TPM 2019 CBA. They argue the benefits of TPM 2019 are massively overestimated³ and the modelling is based on unrealistic assumptions about demand and supply response.

The three qualitative reports (Creative Energy Consulting for Trustpower, The Lantau Group for the TPM Group⁴ and Professor Bunn for Vector) agree that the TPM 2019 CBA is weak but have different criticisms of the modelling assumptions and methodology.

Of the two quantitative expert reports that ‘support’ the TPM 2019 CBA:

- NERA describes the estimated efficiency gain as plausible based on a conceptual assessment of the TPM 2019 CBA⁵ and a crosscheck against estimates of inefficiency caused by taxes and mergers.
- Orbit ‘checks’ the vSPD modelling completed by the EA and argues that it is suitable for calculating the benefits to grid users required to allocate benefit charges for the selected historical assets in Schedule 1 of the TPM 2019.

TPM 2019 CBA relies primarily on the benefit of improved grid use

The TPM 2019 proposes replacement of the annual allocation of interconnection charges based on regional coincident peak demand with:

- A new allocator such as anytime maximum demand (AMD) that:
 - shifts some of the interconnection costs from EDB connected consumers to some consumers directly connected to the grid
 - makes it difficult for any consumers to avoid their historically determined share of interconnection costs
- Benefit based charges that re-allocate the cost of some grid assets and new grid assets.

The TPM 2019 CBA estimates that the change to interconnection charge allocation will deliver a net benefit to consumers (an increase in consumer surplus) by:

¹ ‘2019 issues paper, Transmission pricing review, Consultation paper, 23 July 2019’ Electricity Authority.

² CBA approach, methods and assumptions, TPM issues paper 2019, Technical paper, Information paper, 23 July 2019’ Electricity Authority.

³ Axiom and Houston Kemp argue the benefits are mainly wealth transfers from generators to consumers and that the costs exclude the cost of additional generation capacity.

⁴ The TPM Group includes Trustpower and Vector.

⁵ However, NERA also suggest it would be useful if the TPM 2019 CBA ‘explained further’ the treatment of the cost of additional generation



- Initially Increasing EDB connected consumer electricity demand over the peak (1,600) trading periods⁶
- Subsequently increasing electricity supply while lowering wholesale electricity prices.

How does CBA help?

Cost benefit analysis is a tool for comparing two or more future ‘states of the world’ (SOW) in common units – welfare. The CBA uses simplifying assumptions about the current SOW and modelling to forecast the future SOW. The differences between the current and alternative future SOW are used to calculate net benefits of a change and also assess the issues and risks of moving each SOW.

To assess a CBA, it is normal practice to examine the degree to which the:

- assumptions and modelling reflect key aspects of reality (that are material for the changes being considered)
- parameters used in the model (in this case demand elasticities) are aptly estimated and then applied to scenarios that do not undermine the reliability of the estimate
- the adjustment path within each SOW is credible – in particular are the signals for changes in behaviour being modelled in the way that they are likely to be sent, received and reacted to, based on current experience.

Expert assessment of TPM 2019 CBA

Most of the expert reports argue that the modelling methodology is flawed and that the net benefits are massively overstated. Several of the reports argue that the TPM 2019 CBA cannot be simply adjusted to correct for omitted costs or overstated benefits but that it cannot be applied to assess TPM 2019 proposal. The expert assessments of the TPM 2019 CBA are summarised in Table 1 on the following page.

Way forward

To make progress on TPM reform the fundamental differences between the TPM 2019 CBA modelling of ‘more efficient grid use’ and the arguments in the critical expert reports need to be resolved. There needs to be consensus that the modelling reflects both the current reality of electricity demand and supply and a plausible pathway for change in pricing structures so that attention can shift to estimating the costs and benefits of different TPM options. A starting point for this process would be an expert discussion on how to:

- Model pass-through of transmission costs to EDB connected consumers and generator investment decision-making using assumptions that more closely reflect current market practice
- Compare options to reduce reliance on the regional coincident peak demand (RCPD) to allocate interconnection charges with the status quo and the abolition of RCPD,

⁶ EDB connected consumer price elasticity of demand (for wholesale prices plus transmission costs) is estimated to be higher over this period than the shoulder and off-peak periods and also higher than the elasticity of demand for industrial consumers directly connected to the grid.

including modelling of the short term response of direct connect consumers to these changes.

Table 1 Expert report assessment of TPM CBA 2019

Summary of key comments

Expert report	Assumptions	Costs	Benefits	Overall
Quantitative				
Axiom	Generator and consumer demand response are incorrectly modelled.	Grid upgrade costs underestimated, Extra generation and network costs omitted.	Consumer surplus estimate includes wealth transfer.	CBA does not model the TPM 2019 proposal and is irredeemably flawed.
HoustonKemp	Generator response is incorrectly modelled.	Grid upgrade costs underestimated; Extra generation and distribution costs omitted.	Consumer surplus estimate includes wealth transfer. No rationale for averaging benefit estimates.	The CBA overstates the benefits and understates the cost of TPM 2019. After adjusting for these errors, the TPM 2019 CBA net benefit is negative.
John Culy	Battery capacity to smooth peaks is overestimated	Battery costs and cost of related control systems are underestimated.	Benefits of battery investment (amount of peak period grid use they can avoid) is overstated	Additional capacity and net benefits are overstated by a factor of 6.
NERA	Accept TPM 2019 problem definition	Assessment of costs is reasonable, but exclusion of extra generator costs should be explained.	Estimate of efficiency gains passes crosscheck test.	TPM 2019 CBA is credible and estimated efficiency gains appear reasonable.
Orbit	vSPD can be used to estimate benefits of historical assets.	NA.	NA.	Benefit estimates are objective and 'market-like' way of estimating benefits of historical assets to consumers.
Qualitative⁷				
Lantau Group	Problem definition is wrong. RCPD modification should be considered.	Wealth transfer from generators to consumers is ignored.	Grid use benefit cannot be calculated reliably.	Comparison of two extreme scenarios gives an extreme but irrelevant result
Professor Bunn	CBA time period should be 10 to 12 years instead of 30.	NA.	RCPD removal should not be central to the benefit calculation but should be approved on principle.	CBA looks speculative.

Source: EA TTPM 2019

⁷ The report by Creative Energy Consulting is not assessed in this table as it discusses a set of principles rather than the CBA.

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1 Scope

1.1 Focus on expert advice and Transpower options

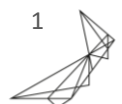
The primary focus of this report is the expert advice included in submissions to the Electricity Authority (EA) about the cost benefit analysis (CBA) of the Transmission Pricing Methodology proposal (TPM 2019). The report considers the following:

- How robust is the CBA? Most of the independent expert reports on the TPM 2019 CBA question both the credibility of the net benefit estimates and the suitability of the methodology for assessing the TPM 2019 proposal.
- Key themes and areas of divergence in the advice of the experts for other submitters
- Translation of the key divergences between advice of experts into estimates of the impact on the CBA and the net present value (NPV) of the proposal.
- Transpower's flexibility to suggest alternatives to TPM 2019 (other than the cost allocation in Schedule 1) and what effect this might have on the CBA.

1.2 Expert advice

This report covers expert advice included in the following submissions:

- Transpower advice from Axiom economics – very critical of the CBA describing it as 'irredeemably' flawed because it includes wealth transfers in the benefits and ignores generation and distribution costs
- Trustpower advice from:
 - HoustonKemp – TPM 2019 CBA massively over-estimates the net benefits due to omission of additional generation (and distribution costs) required to meet the increase in electricity demand over the peak period
 - Creative Energy Consulting – qualitative critique of TPM 2019 analysis of nodal pricing, long term transmission pricing, residual charges and the rationale for beneficiary pays charges and makes passing comment about the TPM 2019 CBA
 - John Culy Consulting – TPM 2019 CBA over-estimated the investment in batteries by a factor of 6 due to errors and inappropriate assumptions about battery investment and operation
 - The Lantau Group – qualitative critique of the TPM 2019 CBA made four key comments:
 - The current regional coincident peak demand (RCPD) charge is clearly far too high during the peak period and there is a case for change from the status quo
 - The business as usual (BAU) scenario (RCPD based allocation of interconnection charges) is flawed and should not be used as the status quo without consideration of modification of the RCPD based charge as an alternative to the abolition of RCPD based charges



- The measures of grid use benefit in the TPM 2019 CBA are not credible and at most provide a measure of how much the RCPD based charge exceeds the long term avoided cost of transmission
- Benefit-based charges are extremely difficult to design and implement so that they achieve the results expected in the TPM 2019 CBA. The TPM 2019 has not addressed these issues in enough detail for the benefits to be included in the CBA

- Vector advice from Professor Bunn – qualitative critique of the TPM 2019 CBA which argues:

- RCPD should be removed as a matter of principle and should not be a key part of the CBA
- Beneficiary pays modelling in the CBA is weak because TPM 2019 does not resolve key issues: such as identification of beneficiaries and benefits and the dynamics of the cost re-allocation if use of asset changes
- the CBA should have been modelled over a shorter period 10 to 12 years.

the CBA of this price mechanism change as if were a long term physical infrastructure project is not just inappropriate but makes it look dubiously speculative and over-advocated.⁸

- Meridian advice from:

- NERA – predominantly a qualitative discussion of the TPM 2019 CBA that summarises the TPM 2019 CBA outputs. NERA is:

broadly supportive of the proposed design of the benefit-based and residual charges⁹...

The Authority's cost benefit analysis ("CBA") captures this interdependency and more generally appropriately approaches the quantification.

The strongest assessment statement about the CBA is based on a crosscheck of estimates of allocative inefficiency from examples such as labour tax, exercise of market power and analysis of the impact of mergers. NERA concludes that:

*None of these studies are directly on point, but they do suggest that the \$2.6b efficiency gain seems to be **quite plausible**. This is particularly the case given the \$2.6b consists of productive as well as allocative efficiency gains.¹⁰*

- Orbit Systems was asked to validate the approach (vSPD modelling) used in the TPM 2019 CBA to allocate the benefit charges for selected historical assets to consumers (Schedule 1 of TPM 2019) and concluded:

⁸ 'A Commentary on the Electricity Authority 2019 Issues Paper on the Transmission Pricing Review', Professor Derek Bunn, September 25, 2019, page 10.

⁹ There are some minor exceptions to this statement.

¹⁰ 'Review of Electricity Authority's transmission pricing review 2019 papers, Meridian Energy, 1 October 2019', Project team: James Mellsop, Will Taylor, Raul Arias page 17. Emphasis on '**quite plausible**' added in this report.



*the Authority's **methodology** is robust and objective – resulting in a market-like way to identify the beneficiaries of each pre-2019 asset.¹¹*

1.3 Conclusion

Most of the expert reports are critical of the TPM 2019 CBA and suggest either that the benefits of TPM 2019 are massively overestimated or that the CBA does not make a strong case for the removal of RCPD based allocation of interconnection charges and the introduction of benefit-based charges.

The quantitative expert reports (Axiom and HoustonKemp both of which are critical of the CBA) argue that the net benefits are massively overestimated because generation and distribution costs are not included, battery investment opportunities are overestimated and the claimed benefits include wealth transfers from generators to consumers.

The qualitative expert reports which are critical of the CBA (Creative Energy Consulting, The Lantau Group and Professor Bunn) agree that the TPM 2019 CBA is weak but have different criticisms of the modelling assumptions and methodology. The Lantau Group and Professor Bunn reports take different positions on the continuation of the RCPD charge and the implementation of benefit-based charges.

The quantitative expert report (NERA) that 'broadly' supports the TPM 2019 CBA describes the estimated efficiency gain as 'plausible' based on a conceptual assessment of the TPM 2019 CBA and a crosscheck - comparison of the CBA with examples of allocative inefficiency in other contexts such as taxation and mergers.

The expert report (Orbit) that supports the calculation of the benefit based charges is a check on the vSPD modelling completed for TPM 2019. but does not provide a detailed comment on the identification and estimation of benefits that can be compared to the expert advice that is critical of benefit based charges.

The two expert reports that support the TPM 2019 CBA are not easily compared with the reports that are critical of the CBA as they do not include quantitative or qualitative arguments that address those in the critical reports. These reports are reviewed in section 3 separately from the reports that criticise the CBA in section 2.

¹¹ 'Transmission Pricing Methodology: Review of Schedule 1 modelled beneficiaries of existing transmission assets Prepared for Meridian Energy by Orbit Systems Ltd 30 September 2019' page2. Emphasis on '**methodology**' added in this report.

2 Expert reports critical of the TPM 2019 CBA

2.1 TPM 2019 CBA

The main source of benefits in the TPM 2019 CBA is increased use of the grid at peak demand periods which is conditional on the following key assumptions:

- Increased demand for electricity from EDB connected consumers over a peak (of 1600 trading periods) based on:
 - EA estimates of wholesale electricity price (plus transmission charges) elasticities¹² of demand
 - an increase in the exposure of EDB connected consumers to peak pricing based on the TPM 2019 CBA from near zero¹³ now to 50 percent by 2035 and 100 percent by 2050. (The EA does not provide any explanation for this increase in take-up of ‘time of use’ pricing and does not model any alternative scenarios involving slower or faster take-up of time of use pricing.)
- Generators meeting this increase in demand at lower wholesale prices (with a lag) based on an investment decision-making rule that considers generation asset profitability in the first year of the investment only.
- The above benefits are net of any additional transmission costs while additional distribution costs are ignored.

Table 2 TPM 2019 CBA

Summary of NPV of costs and benefits over the period 2022 to 2050

Main benefit or cost	NPV (\$m)	Explanation
More efficient grid use	2,390	Increasing electricity use at peak times and lower wholesale prices net of additional transmission costs and unused recent grid investment
More efficient investment in batteries	202	Avoidance of inefficient investment in batteries (3,100 MW of capacity) and other transmission cost avoidance
More efficient investment and increased certainty for investors	146	Benefit based charges for new transmission assets drive more efficient investment in transmission, generation and consumer connection decisions
Other costs	-26	TPM development/approval, implementation and operation
Net benefit	2,711	

Source: TPM 2019 Table 4 page 21

¹² TPM 2019 CBA estimates of the retail price elasticity of demand were unusable for the analysis as they delivered a small positive value in other words, the elasticity estimate implied demand increased with price.

¹³ The TPM 2019 CBA uses the proportion of consumers buying electricity from retailers that expose their consumers to wholesale electricity prices such as Flick Energy as an indicator of the proportion of customers exposed to RCPD based allocation of interconnection charges. This correctly measures the proportion of consumers exposed to generator driven peak costs but overestimates the proportion of consumers exposed to transmission charges as EDB pricing policy determines the pass-through of transmission costs to consumers.

The main driver of benefits in the TPM 2019 CBA is the increase in electricity use at peak periods driven by a fall in the transmission cost pass-through to EDB connected consumers during the peak period assumed by the EA. The EA attributes this to the replacement of the allocation of interconnection charges using share of regional coincident peak demand (RCPD) with allocation based on historical anytime maximum demand (AMD) and an 'S' curve type adoption of pass-through of transmission costs during the EA assumed peak period. The change from RCPD to historical AMD has two effects:

- Moving from RCPD to historical AMD or another historical allocator:
 - increases the allocation of transmission costs to consumers that have suppressed demand (over a subset of the trading periods within the peak 1,600 trading periods as defined in the TPM 2019 CBA)
 - lowers the allocation of transmission costs to consumers that are assumed to place a higher value on consumption of electricity over the peak 1,600 trading periods (as defined in the TPM 2019 CBA).
- Using a historical allocator with a long adjustment lag limits the ability of consumers that have suppressed demand in the past to adjust their consumption patterns to reduce their allocation under the new measure.¹⁴

The TPM 2019 CBA calculates this benefit as an increase in consumer surplus – effectively the change in the difference between the price each consumer would pay for electricity and the price they actually paid multiplied by the quantity demanded at each price (using the elasticities estimated in the TPM 2019 CBA).

The estimated gains from benefit based charging are a small part of the NPV of the benefit claimed by the TPM 2019 CBA due to a combination of the modest¹⁵ efficiency gains assumed for the investment decisions and the very gradual displacement of the residual by benefit based charges.

2.2 Core assessment problem

The credibility of the TPM 2019 CBA depends on the plausibility of the scenario for 'more efficient grid use'. The previous NZIER report¹⁶ questioned the plausibility of the scenario because the modelling of transmission cost pass-through to EDB connected consumers did not reflect the current reality and was unlikely to reflect the future. In other words, EDB connected consumer demand for electricity would not increase at the EA peak period because these consumers were not receiving the demand suppressing signal from RCPD allocation of interconnection costs that the EA modelled.

The quantitative expert reports compared in section 2.3.1 below have focused on the costs of supplying increased demand and argue within the framework of the TPM 2019 CBA that it underestimates the cost of meeting the additional demand and that when these costs are added back the NPV of TPM 2019 benefits is negative. Effectively these reports say that it is not plausible that the increased demand would be supplied at the price modelled in TPM.

¹⁴ 'TPM 2019 Cost benefit analysis, Initial review, NZIER report to MEUG, 1 October 2019' attached to the MEUG submission on TPM 2019.

¹⁵ The quantitative expert reports that are critical of the TPM 2019 CBA argue that even these 'modest' gains are overestimated and that the benefit based charges are likely to be contentious and therefore reduce the durability of the TPM.

¹⁶



Therefore, the increased grid-use benefit that depends on the reduction in wholesale prices will not be realised.

2.3 Comparison of the critical expert reports

This section summarises the quantitative reports (Axiom, HoustonKemp and John Culy Consulting) separately from the qualitative reports (The Lantau Group, Creative Consulting, and Professor Bunn) because they have different implications for the next steps in the reform of transmission pricing.

The quantitative reports argue that the:

- TPM 2019 CBA has flawed assumptions and internal inconsistencies
- Correcting these errors makes the NPV of TPM 2019 negative.

The quantitative reports point out that the TPM 2019 CBA compares two extreme options and rely on adjustment rules for consumers and generators that do not reflect current behaviour, have a weak evidence base and do not seem to be credible. The reports also note that the benefits do not materialise until after 2035. However, the reports still analyse the TPM 2019 CBA piecewise and do not provide an assessment of whether the increase in demand and supply modelled in TPM 2019 CBA is likely to occur.

The qualitative reports do not provide alternative estimates of the NPV of the benefits of transmission pricing reform. All of the reports argue that the TPM 2019 CBA has major weaknesses and ignores overseas experience particularly with respect to benefit-based charges. Two of the reports raise concerns about the long time period used for the modelling each of the reports differs on what the key elements of transmission pricing reform should be and elements of TPM 2019 that are usable.

2.3.1 Quantitative reports

The quantitative expert advice has focused on the plausibility and completeness of the TPM 2019 CBA modelling. In particular, the conclusions that:

- Increased electricity demand from EDB connected consumers will eventually be supplied at at lower wholesale prices
- Costs of increased generation capacity are correctly included.

The HoustonKemp/John Culy¹⁷ and Axiom reports identify similar internal inconsistencies in the TPM 2019 CBA methodology and conclude that the NPV of the benefits is negative. The key elements of their arguments are summarised in Table 3 below.

¹⁷ For investment in batteries to avoid RCPD charges.



Table 3 Quantitative report comparison

Axiom and HoustonKemp

CBA element	Houston Kemp with John Culy (battery investment analysis)	Axiom
Change in consumer surplus	<p>Will only be about \$50 million compared with TPM 2019 CBA estimate of \$2,360 million.</p> <p>TPM 2019 CBA ignores new generation cost of \$1,940 million, underestimates the additional transmission costs required to meet the increased peak demand by \$136 million¹⁸ and should include additional distribution network costs estimated at \$292 m.</p>	<p>Most of the \$2,600 million increase in consumer surplus estimated in the TPM 2019 CBA is a wealth transfer from generators to consumers and relies on irrational investment decisions by generators.</p> <p>The assumption that EDB connected consumers respond to wholesale and transmission price signals at the TPM 2019 CBA peak period is key to the modelling but is unrealistic¹⁹.</p> <p>Additional distribution costs estimated at \$27 to \$81 million and the additional cost of carbon emissions due to higher peak demand are both ignored.</p> <p>Addressing these errors imply the TPM 2019 would have a negative NPV.</p>
Avoided investment	<p>HoustonKemp argues TPM 2019 CBA battery investment modelling assumptions are implausible.</p> <p>John Culy Consulting report estimates that at most an additional 400-500 MW of battery capacity would be installed (compared with about 3,100MW in the TPM 2019 CBA). This suggests the NPV of the benefit from avoiding investment in batteries is more likely to be \$30 to \$40 million than the \$200 million estimated in the TPM 2019 CBA.</p>	<p>TPM 2019 CBA battery investment modelling assumptions underestimate the cost of batteries and like the generation investment rule, the battery investment rule does not consider future energy prices.</p> <p>Also, the price caps and floors assumed on the TPM 2019 CBA electricity price modelling prevents convergence between peak and shoulder prices artificially supporting the returns on battery investment.</p>
More efficient investment	<p>TPM 2019 CBA estimates are unreliable because of uncertainty over what assets will be covered and the reliance on relatively high electricity price elasticity.</p>	<p>TPM 2019 CBA estimates are unlikely to be realised. Benefit based charges would not provide a predictable, accurate signal of Transpower's long-run costs grid users.</p>

Source: NZIER

2.3.2 Qualitative reports

The expert reports by The Lantau Group and Professor Bunn cover similar topics but take different perspectives on the continuation of RCPD allocation of interconnection charges and are compared in Table 4 below.

¹⁸ The TPM 2019 CBA estimates the NPV of the increased transmission costs at \$188 million based on the average of two of its scenarios. HoustonKemp argue that the 'all major capex' estimate of \$328 million should be used.

¹⁹ These comments are made in Appendix B.2.1 of the Axiom report and also note that experience in other infrastructure sectors such as telecommunications shows mass market consumers have a strong preference for simple flat rate fees such as 'all you can eat' fixed monthly fee broadband plans or fully variable 'pay as you go' prepay mobile plans. Neither of these types of charge signal the cost of using the infrastructure at peak times to mass-market consumers.

Table 4 Qualitative report comparison

The Lantau Group and Professor Bunn

Report comment	The Lantau Group	Professor Bunn
CBA quality	TPM 2019 CBA is conceptually flawed. More efficient grid use should be excluded from the CBA because it cannot be reliably calculated ²⁰ . Also, the business as usual (BAU) RCPD is too high and could be recalibrated without the extreme change proposed in TPM 2019.	The reliance of the TPM 2019 CBA on benefits over 2030 to 2050 raises doubt the robustness of the CBA. Ten to twelve years should be long enough for this type of price change. RCPD removal should not be the main part of the CBA calculation.
RCPD role	Spread the RCPD charge over more hours so that it is no greater than the long-run avoidable cost of transmission estimated by Transpower	RCPD allocation of costs should only be retained to the extent that it reflects scarcity of transmission capacity in a region.
Benefit based charges	Resolve the pre-requisites for effective beneficiary pays before implementation. Implementation of beneficiary pays is difficult and uncertain because there are: <ul style="list-style-type: none"> • multiple points of potential divergence between the approval of investment and the pricing of the investment • different types and timing of benefits e.g. reliability and price reduction Do not apply beneficiary pays to legacy assets (as there is no compelling economic case for this) other than the HVDC.	Application of beneficiary pays charges to legacy assets is contentious and TPM 2019 does not provide a clear rationale for the proposed application of benefit based charges to the legacy assets. A benefit based charge implies a contract with a group of customers that could be contestable over time. The EA indication that it does not have a solution to dynamic effects is unsatisfactory.
Modelling period	The long modelling period provides an opportunity to weaken the RCPD signal as part of a transition to a new TPM	The modelling period for a change in price mechanism should be 10 to 12 years.

Source: NZIER

The Creative Energy Consulting report covers topics that are difficult to compare with the other two qualitative reports. The main points are:

- The EA needs to allow ‘effective and flexible’ administered transmission (peak demand) charges as actual nodal price outcomes are unlikely to match the EA ideal
- Nodal pricing supplemented by ‘deep connection charges’ is preferable to ‘beneficiary pays’ for ensuring efficient long term investment in the grid.²¹
- Recovery of residual charges should be based on Ramsey pricing principles
- TPM 2019 will not be durable because it is not ‘Intuitively reasonable’, ‘does not offer a clear trajectory for the future’ and is not flexible enough to remain ‘Intuitively reasonable’ in the future.

The Lantau Group report also made three principle recommendations:

²⁰ The Lantau Group also questions how useful the elasticities are for estimating change in demand where when the prices have been ‘too high for a long period’.

²¹ The report also states that TPM 2019 does not produce any evidence that ‘beneficiary pays’ charges improve the effectiveness of transmission planning by encouraging investment scrutiny.

- retain the RCPD charge but increase the number of measurement periods so that the resultant RCPD reflects the long run avoidable cost of transmission
- resolve the pre-requisites for an effective beneficiary pays approach before implementing beneficiary pays
- do not revisit legacy investments except for the HVDC

2.4 Conclusion

The expert reports that are critical of the TPM 2019 CBA argue that it does not make a convincing case for TPM 2019. In the case of the quantitative reports this is because the:

- Methodology is wrong – wealth transfers are treated as efficiency gains and material costs elements (generation and distribution network upgrades are omitted)
- Adjustment path - an increase in peak demand and peak supply at lower wholesale prices is not credible.

In the case of the qualitative reports this is because the CBA:

- should not depend on 'more efficient grid use'
- implementation details of the benefit-based charges are not described fully enough to provide confidence that they will work as intended.



3 Expert reports that support the TPM 2019 CBA

3.1 NERA review of TPM 2019 papers

The NERA report includes the following key sections and comments on the TPM 2019 CBA:

- ‘3. Problem definition’. NERA comments on and supports the TPM 2019 problem definition with respect to the need for a benefit based charge (for future investments and the HVDC) and allocative inefficiency caused by the RCPD charge
- ‘4. Our views on the proposal’: NERA
 - Considers ‘*a benefit-based approach to be an appropriate one (efficient and fair) and in accord with workably competitive market outcomes.*’
 - Supports recovery of the residual charge from load only on the basis that the grid has elements of a two-sided (generators and load) market
 - Agrees that nodal prices are sufficient to signal the need for future grid investment where there is congestion
- ‘5. Cost benefit analysis’: NERA
 - Accepts the TPM 2019 CBA modelling of the interdependence between the grid and the operation of the wholesale market
 - Notes that the TPM 2019 CBA excludes the cost of new generation investment and suggests the EA should explain the rationale for this distinction²² further
 - Describes the efficiency gain modelled in the TPM 2019 CBA as ‘plausible’ based on a comparison of allocative efficiency gains from other examples such as tax reform, deadweight loss caused by the exercise of market power and analysis of merger applications. (The measure is the allocative inefficiency as a percentage of total revenue.)

3.2 Orbit

Orbit assessed the modelling methodology used to produce Schedule 1 – allocation of benefits for seven major recent investments. (Schedule 1 was modelled using vSPD to estimate electricity prices and volumes delivered with and without each of the seven major investments.) Orbit found that the vSPD modelling completed by the EA was based on clear reasonable assumptions, generated reproducible results and was a robust and objective and ‘market-like’ way to identify the beneficiaries of the seven major investments.

3.3 Conclusion

These two reports only provide limited support for the TPM 2019 CBA. The NERA report supports the TPM 2019 CBA approach but questions the treatment of the cost of additional generation. This a key objection to the TPM 2019 CBA in the critical expert reports. The Orbit report does not address the design and implementation issues raised for benefit charges in the other reports.

²² This treatment of generation investment cost is different from the treatment of other costs such as grid investments brought forward.

4 Possible modification of TPM 2019 CBA

4.1 Introduction

This section briefly comments on the last two scope elements from section 1.1:

- Translation of the key divergences between advice of experts into estimates of the impact on the CBA and the net present value (NPV) of the proposal.
- Transpower's flexibility to suggest alternatives to TPM 2019 (other than the cost allocation in Schedule 1) and what effect this might have on the CBA.

4.2 Divergence between expert advice

The issues raised by the expert reports that are critical of the TPM 2019 CBA cannot be resolved by an adjustment to the TPM 2019 CBA net benefit estimate. Their primary criticism of the TPM 2019 CBA is that the methodology used is wrong and the proposed adjustment path is not credible rather than that the values of key modelling parameters or equations need to be adjusted.

Both the Axiom and the HoustonKemp reports argue that the extra generation costs need to be deducted from the net benefit estimate (and that wealth transfers should be excluded). Axiom estimates that correcting these issues would lower the NPV of the benefits to \$-1.5 billion. HoustonKemp estimates that correction of the issues would lower the NPV of net benefits to \$-2.3 billion. (This estimate does not include the \$0.17 billion reduction in the net benefit of avoided investment in batteries estimated in the John Culy report²³.)

The substance of Axiom and the HoustonKemp comments on the TPM 2019 CBA modelling of generation investment was that the investment decision rule was wrong. Neither report suggested an alternative. The question of generator investment response to increased demand at peak periods one of the key differences between these expert reports and the TPM 2019 CBA that needs to be resolved to deliver a credible consensus estimate of the impact of TPM 2019. The other key issue is the modelling of the change in EDB connected consumer demand in response to modification or abolition of RCPD based allocation of interconnection charges

The Creative Energy, Lantau Group and Professor Bunn reports suggest a revision of both TPM 2019 and the TPM 2019 CBA methodology. The effects of their proposed changes cannot be easily analysed within the TPM 2019 CBA framework.

4.3 Transpower flexibility

Transpower has the flexibility to adjust the number of periods used to measure the RCPD and the number of regions used. Unlike TPM 2019 these changes would not cause a substantial long term reallocation of interconnection charges. The CBA analysis for this type of change would centre on the small allocative efficiency gains from aligning the RCPD signal more closely with the avoidable cost of transmission potential changes and the change in timing of investment in grid capacity.

²³ The HoustonKemp and John Culy reports were both commissioned by Trustpower.

4.4 Next step

The key question is how to reconcile the fundamental difference between the TPM 2019 CBA modelling assumptions and methodology for 'more efficient grid use' with the arguments in the critical expert reports so that the modelling reflects both the current reality of electricity demand and supply and a plausible pathway for changes in pricing structures. A starting point for this process would be an expert discussion on how to:

- Model pass-through of transmission costs to EDB connected consumers and generator investment decision-making using assumptions the more closely reflect current market practice
- Compare options to reduce reliance on the RCPD to allocate interconnection charges with the status quo and the abolition of RCPD including modelling of the short term response of direct connect consumers to these changes.

