



# Review of the Commerce Commission's Price Model for the Aurora Customised Price-Quality Path

**Report to Commerce Commission**

4 November 2020

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# Definitions

ACOT	Avoided Cost of Transmission
Capex	Capital expenditure
CPP	Customised Price-Quality Path
DPP	Default Price-Quality Path
ICP	Installed Connection Point
IRIS	Incremental Revenue Incentive Scheme
kWh	Kilowatt hours
LFC	Low Fixed Charge
Opex	Operating expenditure
PTB	Pass Through Balance
TPM	Transmission Pricing Methodology

# Executive Summary

The Commerce Commission asked Castalia to review the methodology used to estimate the effect of the Aurora Customised Price-Quality Path (CPP) on prices and bills of residential consumers.

We reviewed the methodology and assumptions that the Commission used in its price model and we recommended that the Commission make the following amendments to its model:

- Use of the following volume forecasts for Dunedin residential customer usage

2021	2022	2023	2024	2025	2026
382,011,365	381,609,092	381,206,819	380,804,546	380,402,273	380,000,000

- Use of Aurora’s volume forecasts for the Central Otago and Queenstown regions
- Use of MBIE’s Quarterly Survey of Domestic Electricity Prices of 15 May 2020 to estimate retail costs during the 2021 financial year
- Use of 9250kWh as the annual electricity consumption for the Large consumer profile in the Central Otago region

The Commission has made these changes to its model. As a result, we conclude that the model fairly and reasonably indicates the price changes that Aurora’s consumers are likely to experience during the CPP period, given the net allowable revenue determined in the Commission’s draft decision.

The Commission also asked Castalia to consider the seasonal impact of price changes. It is likely that winter bills would increase by a larger amount than summer bills because of the difference in consumption between summer and winter. It is possible to estimate seasonal consumption variation using data from Aurora’s Default Price-Quality Path (DPP) compliance statements.

# 1 Introduction

The Commerce Commission asked Castalia to review its analysis of the bill impact on residential customers of the Aurora CPP. The Commission's price model sets out forecast revenue during the CPP period, allocates the revenue to each geographic pricing region and consumer group, calculates average residential prices, and applies those prices to representative consumer profiles.

The model necessarily makes some simplifying assumptions, which reflects the Commission's desire to provide consumers with reasonable estimates of price impacts without striving to achieve false levels of accuracy.

The model contains some conservative assumptions that are likely to overstate, rather than understate, the price impact where there is significant uncertainty about model inputs. In our view, this is a prudent approach to take when seeking to understand the likely impact on consumers' bills.

We have not conducted a cell-by-cell audit of the model, as that was outside the scope of the review. However, we have carried out some high-level checks.

In the following sections, we describe the methodology and assumptions used by the Commission, along with our detailed comments.

## 2 The Commission estimates forecast revenue using given inputs

The Commission calculates a forecast of Aurora's revenue during the CPP period by summing up the components of its revenue requirement for each year and applying a cap to annual revenue increases. We outline these revenue components below. However, a number of components were taken as given and outside of the scope of this review.

We do not have any suggested changes to the forecast revenue calculations.

The assumptions on transmission charges and Avoided Cost of Transmission (ACOT) are reasonable, though potentially conservatively high in the context of changes to the Transmission Pricing Methodology (TPM).

The Commission has determined Aurora's forecast allowable revenue as the sum of:

- **Forecast net allowable revenue**, which includes opex and capital related costs. These are sourced directly from the Commission's Draft Decision. We have not been asked to review these figures, or the underlying calculations, and take them as given.
- The **Capex and Opex Incremental Rolling Incentive Scheme (IRIS)** amounts, which the Commission has calculated according to the IM Determination. We have not been asked to review this calculation, and instead take the IRIS figures as given.
- The **Quality Incentive** amount for FY22 reflects the calculation of the incentive in the FY20 DPP compliance statement. From FY23, the quality incentive is set to zero. This seems reasonable, given that the value of the incentive after FY22 is unknown.

- **Transmission costs and ACOT** are assumed to increase at a rate of 2% per year. The Commission used the figures and assumptions in the indicative price model provided by Aurora. Under the TPM, it is possible that the aggregate of Transmission Costs and ACOT will reduce, as indicated by the Electricity Authority in its TPM decision—the Authority forecast that transmission costs will increase but that this will be more than offset by a reduction in ACOT. However, given the absence of certainty on how peak charges will apply (which drive ACOT reductions), and that the Authority’s TPM Guidelines are currently the subject of appeal, use of the figures provided by Aurora seems reasonable.
- **Other Recoverable Costs**, which is the cost of the CPP application. The Commission uses the estimate provided by Aurora.
- **Rates and levies** have an initial change in FY22 (in aggregate the reduction is 3%), and then increase at an annual rate of 2%. Aurora has provided the forecasts of these costs to the Commission, and we have taken them as given. These costs are a small component of the total revenue requirement.
- The **Pass Through Balance (PTB) allowance**, which for FY22 reflects the PTB stated in Aurora’s FY20 DPP Compliance Statement, and is zero from FY23.

To limit consumer price impacts, the Commission adjusts the total forecast allowable revenue so that annual revenue increases are no more than 10%, in accordance with its draft CPP decision.<sup>1</sup> This adjustment reduces the forecast allowable revenue in the first four years of the CPP period, and increases forecast allowable revenue in the fifth year. In the indicative pricing model, the Commission has appropriately scaled opex and capital-related costs to reflect the adjustments to revenue.

### 3 The Commission’s methodology to allocate the revenue requirement reflects Aurora’s CPP application price methodology

Aurora provided the Commission with the Indicative Pricing Model used to determine price impacts of the revenue increases that Aurora proposed in its CPP application. The Commission used the allocation proportions from Aurora’s model to allocate the revenue requirement for each year to regions and customer groups.

Although the allocations are only approximate, and do not precisely follow the Pricing Methodology described in Aurora’s annual disclosure, we accept that they provide a reasonable approximation for the purposes of estimating price impacts.

An alternative would be to attempt to align more closely to Aurora’s disclosed Pricing Methodology. However, that would be difficult because: (1) the granularity of data and information required is unavailable; and (2) Aurora states in its Pricing Methodology that it is

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<sup>1</sup> We note that we have not been asked to review the decision to impose this limit on annual revenue increase. Instead we have simply reviewed the way in which this limit was applied in the price model.

preparing a new cost of supply model that will be used to determine pricing to apply from 1 April 2021, which presumably could apply a revised methodology.

#### **The Commission allocates the revenue requirement to geographic areas using Aurora’s allocators**

Using the allocation proportions provided by Aurora, the Commission calculates the revenue required for each of the following geographic areas: Dunedin, Central Otago, Queenstown, and Heritage. This is done using a separate set of allocation proportions for each of the following types of cost: Opex, Capital-related costs, Transmission, ACOT, and Other Pass-through and Recoverable Costs. Incentives (Opex IRIS, Capex IRIS and Quality Incentive) are allocated using the same proportions as for Opex.

We concluded that it is unnecessary to alter the capex allocations to reflect the reductions that the Commission made to the capex proposed in Aurora’s CPP application. Aurora’s CPP Indicative Price Model uses total network replacement costs to determine capex allocators for each geographic region. As a result, the allocations do not appear to be directly linked to the capex proposed in its CPP application.<sup>2</sup> Therefore, it would not be meaningful to adjust the allocators. In any case, the Commission conducted sensitivity analysis, which found that capex adjustments, if they were to be done, would make little difference to the price impacts.

#### **The Commission allocates the revenue requirement to customer groups using Aurora’s allocators**

The Commission uses allocation proportions provided by Aurora to allocate revenue to customer groups within each region. For simplicity, Aurora aggregated some price categories so that revenue only needed to be allocated to four consumer groups: residential, small Commercial and Industrial (C&I), medium C&I, and large C&I.

The Commission’s use of aggregate consumer groupings is reasonable because the analysis focusses on residential consumers, and so the aggregation of commercial categories is unlikely to materially affect the Commission’s results.

## **4 We recommend adjusting the forecast residential usage volumes**

Castalia recommends that the Commission revises the forecast kWh volumes used to calculate network prices. We have proposed a set of alternative forecasts.

#### **We recommend using Aurora’s FY2020 and FY2021 actual residential usage volumes**

Castalia recommends using Aurora’s FY2020 and FY2021 usage volumes, rather than the Commission’s rebased forecast.

Aurora provided historic volumes (kWh and ICPs) and forecast volumes (kWh) to the Commission. The volumes were provided separately for Dunedin, Central Otago and

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<sup>2</sup> The Indicative Price Model provided by Aurora uses an estimate of replacement cost by geographic region for 2019/20. For each of the years until 2025/26 forecast augmentation capex (augex) by region is added to the replacement cost. However, the augex is only a portion of the total capex planned by Aurora for each year of the CPP.

Queenstown. The Commission rebased the forecasts for all three regions using lower FY2020 and FY2021 volumes.

It is unclear where the new FY2020 volumes came from, because the FY2020 volumes used by Aurora match with those in the Schedule 8 of its Information Disclosures. Castalia recommends that the Commission uses Aurora's disclosed FY2020 volumes, unless there is justification for suspecting the FY2020 volumes are incorrect.

We also recommend adopting Aurora's FY2021 forecast, which may reflect the network's understanding of consumption during the winter that has just ended. Winter temperatures are a key determinant of year-to-year variation in volumes.

**We recommend adjusting forecast residential usage volumes for Dunedin**

For future years, Castalia recommends using a negative growth rate for Dunedin that is flatter than that modelled by Aurora.

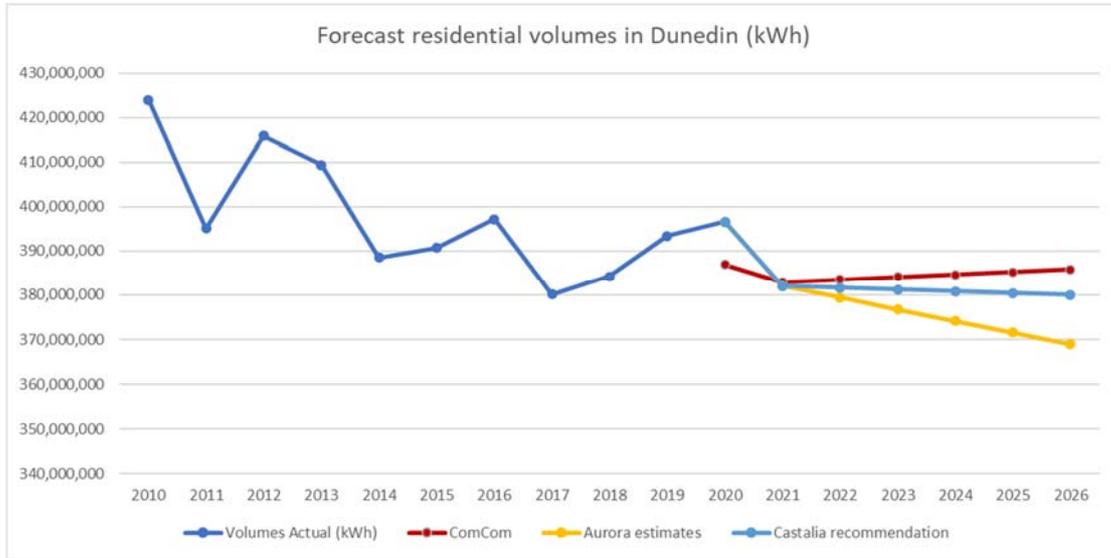
Aside from rebasing the 2020 usage volumes, the Commission adopted Aurora's forecasts for the Queenstown and Central Otago regions, but carried out its own forecast for Dunedin. The Commission came to the view that Aurora's volume forecasts for Dunedin looked overly pessimistic. The Commission's forecasting methodology uses the rebased volumes for 2020 and 2021, and then assumes volumes would increase from 2022.

As seen in Figure 4.1 below, there has been a general downward trend since 2010 in Dunedin residential volumes, though this appears to have flattened in recent years. Within that general trend, however, there is significant variation from year to year, which is largely driven by weather. Generally, on urban electricity networks in NZ, residential usage is highest in years when there are cold winters, and lowest when there are mild winters.

We agree with the Commission that Aurora's projections appear to be overly pessimistic. Aurora's projections do not reflect a flattening of the downward trend and use a negative growth rate that appears to reflect a negative trendline for the full set of historic data.

Castalia recommends forecasts derived from an exponential curve fitted to historic data, and then projected at a constant rate (see the table below Figure 4.1.)

**Figure 4.1: Dunedin residential volume forecasts**



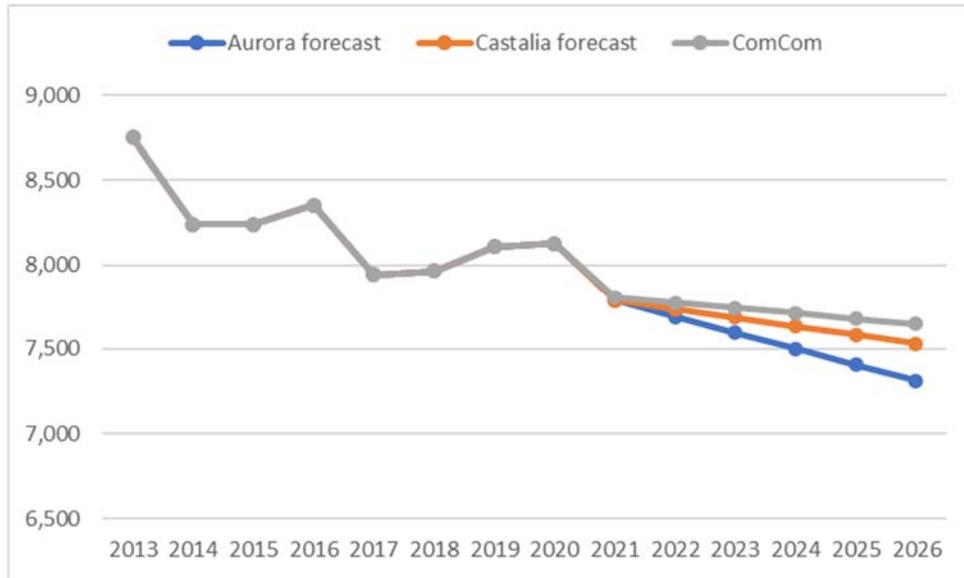
	2021	2022	2023	2024	2025	2026
Castalia forecast	382,011,365	381,609,092	381,206,819	380,804,546	380,402,273	380,000,000

**We have cross-checked usage per ICP for Dunedin consumers**

As a cross-check on our recommended forecast volumes for Dunedin, we examined the resulting trend in usage per ICP. The usage per ICP derived from our recommended usage forecasts is in line with the historic trend.

Residential volumes per ICP have been decreasing on many urban networks across New Zealand due to a range of factors, including improved insulation, as well as increased energy efficiency in appliances and lighting. This downward trend is also observed in Dunedin. All three sets of forecasts reflect a downward trend, with the Aurora forecasts showing the steepest decline, and the Castalia forecast lying between the Aurora and Commission forecasts.

Figure 4.2: Annual residential consumption per ICP in Dunedin



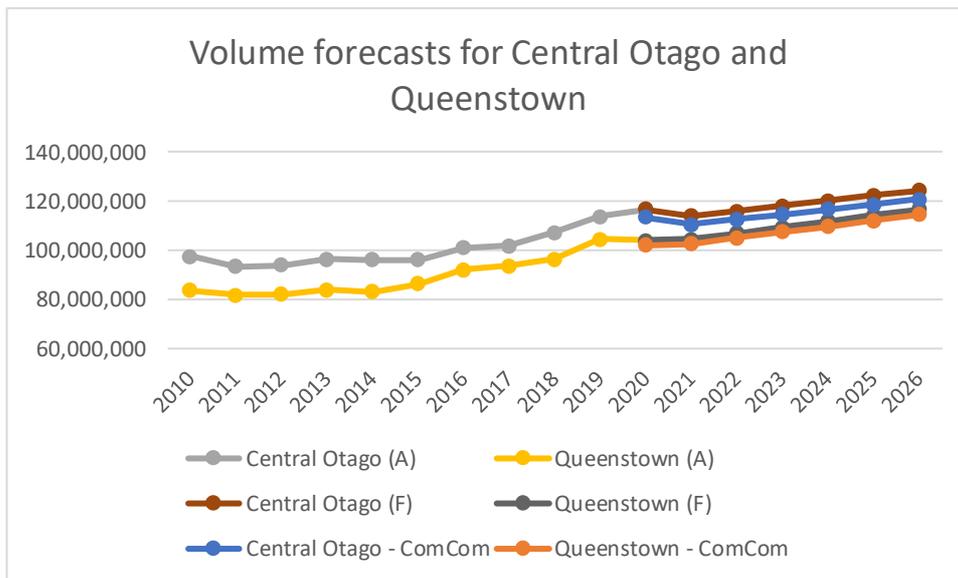
**We recommend using Aurora’s forecasts for Central Otago and Queenstown**

Volumes in Central Otago and Queenstown have followed an upward trend, driven by growth in connections. Building consents were strong in the June 2020 quarter (up significantly from the June 2019 quarter)<sup>3</sup> and real estate sales volumes and prices in the July-September quarter are up on the same period last year, which is likely to drive more new builds. Given this context, growth in electricity volumes, driven by growth in new residential connections, is likely to continue.

Aurora’s forecasts show a dip in volumes in these areas in FY2021, followed by resumed growth (see Figure 4.3). These forecasts align with the trends in residential connections discussed above.

<sup>3</sup> <https://ecoprofile.infometrics.co.nz/Queenstown-Lakes%20District/QuarterlyEconomicMonitor/ResidentialConsents>

Figure 4.3: Residential consumption forecasts for Central Otago and Queenstown (kWh)



## 5 The Commission uses a reasonable degree of simplification to estimate network and retail prices

After the model determines the allocated revenue requirement and forecast volumes, it calculates network prices. We do not recommend changes to the methodology used in those calculations.

The Commission’s methodology to estimate retail price changes also seems reasonable. We have made a minor recommended change regarding the use of 2020 data.

### Network prices are calculated as an average across usage types

Aurora does not have a dual Low Fixed Charge (LFC)/Standard plan, which means that price calculation is straightforward, so that the total variable charges equal:

$$\text{Total revenue minus } (\$0.15 \text{ per day} * 365 \text{ days} * \text{the number of ICPs})$$

Total variable charges are unitised by dividing by total kWh.

The Commission has taken the simplified approach of calculating a single usage rate per kWh, rather than determining separate rates for different types of usage (controlled, uncontrolled, night boost), or for different types of connection (all-inclusive vs. separately metered, and 8 kVA vs. 15kVA). This is a reasonable approach, given that the Commission is seeking to understand the effect of price changes on representative profiles.

It is possible that the LFC Regulations applying to residential consumers may be repealed, or change before, or during the CPP period. This would alter the way that fixed and variable charges are set for residential customers. However, given the uncertainty on whether the regulations will change, we agree with the Commission's approach to model Aurora's pricing methodology with the existing 15c limit on fixed daily charges.

If the LFC is changed or removed, there may be less variation across customers arising from the CPP than what has been estimated by the Commission, because some or all of the revenue increase could be collected through fixed charges, rather than through usage charges.

#### **The Commission uses MBIE's price survey to estimate the retail price component**

The Commission estimated the retail component of the bill using the MBIE Quarterly Survey of Domestic Electricity Prices. This survey contains the most readily available estimate of the components that make up a retail electricity bill in New Zealand.

The retail components used by the Commission for FY2020 correspond to the data contained in MBIE's survey of 15 May 2020, however these survey figures relate to FY2021. We recommend that these figures therefore be used for FY2021.

The Commission assumes that wholesale energy costs, and the costs of retailing increase at the rate of inflation. Given that marginal new electricity generation is renewable, and costs are falling, it may be that wholesale energy prices will fall in future. However, there are other factors that could potentially push up prices, such as increased demand due to electrification of transport and process heat, and a need for storage to achieve renewable generation targets. Given uncertainty in future price trends, it seems reasonable for current purposes to assume constant real wholesale energy costs. Moreover, an assumption that wholesale energy prices will fall may be seen as obscuring the effects of the Aurora CPP.

## **6 The Commission calculates bill impacts using representative residential customer profiles**

The Commission has identified a small, medium and large customer profile for each of the Aurora pricing regions. Castalia considers that the Commission has used a reasonable methodology for determining representative consumer profiles, and that the use of a number of profiles, rather than a simple average, will help clarify for consumers that bill impacts will vary according to usage.

The Commission asked Castalia to consider seasonal differences in consumer bills. We have found that the seasonal bill impacts associated with higher winter usage can be estimated using data disclosed in Aurora's DPP compliance statements.

#### **The Commission has determined small, medium, and large residential customer profiles using actual consumption data**

Aurora provided the Commission with annual kWh usage for each residential consumer: 47,222 ICPs in Dunedin; 16,282 ICPs in Central Otago; 10,336 ICPs in Queenstown.

The Commission used this information to determine a usage profile (kWh per year) for small, medium and large residential consumers. It did this by setting the medium usage profile at a level that is approximately the median of the dataset, with the small and large profiles roughly reflecting the lower and upper quartiles. The profiles used by the Commission are contained in the following table.

**Table 6.1: Residential consumption (annual kWh per consumer)**

	Dunedin	Central Otago	Queenstown
Small	5,250	4,000	5,500
Medium	7,500	6,500	9,000
Large	10,500	9,000	13,000

We suggest consistent rounding to the nearest 250kWh, which would lead to the upper quartile for Central Otago being 9250 rather than 9000 for the large residential consumer profile.

The Commission’s approach of examining a number of profiles, rather than a simple average, is particularly useful given that Aurora’s residential pricing is highly volumetric—that is, a very high percentage of revenue is earned through usage prices rather than fixed charges, which means that there will be significant variation in consumer bill impacts.

The usage profiles selected by the Commission reflect the differences in usage distributions by region. Moreover, they are consistent with the general observation that rural areas tend to have lower average consumption than urban areas (for example, consumption in Central Otago is lower than in Dunedin or Queenstown).

**The way that the Commission describes bill impacts is consumer-focused**

The Commission’s analysis looks at the change in prices over time, identifying changes in nominal network charges, and estimates the change in total power bills (in nominal terms). In contrast, Aurora’s estimates focus on network charges only and are in constant 2020 dollars. Aurora presents the indicative price changes over time, and also relative to prices that would have prevailed under the DPP.

By looking at the change over time in the total power bill, the approach used by the Commission does require it to make more assumptions on other cost factors (for example, wholesale energy and retail costs). However, the benefit of the Commission’s approach, combined with its use of nominal prices, is that it allows consumers to understand how their bills may change in total over the period.

**Bill impacts are likely to vary by season (summer/winter)**

The Commission has calculated annual bill impacts and expressed the results of its analysis on an annual basis in its draft report. If it were to instead express the results as an average monthly impact, we would advise at least noting that actual monthly impacts will vary across the year. Given the seasonal variation in residential electricity usage, winter bills are likely to

increase by a larger amount than summer bills. The difference could be estimated if the Commission chooses to provide monthly bill impacts in its report.

Summer and winter consumption volumes disclosed by Aurora in its DPP compliance statement show that average consumption per month for residential consumers in Dunedin is around 70 per cent higher in winter (May to September) than it is in summer (October to April). Assuming summer and winter prices increase by an equal amount, then the average monthly bill during winter for a medium-sized customer in Dunedin would increase by approximately \$6.07 as compared with \$3.55 per month in summer. However, if the LFC regulations change (as noted earlier) there will be less difference between summer and winter bill impacts.

Some of Aurora's prices for residential customers are seasonal – for example, the uncontrolled price for Dunedin customers in winter is 50 per cent higher than in summer. The way in which Aurora sets summer and winter prices under the CPP revenue cap may further affect the difference in seasonal bill impacts. As is evident from Aurora's price schedule, some of the differential between summer and winter prices results from the way that Aurora recovers transmission charges. This reflects that winter demand drives interconnection transmission charges. It may well be the case that Aurora would not substantially increase the winter-summer differential to recover the additional revenue allowed under the CPP. However, it is not clear exactly how the winter and summer rates are likely to be set in future, so it is difficult to comment on this aspect of seasonal bill impacts.



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