

Changing the WACC percentile

Advice to MEUG regarding Commerce Commission
proposal to amend the regulatory WACC for electricity
line & gas pipeline services

NZIER report to MEUG

29 August 2014

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Key points

The Commerce Commission (Commission) are seeking submissions in response to their 22 July 2014 proposal to change the regulatory cost of capital (WACC) for electricity and gas businesses from the 75th percentile to the 67th. The Commission has considered advice from several experts, particularly Oxera Consulting and Professor Ingo Vogelsang. The advice supports the Commission's decision to reduce the uplift but also highlights the difficulties in establishing whether or not any uplift makes consumers better-off.

What problem are they trying to fix?

In December 2013, the High Court made comment regarding the lack of evidence supporting the use of the 75th percentile by the Commission. The Commission was concerned that these comments could heighten uncertainty about the regulatory process. At a simple level the problem that the WACC uplift is seeking to resolve is the assumed risk that network owners could 'under-invest' in the network if they perceive that the Commission's estimate of the regulatory WACC is less than their true WACC.

The additional cost of this uplift to the consumer needs to be balanced against the benefits to the consumer from improved reliability that is directly attributable to the additional investment in the network induced by the uplift.

- Economic theory on both the drivers of investment in reliability and the assessment of welfare losses to consumers due to reliability is not granular enough to apply to this question.
- There is limited empirical evidence on; how network owners make investment decisions, how their investment affects the reliability of the network or how electricity uses are affected by different levels of reliability.

Scope of our brief:

MEUG have asked NZIER to advise on two aspects of the Commission's proposal:

1. What has been learnt from the WACC submission process and have our views regarding the appropriate WACC percentile changed as a result of the submissions.
2. What issues have emerged in the wider context of the Input Methodologies (IM's) and the 2017 IM review.

The Commission's proposal

We read the Commission's proposal as accepting that WACC uplift to the 75th percentile is too high and that producers have been over-paid at that level. We do not see evidence that the same situation will be avoided at the proposed 67th percentile. The proposal is a move in the right direction but until satisfactory evidence is available we prefer to see the mid-point as the logical estimate.

From the consultation process:

- Our views regarding the WACC percentile have not changed from our review of submissions. At this time we see little evidence that suggests a WACC other than the mid-point should be used by the Commission.
- We are not satisfied with what appears to be a presumption that a lack of evidence against uplift implies the need for uplift. It is also not reasonable to presume that welfare costs from WACC estimation error are always asymmetric.
- The Commission have set a process in motion that threatens the durability of the Part 4 regulatory approach. Their WACC percentile choice here is to be again reviewed with the other IM's in 2017. In some ways this is a good thing because if they do not get it right now, they have another chance in 2017. However this review of the WACC in isolation makes it harder to introduce other mechanisms that may be feasible under the IMs and more efficient and effective than a WACC uplift in securing an appropriate level of investment in network reliability.
- We remain concerned about the use of analytical models that rely on assumptions, abstract away from the real world to make major judgement calls.
- What did we learn from the consultation process - to be honest, very little. This is not being critical of the process but for us it highlights that we now know what we don't know. The Commission's advisors made an honest attempt at a 'probability of loss' analytical approach but it is disconnected from New Zealand specific conditions, reducing its applicability to the Commission's decision.

Making rules under uncertainty

- Does the welfare measure really matter – yes it most certainly does. Under Part 4, producer surplus is always subordinate to consumer welfare. This is why producers are being regulated.
- The local New Zealand network data that we examined is not similar to the US analytics that underpin the Commission's proposal, which suggests to us that this proposal involves more judgement than appears on the surface. (Also it is not clear to us that the failure in the US networks used as examples in the Oxera report would have been avoided by increased reliability investment, nor is it clear that such investment would have been made if regulators allowed a slightly higher return on capital)
- To illustrate, transmission and distribution networks in New Zealand have seen significant capital investment recently and from our brief review they

are now performing pretty well. Indeed, we seem materially better situated than is reported for US networks.

- The use of WACC + uplift is an incomplete model of incentive regulation. Investor incentives from this mechanism can work in opposite directions and it seems to us that the use of uplift is very situation and strategy specific. There are mechanisms other than WACC uplift to manage potential welfare losses.
- Marginal benefits from network investments are very much dependent on the relationship between demand and capacity over time. For instance geographic areas with consumers who have high supply costs may be best regulated by WACC + uplift but lower supply cost/higher density areas will likely require less flexibility and may be better regulated using performance standards.
- The Commission needs to adopt a more structured approach to thinking about its rule-making under uncertainty. Less judgement and more transparency will promote time-consistent policy making.

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1. The Commission's proposal

The Commerce Commission (Commission) has released a paper¹ which proposes to change how they estimate the regulatory cost of capital (WACC) applied to energy businesses which are regulated under Part 4 of the Commerce Act. They propose that the 67th percentile of their estimated distribution of WACC be used for setting the price-quality path, replacing the 75th percentile that has been used from 2011 up until now. The change would take place immediately and apply to the price-quality resets that are due to be implemented in 2015.

Their paper is the culmination of an evidence seeking and consultation process that the Commission has had in process for six months. Interested parties have expended considerable effort in submitting on this matter while the Commission has taken extended expert advice ahead of making this proposal to change the WACC.

1.1. Scope of this assessment

NZIER has been asked by MEUG to consider the proposed change and provide MEUG members with advice on two aspects of the proposed change:

1. What has been learnt from the WACC submission process and have our views regarding the appropriate WACC percentile changed as a result of the submissions?

What issues have emerged in the wider context of the Input Methodologies (IM's) and the 2017 IM review?

This advisory report is structured to answer these two questions as follows.

The proposed change to the 67th percentile

Here we consider:

- (i) the extent to which NZIER has changed any views in light of submissions and why - to the extent NZIER has been informed by the various submissions;
- (ii) which pieces of advice from submissions are important given e.g. novelty and weight of evidence/strength of argument - to the extent are there any NZIER think warrant attention;
- (iii) what remains open or unanswered but should be dealt with/answered in NZIER's view - in the context of choosing a WACC percentile.

The broader view

Here we consider the issues the Commission faces both now and as they head towards 2017 when IM's are due for review:

- (i) The need for uplift at all. Professor Vogelsang, an expert for the Commission, suggested he too would be happy with 50%, given options,

¹ "Proposed amendment to the WACC percentile for electricity line services and gas pipeline services" Commerce Commission 22 July 2014.

- other than uplift, for dealing with investment incentives. (This would be a foundation think piece to set the scene for what matters for 2017.);
- (ii) How to think about dynamic efficiency and the trade-off between price, quality (including reliability) and investment (another think piece but with practical application for the IM review);
 - (iii) Balance of the benefits between consumer welfare and total (and/or producer surplus) which both matter and lead to different outcomes and trade-offs between price, quality and investment.
 - (iv) How the Commission could foster innovation from regulatory incentives, including perhaps WACC uplift.

What problem are they addressing?

The 2013 High Court judgment regarding the merits review paid particular attention to the use of the 75th percentile by the Commission, observing that there was very little evidence to warrant any uplift let alone uplift to the 75th percentile. To minimise the effects of any uncertainty that resulted from the Court's comments, the Commission initiated a short-term WACC review process that has resulted in this draft amendment proposal.

At a simple level, the problem that the WACC uplift is seeking to resolve is the assumed risk that network owners could 'under-invest' in the network if they perceive that the Commission's estimate of the regulatory WACC is less than their true WACC. We say 'assumed risk' because there was, and in our view there still is, little evidence that the regulatory WACC has a direct effect on investments in the regulated networks let alone marginal changes in the reliability of the network.

In economic terms the judgement call that the Commission is making is that the cost to consumers from giving network businesses a WACC uplift is less than the 'avoided' cost to consumers of network failure. The Commission expects that this will result in a net benefit to consumers. For the Commission's expectation to be met, the WACC uplift has to be the only sufficient condition for network owners to make reliability enhancing investment in the network. In other words, network owners:

- can foresee opportunities to improve the reliability of the network that would have a net benefit to consumers;
- would make this investment only if the average return on their entire regulated asset base was higher.

This is a very specific test of network owner investment decision-making. However the advice to the Commission seems to focus on the effects of networks getting reliability investment decision wrong rather than on whether a WACC uplift would actually encourage network owners to get those decisions 'right' from the consumers perspective.

The resolution to the problem of providing efficient incentive for 'optimal' investment in network reliability is far from simple. There is little in the way of independent empirical evidence or detailed applicable economic models to assist the Commission's judgement calls, while a wide range of views have emerged from the consultation process regarding how to determine what an appropriate level of WACC uplift should be.

1.2. Our views on WACC percentile

Our views on the approach to the estimation of the regulatory WACC have been well documented in advice to MEUG, Air New Zealand and others.²

In summary we were of the view that:

- the weight of evidence supports regulatory WACC being set at estimated WACC (notionally the mid-point or 50th percentile), given the logical conclusion that the mid-point is the value of WACC which minimises error in estimation of the 'true' WACC value;
- empirical evidence on the market value of regulated assets suggests that even a WACC at the mid-point likely over-compensates investment in regulated assets;³
- an emerging shift in regulatory practice overseas with respect to reducing regulatory WACC now makes the Commission's current IMs something of an outlier, and that
- industry specific circumstances and current regulatory frameworks commend a default WACC which excludes uplift.

Our earlier research showed that the Commerce Commission's use of the 75th percentile of WACC had no strong evidentiary basis. The Commission made an assumption about the probability distribution of their WACC estimate and chose the 75th percentile from that assumed distribution.⁴ Their choice was based on judgement rather than evidence. The Commission's estimated mid-point (the expected value) for WACC did come from empirical observations and estimates. In other words, the mid-point has an evidential or empirical basis but the 75th percentile does not.

We were also extremely cautious about the Commission relying on analytical models to inform them about whether to use a percentile other than the mid-point estimate, because:

- analytical approaches are usually heavily influenced by assumptions and are not connected to real world conditions to which the Commission decision applies. The predictions from current analytical models are that when a WACC rate is set too low, investors may delay or cancel investment and the supply of goods and services falls. Before the Commission chooses to rely on these predictions it should at least attempt to test the model assumptions against actual network owner behaviour;
- findings from analytical studies, while intellectually interesting, suffer from the usual shortcomings of theoretical and analytical models which abstract from the real world in order to focus on the issue of interest and to keep analysis tractable;

² Refer NZIER advice to MEUG regarding WACC percentile, March 2014 and May 2014.

⁴ There was an empirical basis of sorts behind the numbers used – they were informed by estimated standard errors from components of the WACC – however the size of a standard error has no probabilistic meaning unless there is some prior knowledge of the underlying distribution from which the data is drawn. If the component estimates are from sufficiently large random samples (e.g. larger than 20) and are independent then standard errors can reasonably be assumed to normally distributed (according to the central limit theorem). To our knowledge none of these conditions were met in the Commission's estimates of the components of WACC. Oxera rely heavily on the Commission's estimate of the standard error and have caveated their analysis accordingly.

- analytical research also does not consider the extent to which consumers are a broad range of people and organisations with different demands for regulated services and different willingness and abilities to pay for service and reliability. This type of variation is important when evaluating welfare effects and is therefore a vital element for understanding the extent to which higher prices are preferable to lower investment;
- the theoretical work which postulates asymmetric loss did not explore the dynamic costs to consumers from excess pricing driven by WACC uplift.

In our view, the size of welfare losses from high prices is as uncertain as the extent to which investment in reliability will be reduced by rates of return which are too low.⁵ The existing research into asymmetric impacts from estimation errors ignores this source of uncertainty. This is not fatal to academic analysis but it is a significant problem if the findings are used for policy purposes or regulatory decision making in the real world.

⁵ The welfare losses to consumers could possibly be larger if the asymmetry, in reality, is greater on the consumer side as Covec have suggested.

2. Empirical evidence

The core issue for the Commission resulting from the High Court decision was whether evidence actually existed to show that there were asymmetric losses from setting the WACC estimate too high or too low. The lack of empirical evidence that the High Court commented on in 2013 (that we and others researched) remains an issue at this point. Despite the considerable effort that has been applied to developing an analytical approach by Dobbs,⁶ and most recently by Oxera on behalf of the Commission, we do not see persuasive evidence that a percentile other than the mid-point should be used. Nor do we see evidence that mis-estimating the WACC mid-point will result in losses or that potential losses will be asymmetric about the mid-point.

We are especially concerned that the Oxera analysis makes primary assumptions of a loss function which provides a basis for developing an approach, then gather data from US sources and attach it all to a calculation of welfare losses here in New Zealand. In some ways the discussion is now more confused because, in reality there are more assumptions and unknowns than we realised before. We now understand better what we don't know and can clearly see that the Commission is exercising considerable judgement across a wide range of factors when proposing regulatory WACC at the 67th percentile.

2.1. Network investment in New Zealand

Submissions mostly took an advocacy position arguing for a particular view point while some involved analytics that were based on unproven assumptions. In our view not enough has been made of real world data to gain an understanding of investments by network companies in NZ regulatory control periods. Our various concerns with the analytics that have been undertaken and especially our caution about the use of benchmarking as opposed to real world local data led us to briefly investigate the nature of network investments during RCP1 in New Zealand⁷.

2.1.1. Root cause of failure

The core of the Oxera analysis is that a WACC which is set too low will deter investment, leading to network failure and black-outs for consumers. To evidence the argument they cite a number of studies that have contemplated the costs to the US economy from major electricity black outs. Oxera use these studies to quantify the costs of such a black-out from underinvestment in the network and then scale the US quantitative estimates back to the size of the New Zealand economy.⁸

⁶ Refer Dobbs 2011

⁷ RCP1 is 'code' for Regulatory control period 1, the current 2010 to 2015 DPP period.

⁸ To illustrate the costs to the economy, these studies use the North Eastern US/Canada black-out of 2003 (apparently caused by a chain of events that seem only indirectly investment related, if at all) and the Manhattan black-out of 2012 (the primary cause of which seems to have been a storm surge from hurricane Sandy which took out a sub-station on Manhattan Island that was located close to the Hudson River).

Both steps in this argument are worthy of closer scrutiny. First up, for the examples to be used to justify WACC uplift they need to show that the investment that could have avoided the outage:

- was not made because the regulated returns were too low but
- that there is good evidence that the network companies would have made this investment in reliability if they were allowed a higher return (rather than pass the higher return onto their shareholders).

Second up, for the example of the outage to be a good quality estimate for the cost of a New Zealand outage, the nature and duration of the outage and the businesses affected would need to be similar.

In their table 5.2 Oxera attribute two North American, and several African and India blackouts, to underinvestment in the networks, citing Michael Spence as a reference on causality.⁹ We find this somewhat of a leap of logic especially when Oxera's resultant estimate of the loss to New Zealand (\$1 billion) is then used in the welfare analysis they undertake to justify the WACC range of 60% to 70% to the Commission.

It seems that there are two important matters sitting behind the Oxera analysis and particularly whether it is useful in the New Zealand context.

First is the start point regarding investment in the network, by which we mean have the New Zealand networks suffered from the same under-investment that the US networks are alleged to have suffered from that could lead to an increased risk of failure at a cost to consumers and the wider economy.

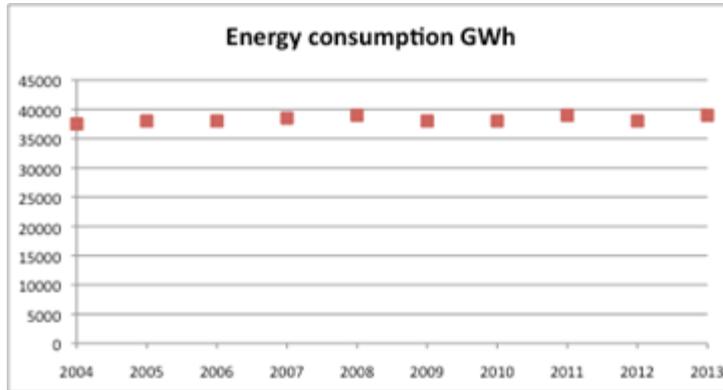
Second is whether the operators of the network would have contemplated the rare sequence of events that led to the failures and if they had could they have justified the amount of network investment that is able to fully accommodate rare one-off events like hurricanes or cascade failures that were causal in the US blackouts. The two US examples are interesting in this regard – one was due to a rare and extreme weather event that would have required extensive investment to avoid. The other was a cascade failure caused by a series of events that could possibly have been avoided by a reasonably small investment.

2.1.2. Relevance of Oxera examples to NZ

Here we attempt to illustrate that the New Zealand network *situation* is not as described by the US *situation* that is referenced in the Oxera analysis. The relative network start point can be better understood by examining demand for, and supply of, transmission and distribution networks over time. That is – how does New Zealand peak demand relate to network capacity and how does this compare to the US? This supply/demand relationship underpins the potential for network failure in the reference studies used to justify the 67% uplift.

⁹ In 2012 Michael Spence wrote a general paper on the resilience of networks that are critical to the economy which seemed to us more about stimulating thinking rather than about a causal analysis of the Manhattan black-out. His reference of this black-out was illustrative and that the cost of the black-out was very difficult to calculate but likely 'huge'.

Figure 1 - 10 year energy consumption



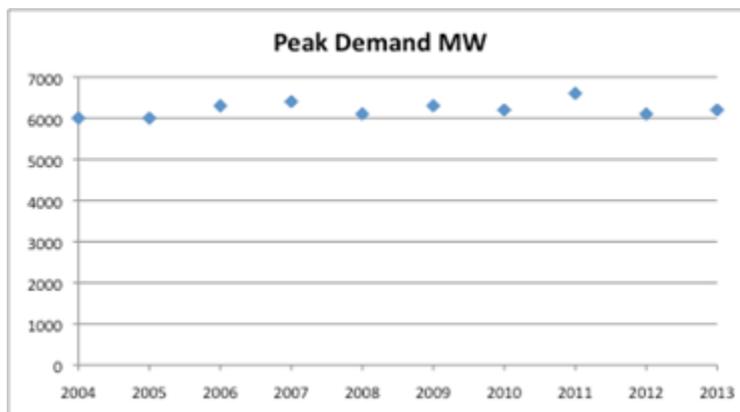
Source: MBIE Energy Data file 2013

Average annual growth in energy consumption over this 10 year period was 0.3%. MBIE are forecasting a low growth scenario for energy consumption at 1% pa and a high growth scenario of 1.5% pa through to 2040.

The demand forecast data for the US that sits behind the ASCE analysis of the cost of under-investment that Oxera used as a reference source from both EIA and NERC annual energy outlooks (2011) does not fit with these observations from local network demand. These outlooks project growth of a little below 1% pa through to 2040 *net of a 15% contribution* from demand side management. Current growth of both energy and peak demand in the US appears to be about 1%, somewhat higher than New Zealand.

Peak demand in New Zealand shows similar (very low) growth over the last 10 years.

Figure 2 - 10 year peak demand



Source: Strata Energy review of Transpower RCP2 proposal

This reasonably flat growth and the steadily increasing levels of investment that we describe below suggests that pressures on both energy demand and network capacity, that may exist, will likely reduce further in the short to medium term

future.¹⁰ It appears to us that this changing demand landscape is now reflected in the lower level of capex allowances in the Commission's draft of the 2015 to 2020 RCP2 transmission and distribution determinations.

Given a longish period of flat demand, what levels of capital have been invested in the New Zealand networks and what types of investments have taken place? Here we are interested in where network capital has been invested - into reliability assets to make the existing network less congested and more reliable, in replacement assets to upgrade old parts of the network or in new connection assets for network expansion.

Figures 3 and 4 below are helpful to illustrate the dynamics of overall investment in these networks from 2010 when RCP1 started and the 75th percentile was implemented.¹¹ Both charts show that there has been under-spend of capex relative to the regulatory allowance. Our brief examination of the reasons behind the under-spending is that they were voluntary commercial decisions by the businesses to defer or re-prioritise investment (timing decisions), or not to invest at all.

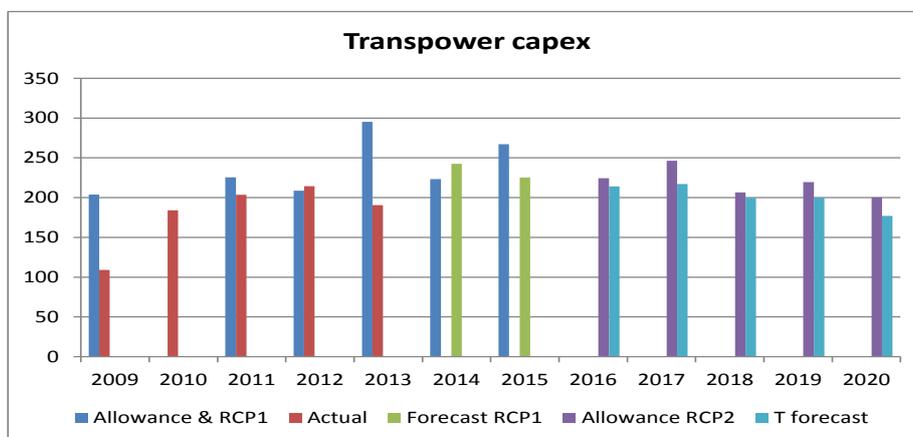
For Transpower:

- the period 2009 and 2010 saw them under an administrative settlement regime. Actual capex spend was well short of that allowed under the settlement;
- RCP1 covered the period 2011 to 2015. Spend to date (2013) is also well short of allowance. Transpower's forecasts for 2014 and 2015 investment are at or below regulatory allowance;
- on top of RCP1 "normal capex" that is shown in the following chart, the transmission network has seen an additional \$1.2billion spent on major investments (mostly North Island projects but also another pole for the HVDC link) to improve security and reliability over the last couple of years;
- the cumulative under-spend over the 6 years of the administrative and RCP1 period is about \$200m, plus a \$250m under-spend on the major projects;
- It appears from our investigations that the areas of recent largest under-spend have been with asset replacements and information technology projects.

¹⁰ This reduction will come from increased development of renewable generation (wind and solar that is often located within the distribution networks close to demand loads), and from the wider use of demand side management to reduce individual loads at peak times. In the US NERC are predicting that 15% of peak demand in the US will be met from demand side load management in 2023 rather than requiring additional generation and network capacity, whereas the assumption for New Zealand is that demand management will contribute less than 10% load saving through the forecast period.

¹¹ Note that figure 3 excludes the recent major transmission investment projects.

Figure 3 Transpower – actual and forecast capital investment



Source: Transpower disclosures, Strata review of RCP2, Commission draft IPP for Transpower

Despite this under-spend, during 2011 to 2013, performance of the transmission network has improved to the point that Transpower is now materially ahead of its reliability targets to the extent that they could earn a hypothetical revenue bonus by out-performing network targets.¹²

Transpower’s evidence to the Cabinet select committee at their 2013 financial review¹³ assessed the transmission network as now being in a far more stable condition than it has been. Transpower advised the Committee that they are well placed to handle the expected demand growth with the existing network, most especially in Auckland, and there is little need for substantial capital investment on it for another 20 years.

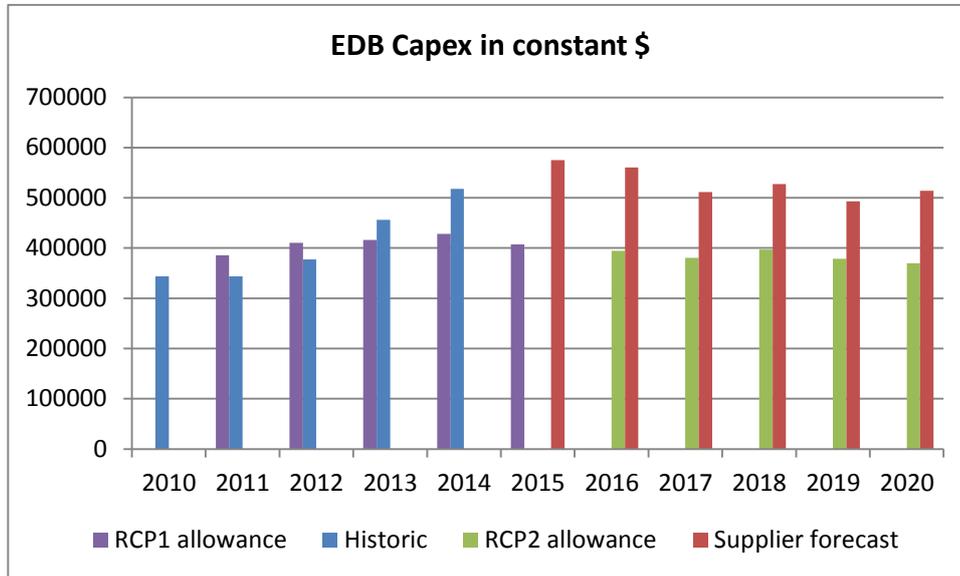
For the regulated distributors capital invested has also grown steadily over the recent past. The following Figure 4 illustrates the investment trend for the RCP1 period from 2010 when they too appear to have voluntarily under-spent capital relative to the regulated allowance despite the incentive of the 75th percentile WACC in place. A more specific review of the EDB’s network investment and performance has not been possible in the time available but in aggregate we are satisfied that, in the same way as for Transpower, there appears to have been structured decisions to delay, defer or cancel investment relative to the level allowed under regulation.

This high level review of the level of planned versus actual investment did not indicate that Transpower wanted to invest more in the reliability of the network to ensure they comply with service standards but did not do so because the WACC was too low. The comments in this section also illustrate how difficult it is to establish a clear connection between improvement of network reliability and the current or recent levels of the WACC.

¹² Although they are estimated using different approaches, it is worth recording that the IEEE SAIFI for US networks are at 1.5, with Transpower now performing at 0.4 and the EDB’s at 1.7 .

¹³ Refer- Report to Commerce Committee – 2012/2013 financial review of Transpower and Report of Auditor-General on Transpower.

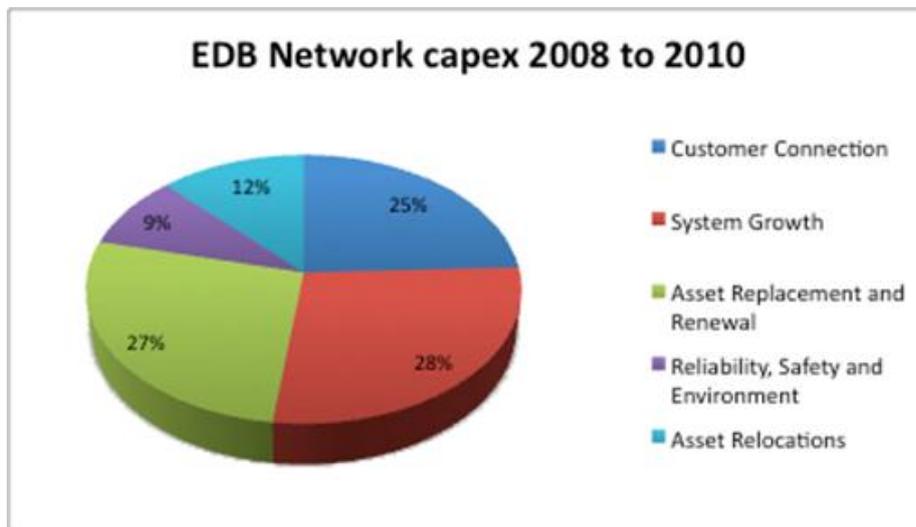
Figure 4 Distribution networks – actual and forecast capital investment



Source: Commission EDB disclosure models, draft RCP2 determination

Our review of the EDB capex data for the RCP1 period and the two years prior provides the following analysis. The period prior to RCP1 (2008 to 2011 when there was no regulated WACC uplift) saw a reasonably equal share of capex going to customer connections, system growth and asset replacement. Our interpretation is that reliability per se was less of a direct concern to the EBDs at that time as opposed to customer connections, network growth and capital maintenance of the existing network.

Figure 5 EDB – Capex breakdown 2008 to 2010

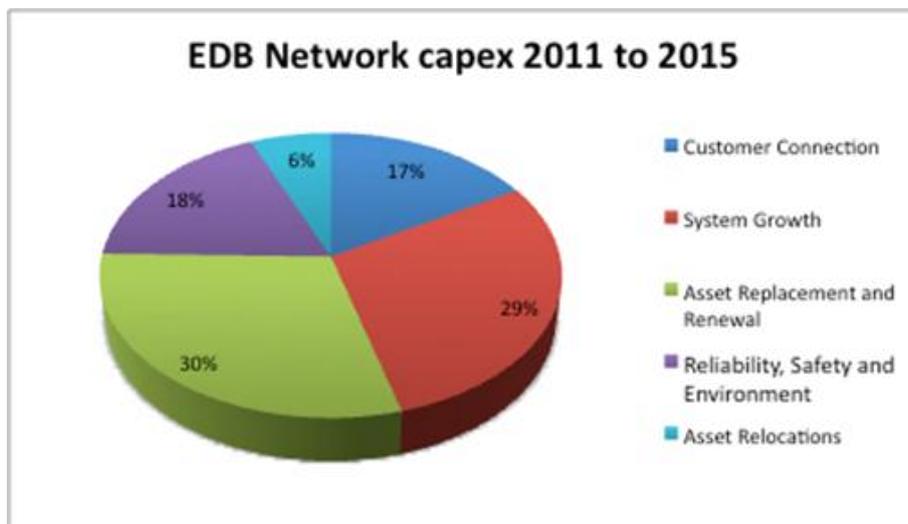


Source: Commission info disclosure models

The introduction of network regulation from 2011 saw changes in both the level of investment (Figure 6 below) and to the mix of investment use. There was a lower level of capital investment in customer connections and an expansion of capex into network growth, capital maintenance and reliability.¹⁴

These charts indicate variation in the pattern of investment over this period due to factors other than the level of the WACC.

Figure 6 EDB – Capex breakdown 2011 to 2015



Source: Commission info disclosure models

In summary, what we are illustrating with this analysis of investment in the transmission and distribution networks is that the capital spend on these networks (especially transmission) in New Zealand over this period has been directed at growing the network, replacing older assets and making the network more reliable. The increasing level of investment has been undertaken on the back of an extended period of flat demand and growth in embedded generation, and has resulted in networks that appear to perform materially better than they previously did and importantly for this analysis seemingly better than their equivalents in the US.

What was unexpected for us is that the networks have under-spent relative to the regulated capital allowance. For Transpower this under-spend was in excess of \$500m over the RCP1 period but, by their own admission, the reduced spend has still resulted in networks that have a very high level of resilience and security, are performing better than they were (and better than equivalent US networks). They also have an increasing level of spare capacity and headroom over current and forecast demand levels. Actual revenue in 2013 was below the regulated MAR.

With WACC set at the 75th percentile this is not an outcome that we would have expected. Amongst a range of other things, it suggests to us that there is likely a disconnect between the decisions that the network businesses make about network investments and the regulatory WACC.

¹⁴ Note that this chart includes the EDB forecast out-turn for the 2014 and 2015 years and actuals for 2011 to 2013.

2.2. Valuing the welfare loss

Using the results of survey work completed by Electricity Authority on New Zealand Value of Lost Load (VoLL) is an alternative way to estimate the cost of network outages rather than using a 'cost to the economy' estimate based on academic studies from the US.

The Electricity Authority published estimates of consumer willingness to avoid outages. This gives us the consumer price for an outage. To use this 'price' to estimate the consumer welfare gain from increased in reliability investment we need an estimate of the quantity of lost load that is prevented by the reliability investment. That means a scenario has to be defined for the additional reliability investment that specifies:

- How many consumers are affected?
- How long their consumption is affected?
- The probability of an outage with and without the reliability investment?

Linking these failure scenarios to a reliability investment that would prevent the failure and an estimate of the likelihood of failure focuses the analysis on questions about credible decisions on reliability investment. This also avoids distorting the discussion with estimates of loss from catastrophic failure that probably could not be influenced by reliability investment.

2.3. Estimating welfare loss

In the time available we have not been able to develop an alternative estimate of the welfare losses from outages to that presented by Oxera. However, we suggest that this is an area of work the Commission should consider.

The Oxera loss estimate needs to be considered in the context of:

- the likelihood that such an outage would occur;
- an assessment of the level of network reliability investment required to avoid the outage;
- the conditions under which EDBs would actually make this investment.

In this section we suggest several steps that we believe should be added to the Oxera approach that will provide examples of the evidence that support the loss function approach.

The key elements that we believe need to be added to the Oxera approach are:

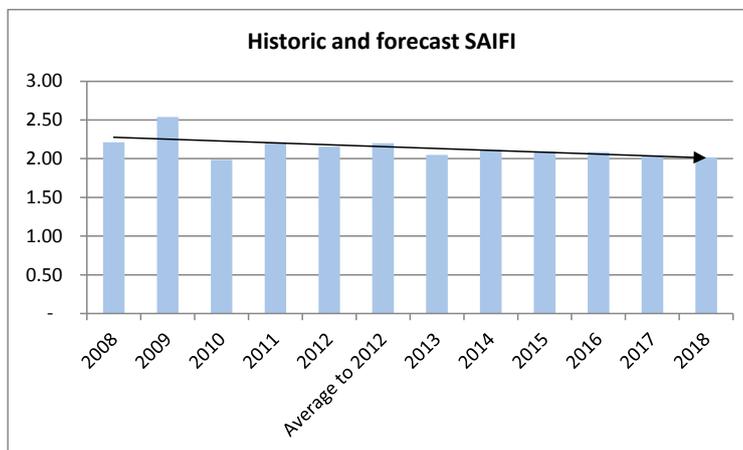
- an assessment of the current reliability of the network and the main influences on reliability in the medium and long term
- an assessment of the additional network investment required to maintain the current level of reliability

- a description of the failure scenarios and their likelihood that defines the scope for reliability investment
- estimates of the cost of failure based on analysis of either the effects of recent outages or New Zealand based willingness to pay data.

Reliability of the network

Given the brief assessment that we made earlier regarding the capacity and performance of the networks in New Zealand, it appears that the Oxera analysis likely significantly overstates both the probability of a welfare loss from under-investment and the economic impact of a network failure should it occur.

Figure 7 - EDB frequency of outages

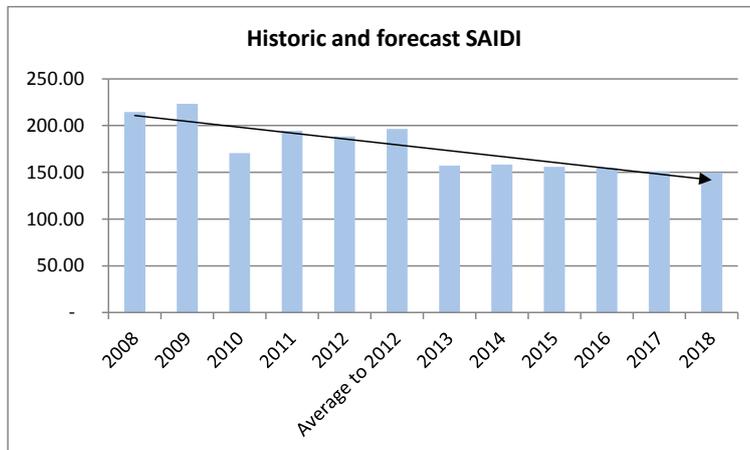


Source: Commission EDB disclosures to 2012, forecasts from 2013

This is just the trend that we would expect from the operational attention and capital that has been applied to the performance of the distribution networks. While the improvement in the frequency of outages is only small, the trend is consistent and positive. The range of minimum to maximum SAIFI performance has tightened significantly over this period to date and the trend is forecast to continue. The potential for a sustained outage is reducing for the distribution networks and is forecast to continue to do so.

The trend in outage durations shows an even stronger improvement in reliability. Network investments have delivered larger improvements in outage recovery times.

Figure 8 EDB duration of outages



Source: Commission EDB disclosures to 2012, forecasts from 2013

We regard this (somewhat brief) review of local network performance as more useful and relevant to the Commission’s decision on New Zealand network companies than the benchmarking analytics that Oxera offer. The reference survey in the US that we compared our New Zealand data to, is conducted by the IEEE who have developed a standardised approach to measuring SAIDI and SAIFI that, since 2006, unfortunately does not lend itself to reporting ‘averages’ in the way the Commission’s methodology does in New Zealand. The IEEE methodology gathers and standardises performance data from local distribution utilities that use their own, sometimes unique, internal measurement systems.

The network performance story for Transpower is even better. As we noted earlier significant capital has been invested in the transmission network which appears to have delivered a prompt performance improvement.

Figure 9 Transpower RCP1 network outages

Table 14: RCP1 Quality Performance

| Measure | Target | 2011/12 | 2012/13 |
|--|--------------|---------|---------|
| Loss of supply events frequency over 0.05 system minutes | 21 | 19 | 12 |
| Loss of supply events frequency over 1 system minute | 3 | 2 | 2 |
| Unplanned HVAC circuit unavailability (%) | 0.054 | 0.064 | 0.032 |
| Unplanned HVDC bi-pole unavailability (%) ³³ | N/A | 0.109 | 0.684 |
| Total impact of interruptions (system minutes) | 16.69 | 14.45 | 7.62 |

During 2011/12 we did not achieve our unplanned HVAC circuit unavailability target. This was largely due to outages at six circuits where adverse weather and circuit breaker faults led to significant outages. In 2012/13 we outperformed the targets for all measures.

Source: Transpower RCP2 proposal

Figure 9 above shows the RCP1 outages (simply the number of network interruptions per year) where “target” is the regulated outage target that the Commission has built into the RCP1 determinations. By 2013, Transpower was materially exceeding regulated targets in all measurement categories. Figure 10 below shows the network performance that is expected from the RCP2 period.

Figure 10 Transpower RCP2 network outages

Table 37: RCP2 and Long-term GP1 Targets (by category)

| Category | Long-term Target (annual number less than) | RCP2 Target (annual number less than) |
|---------------|---|--|
| High Priority | 2.3 | 5 |
| Important | 8.6 | 11 |
| Standard | 33-39 | 33 |
| Generator | 11-20 | 11 |
| N-security | 63 | 67 |

Source: Transpower RCP2 proposal

Note that “High Priority, Important, Standard Generator and N-security” are Transpower points of service categorised by the importance of the customers that are served by that point of service.

Additional reliability investment required in the network

Our analysis in Section 2.3 above suggests that the Transpower and EDB investment in network reliability has not been constrained by regulated rates of return. However, we suggest that this could be cross-checked by the Commission:

- asking the EDBs to describe what additional reliability investment they believe should be made in the network but has been prevented because of low returns;
- reviewing business continuity/disaster recovery plans of EDBs to understand what the experts believe are the weak points in the reliability of the system and how they would respond to failure events.

3. What has been learnt

Submissions vary in quality and content, some well-considered while others clearly promote self-interest. Most stakeholders are suppliers and want to retain the status quo. They claim that a change to the WACC is not warranted or that it is simply too hard to figure out whether a change should take place or what the change should be. This section describes both our key learnings from the submissions and also summarises arguments from submitters that we regarded as influential.

3.1. Benchmarking is less helpful

Comparing WACC percentiles across different regulatory regimes seems to be fraught with difficulty – regulatory structure and the application of sector regulation differs across countries. To generate required regulatory outcomes regulators variously make use of both rate of return and incentive/punishment based mechanisms that suit local conditions. The various pieces of research comparing regimes in submissions did not uncover evidence that was helpful to the Commission, instead generated considerable argument. In our view, the benchmarking comparisons in the analytical advice that the Commission now relies on in the proposal to use the 67th percentile do not add sufficiently to the stock of evidence.

In proposing a change to the 67th percentile the Commission relies heavily on two pieces of analyses that are at least partially built on benchmarking and assumptions that in our view are view could be replaced by more relevant analysis.

1. First, to estimate the possible losses in the New Zealand economy, Oxera makes use of a small number of studies from the US that postulated the size of losses from earlier electricity black-outs there. They then guesstimate the probability of these types of losses occurring here in New Zealand. We do not disapprove of their methodology, indeed there is much that can be learnt from researching experience elsewhere. However, we suggest that evidence from the New Zealand market would better inform the Commission's assessment of potential losses than anecdotal data from elsewhere.
2. Second, we are concerned that the Commission places too much reliance on two observations of the sale of shares in regulated lines companies at an apparent premium over the value of the regulated assets in the financial accounts. They believe that the apparent premium is substantially driven by the excess returns that are derived from their use of the 75th percentile. By using these sale prices to asset multiples to justify a reduction in the WACC from 75% to 67% the Commission should be cautious not to apply a false level of precision, especially when they admit that there is little understanding as to the drivers of the apparent regulated asset base (RAB) premium. It may be prudent to accept that, in the same way as for the probability of loss analysis,

there are too many unknowns and that these approaches should not be relied upon to support a quantitative decision.¹⁵

3.2. Sector specific regulation: the way to go

In our earlier advice we promoted the view that sector specific regulatory arrangements were the way to go and it seems that this has become more mainstream – the Commission’s advisors generally support this approach in their submissions to the Commission, while the Commission has said that the proposal to use the 67th percentile is limited to regulated energy businesses because specific issues relating to other sectors, raised from submissions, require more time for consideration. We applaud their approach in this regard.

The Commission also appears to be open to the use of a range of approaches other than a blanket WACC uplift to incentivise network owners to invest efficiently and deliver welfare enhancing outcomes for consumers.

We would however note here that the Commission's key advisors on the use of the 67th percentile (Oxera and Professor Vogelsang) are both of the view that the use of uplift to WACC is heavily dependent on there being a real loss from WACC mis-estimation and that the loss is not trivial. They both point out that should these conditions not be present then alternative mechanisms will likely produce better outcomes than a blanket WACC uplift.

Sector specific regulatory issues were not the focus of the consultation/search for evidence but, to ensure that they are given appropriate attention, they should be addressed as part of the overall IM review – as the Commission points out, trade-offs of price/quality/investment/risk are not the same across all regulated sectors. In the meantime the safest intellectual course is to move to the mid-point while the work is being done.

3.3. Other learnings

3.3.1. Lack of analytic model for welfare loss

For us there remains an absence of a structured analytical model to assess the options, trade-offs and evidence from here in New Zealand. The Dobbs model falls short in this regard for reasons that we discussed previously¹⁶ but especially because it pre-supposes a loss function from a short fall of investments in innovation¹⁷ and sets aside larger and more important ongoing investment in replacement assets.¹⁸ Little has emerged from submissions to fill this gap and enable real world evidence to inform the Commission’s decisions. The Oxera analysis has a well thought out approach but seems to be more improvised than structured, and searches for evidence from international sources to ‘join the dots’ between investment levels and

¹⁵ We understand that Ireland Wallace & Associates have examined the Commissions workings of the RAB multiple and are satisfied that the Commissions approach is adequate and likely quite conservative. That is, Ireland Wallace estimates of the RAB multiples are higher than the Commission.

¹⁶ Refer NZIER – Response to Commission invitation of 31 March 2014 and May 2014.

¹⁷ We still struggle to understand how excess returns are going to motivate network businesses to invest in innovations.

¹⁸ Figures 5 and 6 of this report illustrate that most network capital investment goes into these categories.

regulatory WACC. In Sections 2.3 and 2.4 we point to some of the differences that we see.

The Oxera report also brings the critical relationships between returns to network owners, investment levels, network quality, the probability of network outages and the cost to the economy of any outages into focus. For us their analysis serves to highlight that we all fail to understand and are unable to adequately evidence any of these relationships at this time. Professor Vogelsang rightly points out that Oxera makes an honest attempt at a methodology to estimate these relationships but comes up short of evidencing and quantifying them.

It seems to us that the quantum of the overall (static and dynamic) welfare loss from under-investment is the critical component in the trade-off the Commission is making. If the loss is small, blanket uplift to the WACC is likely to be an expensive way of avoiding the welfare loss compared with other interventions and may exceed the avoided welfare loss.

The Oxera approach to estimating the static welfare loss and the probability weighted cost to the NZ economy from a major unplanned outage is missing a complete analytical model. It uses various US data in what seems to be an ad-hoc manner. We reported earlier on our examination of both local investment and network reliability conditions which suggest to us that there is an absence of systematic 'over' or 'under' investment and that a number of factors unrelated to WACC influence network owners' investment decisions.

Absent from the Oxera analysis are dynamic costs from over-investment which will result in a potentially large welfare loss to the economy over time. Professor Vogelsang hints at this point in his July review paper but concedes that he does not have the data to adequately evidence this cost.

Amongst the various commentaries about Dobbs' proposition regarding a potential loss from the regulated firm's under-investments, a valuable insight emerged from the BARNZ submission. Their advisor, Covec, offered the view that the benefits to consumers from a (set too) low price will be greater than the losses from a higher price and that the asymmetry is likely the other way around from that proposed under the Dobbs model. This conclusion from their analysis is however dependent on the level of the assumed costs of network outages, a subject that we come back to later in this advisory note.

3.3.2. Lack of evidence

The Commission's other advisors¹⁹ provide various evidential inputs to the process, more especially Economic Insights who prepared a survey of international practice in setting regulatory WACC.²⁰ It was helpful to bring the differences into focus and highlighted the care that is needed when making cross-country and cross-sector comparisons.

Also of note from submissions was the absence of evidence regarding network companies making inadequate returns under the current IM's.

¹⁹ Refer Franks, 23 June 2014, Lally, 19 June 2014 and Vogelsang, 12 June 2014 - advice to Commission.

²⁰ Refer Economic Insights 16 June 2014 and NZIER May 2014 previous (brief) attempt to do the same thing. Also refer Frontier Economics (May 2014 and July 2014) critiques on behalf of Transpower of both our and Economic Insight surveys.

These submissions have served to highlight just how little is known about the relationships between network investments, energy service quality, prices and the impacts on consumer welfare from the trade-offs that are made by regulators and network owners amongst these. It seems to us that the starting point for the analysis and reasoning behind WACC uplift is that there *is a loss function* that needs to be justified, rather than taking the mid-point of the WACC range as the logical estimate of the true WACC and working from there. Evidence from submissions, and our own further analysis, does not persuade us that uplift is warranted.

Various submitters had a go at some or all of these issues.

3.4. Influential submissions

As mentioned, Covec offered their interesting views that the gains to consumers from a lower WACC (that presumably lead to lower prices!) likely outweigh the potential losses to producers – as we note elsewhere unravelling these costs and benefits is a pivotal issue. Covec’s views did however attract a contrary response from CEG on behalf of Airports Association and ENA. This disagreement relates to a number of the matters we set out at the start of Section 3.3 above.

Oxera started with the assumption that a loss function was appropriate and then had an honest go at a ‘probability of loss’ methodology considering reliability investments only.²¹ Their analysis is well founded but falls short on execution and does not adequately consider all classes of network investment, focussing on reliability investments.

Professor Ingo Vogelsang provided a number of papers that give very useful commentary and guidance on the WACC percentile and other matters. His June paper appeared somewhat approving of the loss function approach and accepting of how Oxera were going about their work. It is valuable but did not have a particular focus on the Section 2.2 questions above. In July, at the request of the Commission, he did however form a much more structured and critical view of the mechanics and scope of the Oxera work, suggesting that the scope was too narrow and much was left unsaid that could have been added to the Oxera analysis. He also provided a brief review of the Commission’s reasons paper at the end of July. Vogelsang also raised the question of whether WACC uplift is the best method of encouraging investment in network reliability.

Our review of submissions and our analysis of the matters that we raise above leaves us with the view that the Dobbs loss function thinking is less relevant to the Commission’s decision to amend the WACC for gas and electricity sectors. We are of this view simply because these sectors are only marginally influenced by innovation from investments (as opposed to say, telecommunications) but also because they are sectors where other interventions and regulatory structures will likely better meet regulatory outcomes.

Also in our view the focus of the submissions on estimating a loss function based on extrapolation of overseas examples to New Zealand only answer part of the question asked by the High Court and do not cover all of the elements that the Commerce

²¹ Recall that we have concerns regarding their use of very event specific examples of the costs of outages.

Commission would need to consider in setting a WACC that minimises ex ante welfare losses. In particular the examples of outages quoted:

- do not seem to discuss what additional level of investment would have been required to avoid the outage and how network companies would have 'discovered' what additional investment was required;
- were extreme events but were used as point estimates of the effect of an outage rather than being set in the context of the low likelihood that both such an outage would occur and that the reliability investment could have prevented it;
- do not seem to have been cross-checked against the New Zealand experience.

We suggest that if the Commission intends to rely on the concept of an asymmetric loss function in the setting of the WACC then further analysis is required on the failure scenarios including: definition, relative likelihood, and magnitude of effect.

3.5. Loss function - a suggested approach

Well, for us submissions identified that this is really a two-stage evaluation which is made up of a series of questions:

3. First, is there evidence of a likely welfare loss of any sort from mis-estimating WACC (the High Court question)?
 - If no, then use the mid-point;
 - If yes, then move to next stage of attempting to identify and estimate the loss.
4. Then, how do we assess the 'function' and extent of the welfare loss:
 - Does it apply to all investment classes (reliability, replacement, new connections, innovation, etc)?
 - Is it material in some or all of these classes of investment?
 - What is the probability of the loss occurring?
 - How do you measure the loss?
 - Does the potential loss matter for the WACC % or can it be managed in other, more efficient and effective means?
 - What should the Commission do?

4. 67th percentile alternative

4.1. Commission proposal

Most submissions to the Commission's notice of intention to review the WACC did not propose alternatives but merely argued that WACC uplift to the 75th percentile should remain as the cure-all for the risk of sub-optimal investment and that it should apply to both sunk investments in the RAB and to new yet to be made investments.

The Commission have changed their mind and now propose using the 67th percentile instead, but this is still a blanket one size fits all uplift that will be applied for RCP2. For us what was missing is a consideration by the Commission of alternative mechanisms to encourage investment in the reliability of the network.

The Commission have time on their side. We see value in examining local performance data and developing a local strategy that fits the 'regulatory form factor' to deliver Part 4 outcomes for each industry sector. Given that they now concede the 75th percentile is inappropriate, there is little urgency to establish a long term WACC percentile other than the mid-point at this time.

4.2. Strengthening the rationale

We had a think on how to go about this. There is a lot at stake here and to help the thinking we unpacked this proposition and suggest that they could go about this sort of analysis as follows:

- Should WACC 'incentives' apply to the entire RAB, regardless of the percentile?
- If yes – why?
- If not, why not and what return should the RAB receive?
- What other incentives should apply to different classes of regulated assets?
- How would they work in the real world?

There are lots of issues to deal with here and lots of trade-offs so this needs breaking down into what is important with each class of capex. For example:

- Short term SAIDI/SAIFI reliability standards vs longer term incentive targets for reliability
- What investments do Transpower and EDB's have discretion over?
- What time frames matter for each capex class?
- Are there simple limits to the potential over/under investment as Professor Vogelsang suggests?
- How big is each category of capex (historic and forecast) – that is, do we have a material problem?
- Which capex categories do the different networks have more of a focus on (transmission vs distribution)?

Break the capex down into its components and consider how to regulate investment levels in each. What does theory say should be done and what is practical in the real world. Also consider what actually happens with Transpower's and EDB's investments.

1. Investments in assets for innovation – like what? Smart meters - not regulated? What else is there in this category?
2. Incremental capex for new customer connections - these must be done as they are customer driven
3. Maintenance capex for replacement assets – these impact reliability. What rate has/have network companies been replacing RAB under their own steam? Is the 75th percentile WACC an incentive to over-replace assets? Are there other incentive arrangements that relate to reliability performance (targets with carrots and sticks like STIPS)
4. Capex for developing the network (make it more reliable, diverse, safer) – this is more to do with Transpower than EDB and needs its own bit of thinking.

5. The wider context

5.1. Presumption in favour of uplift not justified by evidence

We are unhappy with a presumption that a lack of evidence against uplift implies the need for uplift. It is not reasonable to presume that welfare costs from WACC estimation error are always asymmetric. This is not our categorical rejection of the idea – absence of evidence is not evidence of absence – rather we simply do not see that the weight of evidence is yet in favour of uplift.

Our previous analysis suggested:

...a discontinuous relationship (loss function) between welfare and WACC percentiles. This discontinuity suggests caution and industry-specific analysis before selecting a WACC percentile.

In other words consumers may be made worse off by uplift. In our previous advice we also noted that:

the shape of partial equilibrium loss functions are likely to be wrong because they overlook certain costs of excess profits and benefits of lower prices.

We appreciate there is an intuition behind 'assumed' asymmetry. We agree that asymmetric costs are possible in some cases and probable in others however we don't see sufficient evidence to presume this is always the case or that it could be sufficiently prevalent to demand uplift by default.

5.2. Incomplete models of incentives

It seems to us that the simple 'WACC + adjustment approach' is an incomplete model of incentives.

5.2.1. Positive incentives

The Commission and their advisors all outlined incentives which can work in the opposite direction to incentives which make under-investment a problem. For example:

- investor preferences for long-term stable returns within a portfolio which:
 - increases willingness to invest in project-specific investments to maintain reliability;
 - increases willingness to invest regardless of a change in expected return, as long as there is no change in variance (mean-preserving spread, increases investment in lower risk assets);²²

²² Investors in regulatory assets are willing to trade off higher % returns for durability over time (mean preserving) which is not necessarily the rational investor behaviour model that Oxera argues for.

- awareness that higher returns in the short term may reduce returns in the longer term by provoking a negative regulatory (political) response;
- incentives on boards and management to ensure quality of service given that they:
 - have obligations to manage health and safety risks
 - suffer reputational risk of being associated with ‘the lights going out’
 - need to maintain stable cash flows to support expansion into other ventures.

5.2.2. Dis-incentives

The Commission also noted that there are measures which run in the opposite direction, increasing the likelihood of under-investment, such as:

- information asymmetry – running down the quality of network to make the network look more profitable than it is and then selling (i.e. pulling the wool over other investors eyes or the regulators);
- using regulated business to bolster other parts of the business (‘cash cow’ incentives);
- investor demands for returns to be maintained, whatever the costs, during periods of instability.

These two sets of observations do not cancel each other out. The first set are general qualifications on what counts as pay-offs and what motivates investors. The incentives in the second set are ‘situation-specific’ and ‘strategy-specific’. They are also manifestations of the sorts of incentives for which the incremental rolling incentive schemes have, in part, been designed.

A recent research paper on the relationship between the political economy and the efficiency of lines company regulation in the United States suggests there is systematic under-investment in lines businesses in the United States, even after controlling for the preference for conservative regulators to increase rates of return.²³ The big so-what for us with this recent piece of research is that it seems to be evidence of the seeming dis-connect between the return on investment and (under) investment.

5.3. Alternative frameworks exist

Regulatory decision-making under uncertainty has numerous intellectual and practical counterparts, such as in monetary policy and in environmental regulation.

In the last two decades there has been significant effort directed towards robust decision rules which perform well under uncertainty. As mentioned in a footnote (15) in our 5 May 2014 report:

“there is extensive consideration of such issues in the monetary and macroeconomic literature that provide a useful frame of reference. Findings from this literature include that, if consumers

²³ Refer http://web.stanford.edu/~ayurukog/main_infrastructure.pdf.

are risk averse, policy should err on the side of stabilisation (low prices) over growth (increased investment), due to welfare losses from cycles – i.e. the analogy with infrastructure is that it may be better to delay rather than charge for unnecessary and lumpy investment. In NZ (Lees 2006)²⁴ findings have also included that model error or uncertainty implies that policy should err on the side of being too stringent, favouring price stabilisation over growth, even if there are costs”.

5.4. Uncertainty implies trade-offs over policy instruments

Uncertainty about costs and benefits should influence the choice of policy instrument. This can be as important as the calibration of a policy instrument

The rule of thumb is that quantity-based policies (giving firms limited flexibility) are the ‘best’ regulatory instrument under uncertainty when marginal costs of meeting regulatory demands rise more slowly than the rate at which marginal benefits decline (Figure 11 below illustrates this effect). The upshot of this observation for WACC uplift is that if the benefits of additional investment are potentially large, then less flexibility and more performance-based rules are better – that is, there should be less reliance on price instruments.

We would expect that marginal benefits of investment would vary depending on existing levels of capacity and demand and likely future demand growth. This suggests further analysis of the kind we have started that is described earlier. Areas with lower service quality and customers that are more costly to serve would be better served by flexible price-based policy instruments. In other words, for them, WACC uplift might be the best incentive.

Networks with good service quality (and thus steeply declining curves of the marginal benefits of investment) and fairly flat marginal investment costs (that is, larger economies of scale) should then be regulated with less flexible incentives – the lower diagram in Figure 11 illustrates this.

Another way of saying this might be that networks with less capital per customer are best regulated with quality and performance standards – from the perspective of optimal policy instruments under uncertainty.

Some may recognise this line of thinking as being used extensively in debate around optimal environmental policy. The fact that these ideas have been used in environmental economics should not distract from their use in regulation of network monopolies. The original research on this matter was not about environmental policy.²⁵ The fundamental issue is the same when:

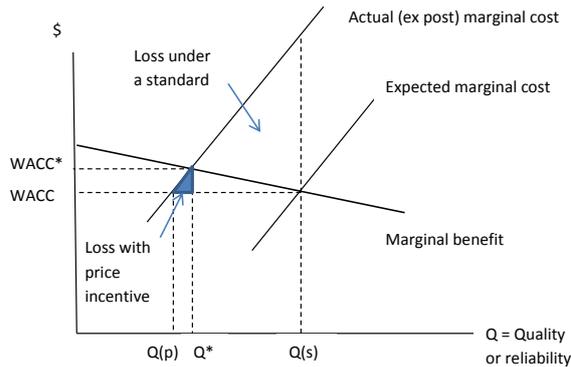
- the intent of the regulation is to encourage a behaviour which is not otherwise being pursued through reasonable market prices;
- there is fundamental uncertainty surrounding what the regulated incentive should be.

²⁴ www.rbnz.govt.nz/research_and_publications/.../2006/dp06_08.pdf

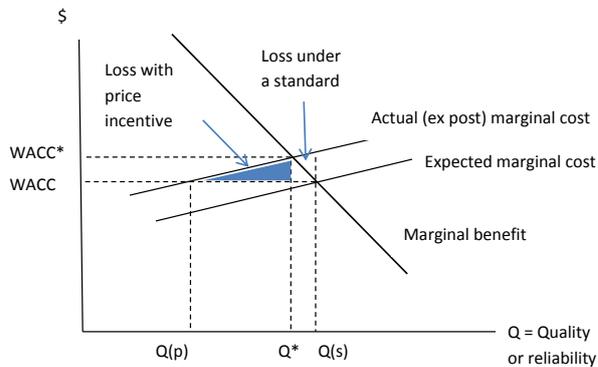
²⁵ Weitzman, M (1974), ‘Prices vs. Quantities’, The Review of Economic Studies, Vol. 41, No. 4, pp. 477-491.

This then raises the question of whether a DPP, or more precisely what components of the current DPP, is likely to tease out the right kind of results in terms of minimising the costs of the 'under investment' problem while also limiting the costs of the 'over-pricing' problem.

Figure 11 Examples of instrument choice under uncertainty²⁶



Ex post optimal $Q = Q^*$
 Quality under a performance standard = $Q(s)$
 Quality under a price incentive = $Q(p)$
 WACC = price incentive set in expectation of quality $Q(s)$
 WACC* = optimal (ex post) WACC



Ex post optimal $Q = Q^*$
 Quality under a performance standard = $Q(s)$
 Quality under a price incentive = $Q(p)$
 WACC = price incentive set in expectation of quality $Q(s)$
 WACC* = optimal (ex post) WACC

Source: NZIER

²⁶ This Figure is illustrative of how the losses from a price incentive depend on the rate at which the marginal benefits from investments decline over the output quantity and the importance of this to the assessment of welfare losses.

Being that electricity and gas IM regulation presently works within the confines of low cost DPPs, the balance of incentives might need to be set in a very simple fashion. A number of approaches come to mind on how to go about this. One approach would be to strike a balance according to the weight of the population. This would mean erring on the side of performance-based mechanisms, seeing as most consumers live in the more densely populated parts of the country and are thus served by networks with higher amounts of capital per customer.

The extent to which this solution is a sensible one also hinges on whether uncertainty about marginal benefits and marginal costs are correlated.²⁷ If they are correlated then the intuition we suggest above reverses and it make sense to err on the side of price incentives.

The idea of greater performance incentives is likely to draw objections. A company with regulated prices cannot pass costs through to consumers and, therefore, if a performance standard is used to incentivise performance, consumers may well be left with no service as investment capital dries up.

This has an air of truth but assuming this is absolutely the case neglects the duality between profit maximisation and cost minimisation. With performance standards;

“There is of course just as much motivation, e.g. to minimize costs at specified output levels so long as at least some fraction of production expenditures is borne by producers.” (Weitzman, 1974)

This line of thinking does have the drawback that, like other old(er) approaches to regulation, it really does not allow for much in the way of new products and services. Policy instruments which focus firms’ attention almost exclusively on cost minimisation are unlikely to cause much in the way of new approaches.

5.5. Is concern about investment and innovation a category mistake?

We question whether firms providing services with significant natural monopoly characteristics have sufficient incentives to innovate in ways which match the needs of consumers except in the case of products which are not regulated.²⁸

The concerns of regulators over innovation and investment appear to be misplaced when it comes to energy networks – except with regard to innovative ways of minimising costs subject to a quality constraint.

Professor Vogelsang did not say this directly but we think he was pointing in this direction when he noted in his review of the Commission’s decision that the Dobbs (2011) article was about innovation and new services and not, per se, the matter being investigated by the Commerce Commission. He has also suggested elsewhere that regulators worry too much about investment:

‘Almost always regulators want investment (in fact, too much so!)’.²⁹

²⁷ Stavins, R. (1996) ‘Correlated Uncertainty and Policy Instrument Choice’, *Journal of Environmental Economics and Management*

²⁸ An illustrative case in point is Vector Technology where they locate and manage their investments and innovations in network utility

²⁹ Vogelsang, I (2010) : Incentive regulation, investments and technological change, CESifo working paper, No. 2964

The tradition that has grown up around network regulation appears to be much less concerned with conventional utility or energy network regulation and much more to do with the dynamic aspects of access pricing of bottleneck services in the presence of competitive by-pass and rapid technological change, - for instance telecommunications and internet access.

It may be that regulators and regulatory experts are too quick to draw connections between insights in telecoms and other domains of regulation without thinking carefully about how well they apply. That is, the implicit presumption we detect in favour of uplift may well stem directly from a category error.

5.6. Consumer welfare needs to be at the centre of decisions

We agree with Dr Small (Covec submission) that the purpose of Part 4 of the Commerce Act subordinates producer welfare to consumer welfare. From this, any alternative framework needs to keep consumer welfare at its centre. In more general terms, whenever significant market power is at stake producer welfare should always be subordinate to consumer welfare.

Producer surplus matters but its importance is subject to conditions. For example, producer surplus is welfare decreasing (in aggregate) if the surplus is invested in rent-seeking or gold-plating of regulated assets.

More generally, maximisation of producer surplus is what motivates regulation in the first place. If we measure welfare gains in terms of producer surplus we can just as easily end up with a sub-optimal monopolistic outcome if we are not careful.³⁰

Recalling our earlier advice of 5 May 2014, the imposition of higher prices can shrink the economy and make people in New Zealand generally worse off – even if owners of distribution companies and perhaps community owners are made better off.

There have been few studies of the systematic effects of monopoly pricing on overall economic welfare but the effects have been shown to fall disproportionately on poorer households (Creedy and Dixon, 1998).³¹

Distributional consequences aren't exactly central to incentive regulation but they are important drivers of the politics of regulation and they are one reason why time inconsistency – (i.e. regulators renege) – is not entirely unavoidable.

In terms of longer run efficiency, the regulator must also have an eye on producer surplus as a matter of considering what is at stake and the potential for higher costs to all-concerned as a consequence of time-inconsistent policy.³²

Investors are inevitably concerned about the bait and switch – that regulators lower their prices or returns after money has been invested in providing better services.

³⁰ The structure of theoretically socially optimal monopoly prices (Ramsey-Boiteux) looks very similar to conventional monopoly pricing 'rules'.

³¹ Creedy, J and R Dixon (1998) 'The Relative Burden of Monopoly on Households with Different Incomes', *Economica*, Vol. 65, No. 258 (May, 1998), pp. 285-293.

³² A recent research paper (July, 2104) on time inconsistent pricing and distribution company efficiency in the US showed that conservatives tend to err on the side of higher rates of return – perhaps reflecting less concern with distributional consequences. These higher rates of return were, however, associated with underinvestment and lower efficiency than for companies with lower rates of return. See http://web.stanford.edu/~ayurukog/main_infrastructure.pdf.

This is of course a risk that has been around for a long time and is well understood. It must, therefore be in the cost of capital. The issue for regulators then is that variation in rates of return are minimised to the extent possible.

5.7. Conclusions

Ultimately the point of all of this analysis and review is two-fold.

First WACC uplift is not necessarily the right instrument for dealing with concerns about the welfare costs of reduced investment. If any additional incentive is required to safeguard consumer welfare that incentive is most likely to be found elsewhere.

The second and more fundamental point is that the Commission needs to adopt a more structured and disciplined way for thinking about its own rule-making under uncertainty. The current approach – to estimate WACC and add an adjuster motivated largely by intuition – is too ad hoc to promote certainty.

The input methodologies could make better use of existing economic frameworks for robust rule-making under uncertainty. Less judgement – at least on how evidence is interpreted – and more transparency would also promote more time-consistent policy making.

However, we doubt there is time this year to consider more robust and systematic frameworks for dealing with uncertainty and potential asymmetries of costs from errors in the estimation of WACC.

We suggest that the interim decision is left at the mid-point and that time needs to be taken to consider the longer term issues between now and 2017 when the IM review is due.