Review of the Transmission Pricing Methodology: CBA - Working Paper

Report to Genesis Energy

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Acronyms and Abbreviations

CBA	Cost Benefit Analysis
CGE	Computable General Equilibrium
HAMI	Half-hourly Anytime Maximum Injection
HVDC	High Voltage Direct Current
LRMC	Long Run Marginal Cost
NPV	Net Present Value
TPAG	Transmission Pricing Advisory Group
TPM	Transmission Pricing Methodology

1 Introduction and Summary

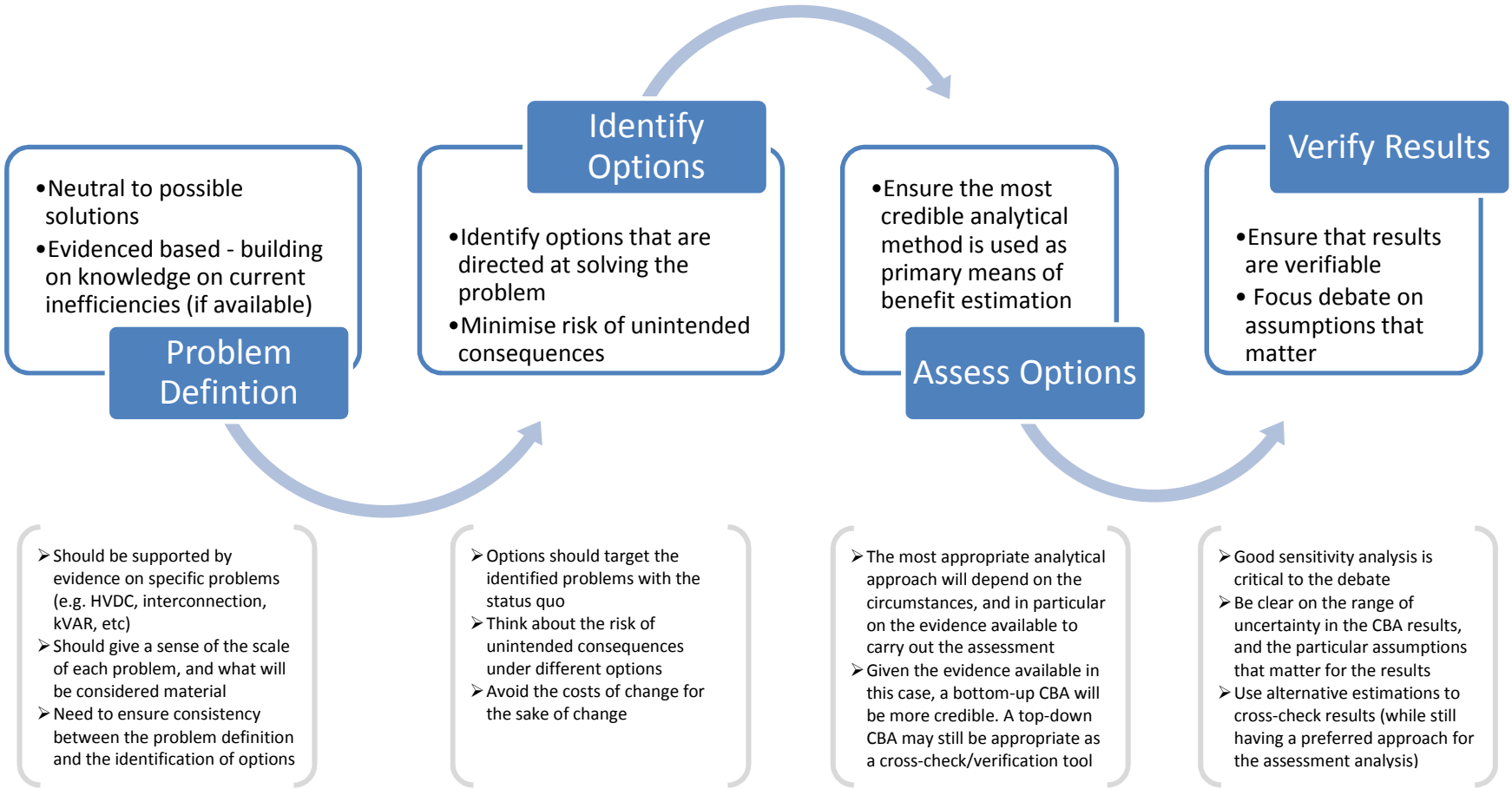
The Electricity Authority (the Authority) has released a working paper setting out its proposed approach to completing cost benefit analysis (CBA) for any proposed reform to the transmission pricing methodology (TPM).

The CBA approach described in the working paper is a clear improvement on the approach used to support the Authority's original TPM proposal (released in October 2012). Overall, we think the Authority has identified important framework issues for how the options analysis is carried out, and how the results of the analysis can be tested. However, the Authority's working paper does not cover important framework issues in deciding on a problem definition and identifying options that would address any problems. The purpose of this report is to provide our comments on how the CBA framework could be developed to ensure credible and defensible results.

We believe that the following four steps are critical to ensuring a complete and credible framework for CBA. These four steps are shown in Figure 1.1 on the following page, and discussed in the remaining sections of this report.

- **Using evidence to support the problem definition (Section 2).** The problem definition should be supported by evidence, should provide a sense of the scale of the problem, and should enable the Authority to distinguish between symptoms of the problem and underlying causes. The problem definition should also be framed in a way that builds on existing work and understanding of transmission pricing. These features of a good problem definition will help to minimise the risk of unintended consequences and avoid the costs of change when it would not be necessary.
- **Deciding how options will be identified (Section 3).** A good problem definition enables options to be identified that can be directed at solving the problem. A best practice CBA framework should describe how a set of options will be identified that are most likely to deliver improvements, most likely to be convincingly assessed against each other, and least likely to cause unintended consequences. Options should be complete, but should not target new objectives or perceived problems that are wider than the initial problem identified.
- **Ensuring that the most credible analytical method is used as the primary tool for estimating the benefits of reform (Section 4).** The analysis of options is the area where the Authority has made the most progress in developing its approach to the CBA. However, given the evidence available to carry out the CBA, we consider that a bottom-up approach will generate the most credible results and should therefore be the primary tool for analysing options.
- **Following a process that generates verifiable results (Section 5).** The approach to the CBA should provide stakeholders with the ability to clearly understand the relative importance of the assumptions used, and the range of uncertainty in the results. While not all participants will agree with the results, a good sensitivity analysis will provide stakeholders with the clarity to identify specific areas of disagreement, and provide input to a regulatory process that ultimately improves decisions. Alternative assessment approaches should be used to cross-check results, while still having a preferred (bottom-up) approach to the analysis.

Figure 1.1: Framework Steps for an Effective CBA



In addition to these substantive issues, we note that some of the points made in the working paper are not framework questions and will be matters that need to be addressed through the substantive CBA itself. For example, MC6 in table 2 addresses concerns relating to the Authority's estimates of the benefit of having fewer disputes over the TPM. In our view, this is an empirical question: if the Authority can credibly show that there will be fewer disputes under a reformed TPM and can quantify the savings generated by avoiding disputes, then these impacts should be included in the CBA. We see no conceptual or framework question in the concerns on this issue—rather that stakeholders were asking the Authority to demonstrate that the claimed benefit is actually plausible.

2 Defining the Problem

A good problem definition does not lead to a pre-determined outcome, but instead:

- Concisely states a situation that should be changed
- Provides evidence to support the conclusion that a problem exists
- Identifies who/what is affected and the nature of those impacts
- Quantifies the scale of the problem.

The Authority working paper does not yet provide sufficient confidence that a credible problem definition will underpin any proposed changes to the TPM. In our view, the working paper deals with some aspects of the substance of the problem definition, without first addressing the framework questions of how a convincing problem definition is put together. This section illustrates this concern by contrasting the problem definition that would support changes to the way that HVDC charges are levied, with one apparent problem definition for interconnection charges.

Framing the problem definition in a constructive way

Part One of the CBA framework working paper defines the problem in the following way:

> *"The current TPM can be improved so as to better promote competition in, reliable supply by and the efficient operation of, the electricity industry for the long term benefit of consumers. Specifically the inefficiencies in transmission cost recovery under the status quo result in inefficient investment in and operation of the electricity industry."*

To define this problem well, the Authority needs to do more than simply assert the existence of inefficiencies in the current charging regime. As the Authority has itself emphasised on many occasions, no TPM is perfect and there will always be some inefficiencies with transmission pricing (just as taxation creates deadweight loss). The issue to resolve through the problem definition is whether the total inefficiencies arising from transmission pricing can be reduced in a material way, and whether any changes will deliver benefits that outweigh the costs and risks of change with a reasonable degree of certainty.

Framing the problem correctly is important. In our view, the problem definition presented above appears to pre-suppose change, rather than establishing a case for change. A statement such as the one above can foreclose potential solutions – in this case doing nothing or changing a particular element of the existing TPM that is demonstrably not working.

In this case a more helpful and open problem definition might involve testing a hypothesis, such as:

> *"To determine if the net inefficiencies in transmission cost recovery can be sufficiently reduced to enhance the … efficient operation of the electricity industry for the long term benefit of consumers."*

This is more than a matter of semantics—the approach to defining the problem reflects the Authority's approach to the analysis, and ensuring that the Authority maintains an open mind is critical.

Building an evidence base that supports the problem definition

Establishing a good framework for the CBA requires an understanding of how the problem definition can:

- **Be supported by evidence**: Where can evidence of any inefficiencies associated with the current TPM be obtained? How will this information be obtained?
- **Provide a sense of the scale of the problem**: How will the materiality of any inefficiencies be assessed?
- **Enable the Authority to distinguish between symptoms and underlying causes**: How will the evidence be used to disentangle undesirable outcomes from the reasons that those outcomes exist?

The scale of the problem is important because there will always be a hurdle of the cost of change to overcome—any improvement needs to be sufficiently large to justify the inherent risks that change brings. These risks include the unintended consequences of change, and the investment impacts of changing the regulatory environment and transferring wealth. If symptoms are not distinguished from causes then the analysis risk supporting another equally inefficient solution—effectively resulting in change for the sake of change.

TPM problems can be separated into HVDC and interconnection charges

The Authority and most industry participants are all too aware that transmission pricing has been a live issue in New Zealand for many years. Although previous regulatory and industry initiatives have failed to achieve a consensus on how to resolve the issues involved, the following two elements of transmission pricing have emerged as potential sources of inefficiency (among others):

- The HVDC charge is a locational signal that leads to inefficient price signals for new investment in generation
- The current approach to recovering the costs of interconnection assets may not provide sufficient incentives on participants to avoid creating a need for reliability-driven transmission investments.

Table 2.1 summarises what we understand to be the essence of these two possible problems, the underlying cause of each problem, and the evidence that may be available to support the problem definition. This provides a stark contrast. The HVDC problem has been relatively well-defined: there is clarity on the underlying cause of the problem, which is supported by available evidence. The apparent break-down in the link between interconnection charges and transmission investments has not yet been made in a compelling way, and there does not appear to be any clarity on the underlying cause of inefficiency.

Table 2.1: Comparison of HVDC and Interconnection Problem Definition

	HVDC Charges	Interconnection Charges
Possible Problem	The HVDC charge is a locational signal that leads to inefficient price signals for new investment in generation	The current approach to recovering the costs of interconnection assets may not provide sufficient incentives on participants to avoid creating a need for reliability-driven transmission investments

	HVDC Charges	Interconnection Charges
Supporting Evidence and Scale	▪ GEM modelling quantifies the cost of distorting generation investment decisions as $30 million NPV (up to $54 million) ▪ No significant generation investments have taken place in the South Island since the HVDC charge was introduced	Would need to identify specific failings in the transmission investment approval process that could have been overcome through greater participation in the approvals process
Underlying Cause	The HVDC charge is levied on the basis of Half-hourly Anytime Maximum Injection (HAMI) by South Island Generators. This creates a strong incentive to manage injections from the South Island, and a strong disincentive to invest in new generation in the South Island	Unclear. ▪ Authority suggests that participants are not sufficiently motivated to engage in the process for making transmission investment decisions ▪ Could relate to the grid investment test for approving transmission investment

If the Authority proposes any change to the way that interconnection charges are set, a specific problem definition that is supported by evidence is needed. Nothing produced by the Authority, or any submitters in the TPM process, to date provides a compelling case that the problem definition needs to include interconnection charges.

The objective of recovering more costs from competitive sectors is unclear

The working paper lists two objectives: efficiency, and recovering transmission costs from the competitive sector (generators and retailers). The Authority does not explain why recovering more transmission costs from generators and retailers is desirable, and what relationship that objective has to efficient transmission cost recovery.

While it is correct to characterise the electricity industry as having competitive and monopolistic components, the regulatory regime under Part 4 of the Commerce Act aims to ensure efficient outcomes from monopoly sectors. Seeking to recover transmission costs from the competitive sector implies that the Part 4 regulatory regime is not effective. In the same way that the alleged problem with transmission investment approvals has not been proven, the case that competitive segments of the market are better placed to manage transmission costs than regulated firms has also not been made.

In fact, the regulation of natural monopolies under Part 4 is capable of replicating the outcomes that would be achieved in workably competitive markets by allowing distributors to pass through all transmission costs. In a perfectly competitive market, all transmission costs (but no more) would be passed on to consumers. When the conditions of perfect competition are not present, economic theory makes no prediction on the level of costs that are passed through—the actual level of pass through may be more or less than 100 percent.[1] Accordingly, some costs may "stick" to participants in

[1] See "Pass-through as an Economic Tool" E. Glen Weyland & Michal Fabinger: October 2009. Available at: http://www.wcas.northwestern.edu/csio/Conferences/DU-CSIO-T-2009/Fabinger.Weyl.pdf

competitive sectors, or alternatively participants may be able to use the cost to increase their margins.

This suggests that the objective of allocating more transmission costs to generators and retailers is misplaced because this does not guarantee a more efficient outcome. In the long run, firms in both competitive and monopolistic markets need to recover their cost of capital and should have incentives to operate in ways that reflect consumer demands. While the means of achieving these outcomes are different (competition v regulation), competitive markets cannot be said to manage the imposition of transmission costs in a way that is more efficient than is achieved through good economic regulation.

3 Identifying Options

The process of defining the problem allows options to be identified that address the problem, without creating unintended adverse consequences. Good reform proposals are no broader than needed to solve the problem because policy makers are aware of the risk of unintended consequences.

The Authority's working paper states that options will be identified as part of the substantive CBA, and does not discuss the options identification further. However, there are some important framework questions associated with options identification. A good CBA framework will link the problem definition to the identification of options, and will describe how options that solve any material problems will be identified. How options are selected is critical to achieving the goal of improving efficiency by ensuring that the right mix of options is assessed in the CBA.

Options should narrowly target problems

The problem definition should identify the efficiency problems with the TPM and provide an evidence base to show the extent of the problem. The options should then cover all practical options to solve the identified problem. The framework for identifying options needs to ensure that the reform proposals do not become divorced from the problems, and thereby seek a logic of their own creating unforeseen consequences and incurring significant costs of change.

Table 3.1 identify two options that might solve each of the two possible problems with the current TPM introduced in Section 2. This demonstrates how the identification of options needs to link with the problem definition, with options ideally being no broader in scope than needed to resolve identified problems. A clearer problem definition such as the HVDC charge leads to an ability to assess the options without having to consider a range of unrelated changes and their impact.

Table 3.1: Comparison of HVDC and Interconnection Options

	HVDC Charges	Interconnection Charges
Potential Options	▪ Change approach to recovering HVDC costs from South Island generators. For example, by replacing the HAMI charge with a charge per MW of South Island generation capacity installed (when HVDC assets were commissioned) ▪ Recover HVDC costs from all market participants, for example through a postage stamp charge or through interconnection with a transition period	▪ Modify the transmission investment approval process to identify exacerbators and beneficiaries and recover costs from those parties ▪ Introduce an exacerbator pays or beneficiary pays approach to recovering interconnection costs to improve focus on transmission investment approvals

Selecting a tractable set of options from many possible combinations

One of the key challenges in the CBA is to compare how a range of broad and narrow options for changing the TPM perform against the efficiency objective. The TPM has

several distinct components, and it is at least possible that different problems exist in different components. Some options will target specific problems, while other options may be able to resolve more than one problem at the same time.

This situation creates the risk that the number of options assessed in the CBA becomes unwieldy. An important question for the CBA framework is therefore how to decide upon options that include both narrow, focused solutions, as well as broader measures that resolve several problems at once. Without this range of options, the proponents of either broad or narrow solutions will not be convinced that the best option has emerged from the analysis.

4 Assessing the Benefits of Reform

What is the best way to assess the likely benefits of changing the TPM? The circumstances and evidence base determine which analytical approach will be most useful in any particular case.

The Authority proposes to complete both a top-down and bottom-up analysis of costs and benefits. This is based on the conclusion coming out of the TPM workshop that both approaches are analytically valid. In our view, to select the most appropriate analytical approach the Authority needs to understand what information is needed to complete the analysis (which the working paper describes well), and also whether that information will be useful in determining whether a new TPM will deliver net benefits. The best way to do that reliably is through a bottom-up analysis of costs and benefits.

Top down approaches rely on benchmarked inputs that are not available

The Authority describes the essence of a top-down CBA as using "estimated efficiency gains from comparable reforms in comparable sectors". We agree that to be credible, a top down analysis generally needs to rely on the magnitude of efficiency gains experienced in other contexts. Otherwise, any efficiency factor will appear to have been selected simply to generate the desired result from the analysis.

Unless the Authority completely changes its proposal to match something that has happened elsewhere (which we would support), the best evidence on impacts cannot come from comparable reforms carried out in other countries or sectors. Even in the unlikely event that a similar reform situation could be found, the impacts on a different system with different characteristics would make the use of the parameter fraught with difficulty.

The Authority states in the working paper that it agrees that adverse consequences from reform also need to be considered (such as generator behaviour, costs, investment appetite, retailer prudential and working capital costs, and retail competition). It is very difficult to incorporate these specific effects into a top down CBA. That would rely on the effects also having been observed in combination in a comparable industry or location at a broadly similar magnitude.

Bottom up analysis relies on information about how behaviour changes

If the proposed TPM reform is innovative or untested, then the evidence on impacts will need to come from the expected effects on market interactions and investment decisions in the New Zealand electricity system. In particular, the analysis will need to assess the effects that a different TPM will have on:

- Transmission investment decisions
- Generation investment decisions
- Load investment decisions
- The operation of the wholesale electricity market
- The operation of the retail electricity markets.

Not all of these effects will be able to be directly modelled. While achieving more efficient investment outcomes can be estimated, wholesale and retail market impacts will themselves likely apply some assumed efficiency (or inefficiency) factor. This can be thought of as a "top down approach within a bottom up analysis".

In our view, the only credible method for establishing the benefits from a change to the TPM is a bottom up analysis of the efficiency effects of a change to the regime. Although all analytical approaches discussed in the working paper are valid, none of the other methods can substitute for this in this particular situation.

Impacts, positive and negative, intended and unintended, should first be identified and described, and then quantified where possible. As discussed below, any top down estimates of efficiency can then be used as a cross-check—but should not be relied on as a primary decision-making tool in this case.

The Authority cites the ACCC paper on counterfactual evaluation methods, in particular, the quotation below:

> *The key message from the applied work is that no single approach to counterfactual analysis is more legitimate, or better or worse, than another, but rather that there appears to be significant diversity in the approaches that have been adopted in theoretical and applied economic work. Ultimately, the approach to the counterfactual must be consistent with the other aspects of the evaluation process including the research question, the evaluation design and data availability.*

From this, the Authority concludes that any method is a good as any other method. We would beg to differ and argue that the statement above actually says that the appropriate method depends on the circumstances, which in this case support a bottom up approach to the CBA.

CGE modelling is unlikely to deliver valuable insights

The working paper raises the prospect that a computable general equilibrium (CGE) model might be used in the CBA. The value of using CGE to understand any links between the TPM and the economy as a whole is unclear.

CGE models can be a useful way to estimate the benefits of reform when the issue being considered is how a change in one part of the economy will flow through the rest of the economy. For example, local governments might want to know how the availability of land in their region might spur economic development in their area. In that case, a fall in regional land prices can be inputted into a CGE model to identify the effects on other sectors of the economy, say in terms of regional GDP or employment.

The issue in the TPM CBA focuses on the magnitude of any change in prices in the first place, and whether and when that change would occur. This means that the primary method for assessing the benefits of any proposal needs to shed light on how this would occur. A CGE model would not provide any insights on the causal link between changing the TPM and the prices charged in the electricity sector. A CGE model can only take a price change as given and then seek to establish the flow on effects. For example, if a 0.1 percent change in the price of electricity was expected then a CGE model might estimate what this means for the economy as a whole and other specific sectors.

That is precisely how CGE analysis was used to support the Labour Party's NZ Power proposal. The CGE analysis (carried out by BERL) purports to show that the proposed reforms would create 5,000 jobs and boost Gross Domestic Product by NZ$450 million. The CGE model found that lower electricity costs will increase household consumption by effectively increasing disposable income. Industrial and commercial sectors would also

be found to benefit due to an increase in cost competitiveness against producers in other countries.[2]

Crucially, the outputs of the CGE model relied on an input provided to BERL by the Labour Party: that the costs of supplying electricity will fall by between $500 million - $700 million per year due to NZ Power. The CGE analysis does not comment on the appropriateness of this assumption or explain whether such an estimate is reasonable given the policy changes proposed. Since the ability to deliver a reduction in the cost of electricity is the main issue of interest to policy makers, the results of the CGE modelling carried out by BERL were irrelevant.

In our view, using a CGE model is likely to detract from the fundamental issue of whether the benefits estimated in the CBA are credible, and whether other possible effects should be included.

[2] See http://www.labour.org.nz/sites/default/files/20130418_BERL_NZPower_Report.pdf

5 Ensuring that Results are Verifiable

The results of a CBA are likely to be contentious. The history of the issue demonstrates that benefits are difficult to identify categorically, uncertainty will exist, and there are subjective elements to any assessment. Interest in the results will be high and scrutiny will be intense from all interested parties. In this situation it is important that the results of the CBA can be verified, so that a meaningful debate can take place on the likely costs and benefits of changing the TPM. Some analytical methods are more easily verified than others.

We recommend that the Authority applies two levels of verification to its analysis through:

- Sensitivity testing the assumptions used in the analysis that have a material impact on the results
- Using multiple estimation methods to cross-check the results of the primary bottom-up CBA.

Sensitivity analysis needs to be robust

The Authority states that the aim of sensitivity analysis is to ensure the efficiency estimates take into account the sensitivity of these estimates to changes in supply of and demand for transmission services (see paragraph 1.18 of the working paper). In fact, the purpose of sensitivity analysis is broader: to assess the impact of all assumptions made in the analysis.

The steps involved in performing a good sensitivity analysis are to:

- **Identify the assumptions made in the analysis** (an assumption is when there is a range of possible levels of a variable and a decision has to be made on the level that will be used in the analysis). For example, one assumption might relate to future wholesale electricity spot or hedge prices
- **Identify the range of plausible values for the variables used to incorporate assumptions into the analysis**. This assumption might be operationalized by using forward price information where available (for example through future prices or hedge contracts settled at a future date), and by using estimates of the long run marginal cost (LRMC) of generation over a longer timeframe. The range of plausible values will be narrower for future prices than the LRMC of new generation in ten years' time
- **Test the impact of the extreme points on those ranges to identify which assumptions have a material impact on the results.** For example, despite having a narrower range of values, the price of futures contracts may have a greater impact on the results of the CBA due to the effect of discounting.
- **Report the results when the extreme points on the ranges for each variable have a material impact on the results.** The results should be reported against each assumption that matters and in groups if particular assumptions are likely to move in the same direction (for example, a low price outcome is likely to also correlate with higher levels of demand).

These four steps help to answer the question: do changes to the key assumptions change the overall results of the analysis. The process of sensitivity analysis also enables the estimation of benefits to deal with uncertainty in a rigorous way. For example, the level of future demand may have a degree of uncertainty associated with it and a known range

of likely outcomes. The impact of this variable should be represented as an uncertainty factor and its impact shown – while it is reasonable to predict the most likely outcome as a central expectation.

Multiple approaches can be used to cross-check the results

Top-down analysis could be used as a cross-check on the bottom-up result. Evidence of benchmarks in other jurisdictions, while an insufficient method to estimate benefits on its own, is sometimes useful as a cross check on bottom up methodologies. Top down methods might also be useful to identify whether the full range of unintended consequences have been identified.

For example, the Commerce Commission adopted this approach when setting copper access prices in 2007. The Commission used a benchmarking approach to establish prices, essentially averaging the prices charged in countries with comparable features to New Zealand. The Commission then used an econometric analysis to cross-check the results, which specifically tested whether the characteristics of comparable countries provided a useful prediction of copper prices.[3]

In our view, having a cross-check approach is preferable to splitting the difference between the results of two separate pieces of analysis (as the Commission did in the 2012 copper access pricing decision).[4] This is because the result can be defended with reference to a single methodology, rather than obtaining a result that is actually not generated by any of two or more approaches.

[3] See Commerce Commission (2012). "Final determination on the benchmarking review for the unbundled copper local loop service", Decision No. NZCC 37 at paragraph 74. Available online at http://www.comcom.govt.nz/the-commission/about-us/decisions-register/

[4] See Decision No. NZCC 37 (above) at paragraphs 271-272

6 Conclusions

The approach described in the working paper improves on the CBA presented in the October 2012 TPM proposal. However, we have identified several further areas where the CBA framework could be improved further. The main area is to ensure that a robust problem definition is available and is used to constrain the options identified for analysis. If the problem definition is done well, then there is a much greater prospect that the industry and consumers will support any changes proposed to the TPM.

A CBA can only be credible if it is completed without a preconceived idea that change is required, or that particular solutions are the answer. Objectives should be limited to overcoming any identified problems and ensuring good outcomes, guided by the statutory objective of the Authority. A TPM can only have limited ability to influence factors that are regulated and controlled elsewhere in the governance of the industry. A poor TPM, however, can provide inefficient signals for decisions that it influences. The framework for completing the CBA should ensure that this risk is avoided.

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