# Comments on Initial Observations on Forecasts Disclosed by 29 Electricity Distributors in March 2013

23 December 2013

# 1 Introduction and Summary

Vector has asked us to review the Commerce Commission report entitled "Initial Observations on Forecasts Disclosed by 29 Electricity Distributors in March 2013". We focus on the Commission's analysis of the forecasts of opex and capex contained in Asset Management Plans, and what the analysis suggests for the 2014 DPP reset.

Overall, the paper contributes to a better understanding of the costs that EDBs expect to face, and the drivers of those costs. EDBs are forecasting real increases in both opex and capex. The Commission and other stakeholders need to understand the drivers of those cost increases so that efficient costs are recovered through future prices.

The analysis also highlights the difficulties that the Commission needs to overcome in setting price-quality paths under the DPP. While robust top down models can provide a useful guide to EDBs' expenditure requirements, in our view expenditure allowances under the DPP need to have the flexibility to allow EDBs to operate and invest efficiently. This flexibility is most valuable for capex—which is driven by the particular asset management practices of each EDB—but also applies to opex. This suggests that the Commission should not rely on the results of a single top model to set allowances.

**Continuing to improve understanding of the top down opex model**

The Commission applies a top down model of opex to generate a forecast of network and non-network opex that is independent from EDB forecasts. The model is based on historical relationships between opex and the outputs provided by EDBs (using data on the number of connections and kilometres of network length), and adjusted for expected changes in input prices (such as labour and materials).

To improve confidence in the results of this modelling, we recommend that the Commission:

- Focuses on explaining how EDB forecasts reflect changes in the relative efficiency of EDBs.
- Clearly explains the intuition behind the modelling, and the range of modelling results that would be consistent with the institution. The Commission should also explain where the modelling results deviate from the intuition.

The Commission does not discuss the option of using an "absolute" approach to forecasting opex (rather than an "adjustment" approach). We are unsure why an absolute approach is not at least considered, as it has some benefits—such as removing the need to select a base year, and better reflecting relative efficiencies.

**Capital expenditure forecasts should not be solely determined by a top down model**

The paper starkly highlights the challenge that the Commission faces at the next DPP reset.

- EDB forecasts of expenditure for both opex and capex vary widely across the industry. However, it is not possible to determine whether these forecasts are reasonable or represent efficient costs through a top-down model. EDBs that are forecasting large increases in expenditure may need to efficiently spend the forecast amounts over the coming years due to the way that the trade-offs between asset maintenance, asset refurbishments, and asset replacement decisions have been made in the past
- But the Commission is required to set the DPP using "low-cost" regulatory approaches. In the last DPP reset, the Commission interpreted this requirement as precluding reliance on supplier information that needs to be audited or verified.

The combination of the fact that asset management decisions are inherently EDB-specific, and the reluctance to rely on unaudited EDB information makes forecasting capex uniquely challenging in New Zealand.

In our view, the best way to overcome this challenge is to de-emphasise the importance of capex forecasts by using a sliding scale that allows EDBs to select from a menu of capex allowances. We have previously described how a sliding scale could work in our reports on the 2012 electricity and gas DPP resets. Alternatively, the Commission could use capex modelling results to establish a reasonable range for capex changes relative to historical levels (with the range being specific to each EDB).

**Further engagement on forecasting approaches before draft DPP reset**

We encourage the Commission to continue to engage with the industry on forecasting approaches for the next DPP reset. We understand that the Commission will release an issues paper at the end of February 2014. This provides an ideal opportunity to develop approaches to forecasting in conjunction with the industry.

# 2 Opex Forecasting

EDBs forecast that industry-wide opex from 2014-2018 will increase by 9 percent compared to the period from 2010-2013. This average contains a wide range of expected changes in forecast opex—from an increase of 33 percent for Eastland Network, to a decrease of 63 percent for Buller Electricity.

This section considers how the Commission can build a better understanding of these expected changes in EDB opex. We encourage the Commission to focus on understanding what the forecasts mean for changes in the relative efficiency of different EDBs. This should help to build confidence in the Commission's approach to modelling opex, and ensure that regulation rewards more efficient EDBs while penalising poor performers.

**Differences between EDB opex forecasts and the Commission's opex model**

The Commission uses the top down model of opex from the final 2012 DPP reset decision to understand what factors might explain forecast opex increases. The Commission's model specifically accounts for changes in the scale of EDBs and changes in input prices. While the model explains some of the variation in EDB forecasts (for example, EDBs with higher rates of customer growth are generally expected to increase their opex), a substantial amount of unexplained variation remains.

We see value in understanding the remaining variation between EDB forecasts and the results of the Commission's model. This variation will either be due to factors that are not explained in the Commission's model, or due to EDBs having forecasts that are less reliable than the Commission's model (or a combination of these factors).

Identifying the reasons for the differences requires the Commission to apply its model using the best available data. We understand that the Commission has not yet incorporated EDB forecasts of scale variables (length and number of connections) into its opex model, and instead extrapolates underlying trends in the scale variables. Incorporating EDB forecasts of scale is therefore a sensible next step in the analysis.

**Understanding whether differences are caused by changes in relative efficiency**

Even if the Commission uses EDB forecasts of scale variables in its opex model, we expect that a substantial gap will remain between the modelling results and the opex EDBs forecast is required. When setting opex allowances for the next DPP, this leaves the Commission choosing between:

- Opex forecasts that are prepared by EDBs and take into account specific characteristics, such as the historical level of opex spent by the business, the need for any opex "catch-up", and any trade-offs that have been made between opex and capex
- Opex forecasts that provide an objective, but incomplete, view of the costs that need to be spent by EDBs from the top down model.

The benefit of the Commission's top down model is that it attempts to exclude any variation in EDB opex that results from changes in the relative efficiency of EDBs. Holding other factors constant, EDBs that expect their relative efficiency to decline will forecast to spend more on opex. In contrast, EDBs that actively seek out more efficient ways to operate their networks will forecast relatively lower levels of opex (or less substantial increases in their opex levels). The Commission signals (in footnote 34 of the initial observations paper) that it intends to undertake further analysis to explore approaches for assessing the relative efficiency of distributors.

In our view, it is appropriate for the Commission to set opex allowances in price-quality paths that assume constant industry-wide changes in efficiency. This has the effect of rewarding EDBs that improve their efficiency at a faster rate than the industry average, while penalising EDBs that are not able to maintain efficiency gains at the industry average level (presently estimated to be the same rate as the economy as a whole). In contrast, if the Commission attempts to forecast different rates of efficiency gains into its price-setting forecasts, then regulated suppliers that are able to identify and implement efficiency gains may not receive full reward for these improvements for the remainder of the regulatory period (or extended carry-over period with an IRIS). Assuming an industry average rate of efficiency improvements is therefore consistent with the purpose of Part 4 of the Commerce Act to provide incentives for regulated businesses to improve efficiency.

The key challenge for the Commission is to present a compelling case that its top down model of opex sufficiently captures the all material factors relevant to opex levels. The opex model includes connections and lines—which are proxies for the main outputs provided by EDBs (services to connected parties and electricity transport infrastructure). In our view, the Commission should continue to test and develop its opex model from the perspective of understanding whether the forecasts made by EDBs do simply reflect changes in relative opex efficiency.

**Investigating an absolute model for opex**

The initial observations paper describes an absolute model for capex (discussed further in Section 3 of this note). However, the Commission does not discuss the option of using an absolute approach to forecast opex, rather than the "adjustment" approach used in the 2012 DPP reset.

In our view, an absolute approach could have some benefits when forecasting an efficient level of opex for each EDB. The absolute approach removes the need to select a base year, and therefore solves the issue of trying to find a representative year that will not create incentives for EDBs to change their expenditure profile in response to regulatory settings. An absolute approach should also provide stronger incentives to improve relative efficiency—whereas an adjustment approach effectively "locks in" past levels of relative efficiency. However, identifying appropriate input prices to use in an absolute approach may be challenging. At this stage, both approaches are worth considering further.

**Building confidence in a top down opex model**

The Commission should also use the time before the next draft DPP reset decision is released to build confidence in the opex forecasting model that will be used at the next DPP reset. We consider that when consulting on its approach to modelling opex, the Commission should:

- **Describe the Commission's expectations of model results.** The Commission states that the opex model is based on statistical tests, combined with engineering analysis, and underlying theory (paragraph 108). Whenever modelling results are presented, we recommend that the Commission explains the intuition behind the modelling and what that intuition means for the results that the Commission expects the model to produce.
- **Explain any areas where the model results differ from the Commission's expectations.** Modelling results will not always conform with expectations. This does not necessarily mean the model is not valid—and in fact can lead to

better-informed expectations of how the outputs provided by EDBs are related to efficient costs.

The ENA working group provides a good avenue for developing a more complete picture of how the industry expects any forecasting model to work. In addition, we consider that the issues paper the Commission plans to release in February 2014 should carefully explain the intuition behind the opex model, and how different modelling approaches conform with the expected intuitive relationships.

# 3 Capex Forecasting

EDBs forecast that industry-wide capex will increase by 16 percent when compared with the period from 2010-2013. This average contains a very wide range of expected changes—from an increase in capex of 142 percent for Eastland Network, to a decrease of 55 percent for Westpower.

The Commission has not yet presented a top down model that attempts to predict an efficient level of capex for each EDB. However, various approaches for completing such an analysis were discussed at the workshop held at the Commission in December 2013. This section summarises some of the challenges in preparing a top down model for capex. In our view, these challenges suggest a top down model for capex should only be used to inform a baseline that has some built-in flexibility to respond to a range of EDB circumstances. The sliding scale used to set expenditure allowances in other countries provides the ideal regulatory mechanism for this flexibility.

**Asset management decisions make top down modelling of capex very difficult**

Asset management should focus on achieving the required level of network reliability at least cost. This involves each EDB making the right trade-offs between asset maintenance, asset refurbishment, and asset replacement decisions. These trade-offs are specific to the circumstances and assets of each EDB, and should respond to any differences in the expectations of customers served by each EDB.

The judgements involved in asset management mean that no model can accurately predict or automate the selection of the optimal trade-off between asset maintenance, asset refurbishment, and asset replacement. Similarly, no model exists that can accurately forecast the future replacement investment requirements of EDBs. Replacement capex will inevitably reflect the preferred asset management practices of the individual business, meaning that true forecasts require more information than simply the age of the assets and their probability of failure.

The process of making asset management decisions means EDBs are the best source of replacement investment forecasts. Only once the practices and strategies adopted by each EDB have been incorporated into the analysis can a meaningful prediction be made of the resulting capital expenditure needs (and any resulting impacts on operating expenditure).

**Previous regulatory efforts at forecasting capex in New Zealand**

In 2007, the Commission engaged Farrier Swier to prepare a model that assessed the replacement needs of each EDB based on the age of assets owned by each distributor.[1] At that time, Castalia, together with Benchmark Economics, was engaged by ENA to review the modelling results and prepare forecasts of likely replacement capex needs.[2]

Our forecasts investigated whether distributors face an escalating probability of failure due to ageing assets. Our work identified that over the regulatory period being proposed at that time (2009-2014), distributors would need to spend $33 million more per annum on average than in 2008/2009 (the base year being discussed at that time).

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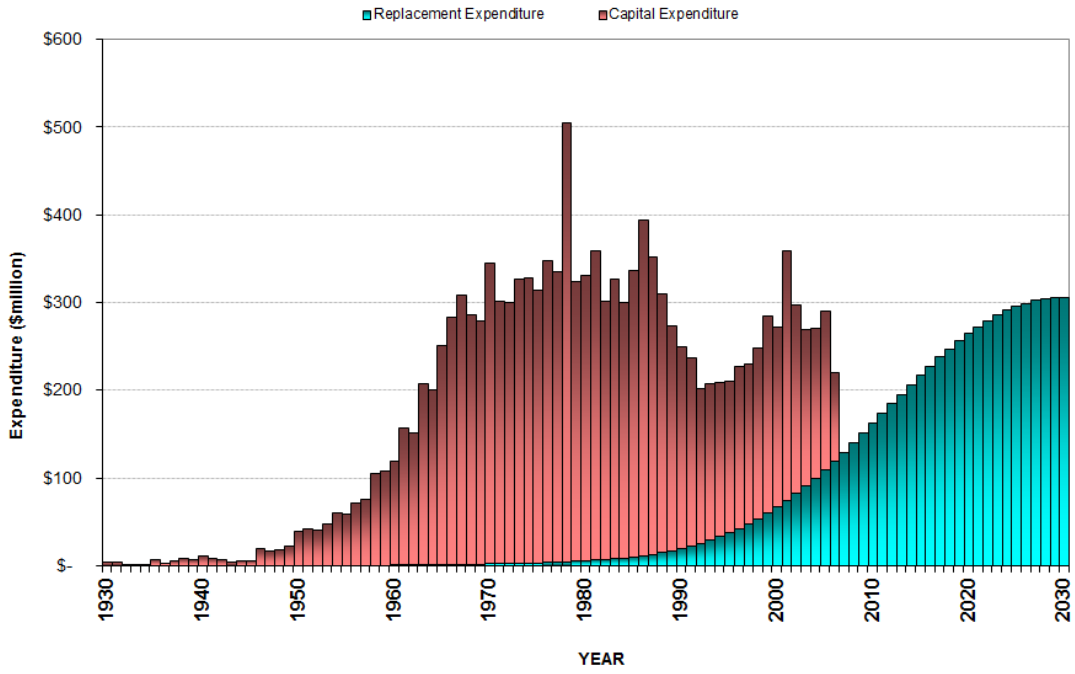
[1] Farrier Swier (2007). "Research Project for 2009 Threshold Reset" http://www.comcom.govt.nz/regulated-industries/electricity/electricity-archive/repealed-part-4a-before-commerce-amendment-act-200/targeted-control/threshold-reset-project/

[2] Castalia (2008) "Ageing Assets in Electricity Distribution: Demystifying the "Wall of Wire. See http://www.iscr.org.nz/f426,12030/ISCR-Ageing_Infrastructure-270508.pdf

The estimated increase in capex from our modelling was due to an increase in the annual probability of failure (proxied by the replacement cost of failing assets) of over 100 percent between mid-2001 and mid-2009. By the end of the proposed regulatory period (mid-2014), our modelling showed that the annual probability of failure increased by over 175 percent.

An overview of the results of our modelling is presented in Figure 3.1. The rate of increase in replacement capex clearly depends on the assumptions used to determine the probability of asset failure.

**Figure 3.1: Illustration of Previous Top-down Capex Modelling**




Source: Castalia "Ageing Assets in Electricity Distribution: Demystifying the "Wall of Wire" (2008)

Although probabilistic analysis of asset failures can help to predict capex replacement needs, it is important to understand the limits of these models. EDBs that are forecasting large increases in expenditure may need to efficiently spend the forecast amounts over the coming years due to the way that the trade-offs between asset maintenance, asset refurbishments, and asset replacement decisions have been made in the past.

For example, Eastland Network forecasts an increase in capex for 2014-2018 of 142 percent over 2010-2013 levels (Table X1 of the initial observations paper). It is tempting to conclude that such a forecast overstates true capex needs, particularly because this capex does not appear to respond to demand growth. However, the asset management decisions made by Eastland Network based on the costs of maintaining and extending the life of its assets may mean that this level of capex is in fact efficient. It is simply not possible to observe the complete dynamics of asset management through a top-down model.

### How to reflect the limitations of capex modelling in regulatory processes

The limitations of top-down capex modelling suggest that the Commission needs to exercise caution when using these approaches to reset price-quality paths, and should look for ways to mitigate the risk that the capex model fails to reflect efficient investment needs. We see two possible approaches.

First, the Commission could only use the models to inform its broad conclusions. For example, if the probability of asset failure shows a significant increase over the coming regulatory period, then the Commission could recognise that an EDB will face a significant escalation in costs from historic levels. In this case, the model results might be used to test that each EDB's capex forecast falls within a reasonable range. This approach would use the modelling as a high-level guide, rather than as a specific forecast.

Alternatively, the Commission could use the model as a starting point to inform "negotiations" over the capex allowance set by using a sliding scale. We supported the use of a sliding scale in past DPP resets for electricity and gas, and continue to see the mechanism as an ideal fit with the low cost intent of the DPP.[3] Under this approach, the indication of capex needs from the model would be used to set the baseline on the sliding scale. Individual EDBs could then choose whether their specific circumstances warrant a higher or lower capex forecast:

- Lower expenditure forecasts would come with higher-powered incentives, allowing EDBs to retain a larger proportion of any under-spend
- Higher expenditure forecasts would come with lower-powered incentives, meaning that EDBs would be able to spend more but would retain a smaller proportion of any under-spend.

**Choosing between an adjustment and absolute approach to capex modelling**

The Commission's initial observations paper describes two broad approaches for a top down capex model—an "adjustment" approach that models changes from a base year (similar to opex), and an "absolute" approach that forecasts a total capex value.

We consider that each approach has advantages and disadvantages, as presented in Table 3.1 below. Selecting between the two approaches therefore requires more information on the impact of the relative advantages and disadvantages of each approach for the task of modelling EDB capex.

**Table 3.1: High-level Evaluation of Adjustment and Absolute Capex Forecasting**

| | Advantages | Disadvantages |
|---|---|---|
| Adjustment approach | ▪ Modelling errors are a lower risk for EDBs<br>▪ Consistent with opex modelling approach | ▪ Locks in allowance that reflects past performance (good or bad)<br>▪ Requires the selection of an arbitrary base year, which may not be reflective |
| Absolute approach | ▪ Provides stronger incentives for efficiency (rewards and penalties)<br>▪ Removes any need to identify a base year | ▪ Modelling errors have significant impacts because they affect the total allowance |

[3] The mechanics of the sliding scale for EDBs are discussed in our submission on the draft 2012 DPP reset: http://www.comcom.govt.nz/regulated-industries/electricity/electricity-default-price-quality-path/2010-2015-default-price-quality-path/