

12 February 2021

Aurora's regional pricing

Purpose

The Electricity Authority sought an in-depth review of Aurora Energy's regional pricing, and whether this approach is appropriate with respect to distribution pricing principles.

The context is Aurora's application to the Commerce Commission for a customised price path. This would increase its total expenditure 20% above that for the last three-year period and increase residential power bills by around 6-10%.

Consumers in Central Otago consider it unfair they would face the largest price increases (\$31 per month compared to \$22 per month in Dunedin in 2023/24).¹ Consumers understood the concept of cost-reflective pricing but didn't like the outcome (Aurora Energy CPP Consultation Report, 2020, p43).

Key findings

Distribution charges per connection or c/kWh in Central Otago are currently nearly twice that of Dunedin.

Much of the difference in charges is explained by network density. Central Otago (including Queenstown) has 108 meters of network lines per customer – 2.5 times more than Dunedin with 43 meters. Also, 42% of lines (by length) are underground, which tends to be more expensive, compared to 28% in Dunedin.²

Aurora's regional pricing is linked directly to its estimate of the optimised replacement costs (ORC) of network assets in each region. Some other distributors also use ORC for cost allocation. Aurora's approach has been the same for many years. The allocation of additional cost in the customised price path application currently follows the same regional allocation methodology.

The approach is reasonably cost-reflective, consistent with the Authority's pricing principles, but has some weaknesses that need to be addressed. This is because it may lead to a region being under- or over-allocated cost, for a number of reasons.

One reason is that actual operational spending or depreciation costs for each region may not arise in proportion to regional replacement costs currently used to allocate costs. A high-level review of Aurora's estimate of actual network operating expenditure and depreciation by region over the last decade indicates that the method has led to mismatches in cost allocation. However, until recently its combined

¹ For updated estimates out to 2025/26 see the Commission's draft decisions on Aurora's application: https://comcom.govt.nz/__data/assets/pdf_file/0018/228024/Key-decisions-infographic-12-November-2020.pdf

² We understand that this higher proportion of undergrounding reflects historic (pre 1999) decisions and, more recently, rapid population growth in Queenstown and Central Otago: resource consents for new subdivisions tend to require lines underground.



effect on pricing does not seem to have been significant. But the data indicate the mismatch is now growing and becoming noteworthy, given recent and planned growth in capital and operating spending.

A second reason is that we consider non-network operating costs should be allocated on a per connection basis or some other broad-based measure, to reflect these are common costs with economies of scale that accrue to all consumers, rather than on regional shares of asset values. Depending on the composition of these non-network operating costs, its impact could be more material. Given the more recent growth in non-network costs, changing the basis for their allocation would materially impact regional prices.

Aurora has stated in its CPP application that it recognises there is scope to improve its regional cost allocation and has already completed some background work. It is considering shifting to using 'regulatory asset base' values, as these better reflect the age of assets and thus depreciation cost with respect to each region; Aurora also noted it may be more cost-reflective to allocate vegetation management costs per kilometer of line in a region instead of using asset values.

We consider that such changes (including for non-network costs) would improve cost allocation. We note there may be other opportunities to allocate actual costs directly to regions, rather than rely on proxies like asset base values.³

The net impact on regional pricing of such changes cannot be confirmed through this review, but changes are likely to benefit consumers of Central Otago, and possibly those of Queenstown.

Aurora's current estimate is that adopting a 'regulatory asset base valuation' would increase asset-based costs for Queenstown and reduce them for Central Otago and Dunedin. Allocating vegetation management cost per km of overhead lines would likely reduce somewhat the operating costs allocated to Dunedin, while allocating non-network costs on a per connection basis would increase Dunedin's share of costs and reduce Central Otago (including Queenstown)'s share.

Nevertheless, regardless of improvements to the allocation methodology, significant regional differences in distribution costs per connection or kWh remain justified given the large differences in population density between the regional networks.

³ On 19 January 2021 Aurora announced it would make changes to its regional pricing:
<https://www.auroraenergy.co.nz/news/2021/customer-feedback-prompts-changes-to-regional-pricing/>



Aurora's network

Aurora has three pricing areas: Dunedin, Central Otago and Queenstown. These pricing areas were decided in 1999 (CPP application para 787) as they are distinct networks with distinct distribution and transmission cost profiles. Current data still support that reasoning.

Table 1 shows the regional breakdown of the optimised replacement cost (ORC) of assets and revenues.⁴

TABLE 1 AURORA'S ASSET VALUES AND TARGET REVENUES 2020

2020	Asset value (ORC)	Distribution (a)	Transmission (b)	Recoverable costs (c)	Total (a + b + c)
Central Otago	\$282m	\$30.8m	\$3.9m	-\$6.6m	\$28.2m
Queenstown	\$148m	\$16.2m	\$6.3m	-\$3.4m	\$19.1m
Dunedin	\$369m	\$40.3m	\$18.0m	-\$8.2m	\$50.1m
Total	\$799m	\$87.3m	\$28.2m	-\$18.2m	\$97.4m

Source: Aurora's 2020 Pricing Methodology

Recoverable costs are negative in 2020 because of a \$18.5m 'incremental rolling incentive scheme (IRIS)' adjustment.⁵ This IRIS adjustment is suppressing significant underlying cost growth.

About half of Aurora's revenues are recovered from Dunedin. But on a per kWh basis Central Otago's distribution costs are around double those of Dunedin. Much of that is explained by differences in population density (Table 2). Per connection, Central Otago has twice as many assets as Dunedin (\$13.2k v \$6.6k, and \$10.6k in Queenstown). Dunedin, which is more urban, has 23 connections per km of network line, 2.5 times the 9 connections per km in the other two regions. (Note: where data for Queenstown is not available separately it is reported as being part of Central Otago.)

TABLE 2 KEY STATISTICS 2020

2020	ICPs	Lines (km)	ICP/km of line	Overhead lines - urban	Use (GWh)	kWh per ICP	MW Peak demand	Distribution c/kWh
Central Otago	21,380	3,719	9	9%	272	12.7k	91	11.4
Queenstown	14,011				261	18.6k	82	6.8
Dunedin	55,654	2,375	23	57%	795	14.3k	217	5.9

Source: Aurora's 2020 Pricing Methodology & Information Disclosure, MBIE quarterly survey of domestic electricity prices

⁴ Aurora told us the asset values are estimates of replacement costs, based on optimised deprival values that were consolidated in 2009. See [Commerce Commission](#).

⁵ Aurora had exceeded its operational expenditure allowance in recent years. The IRIS mechanism shares that overspend between Aurora and its customers, with a requirement for this amount to be passed back to customers. Aurora allocated the 2020 IRIS amount in proportion to the prior year's distribution charges. This seems a reasonable approach in the context of its pricing methodology.



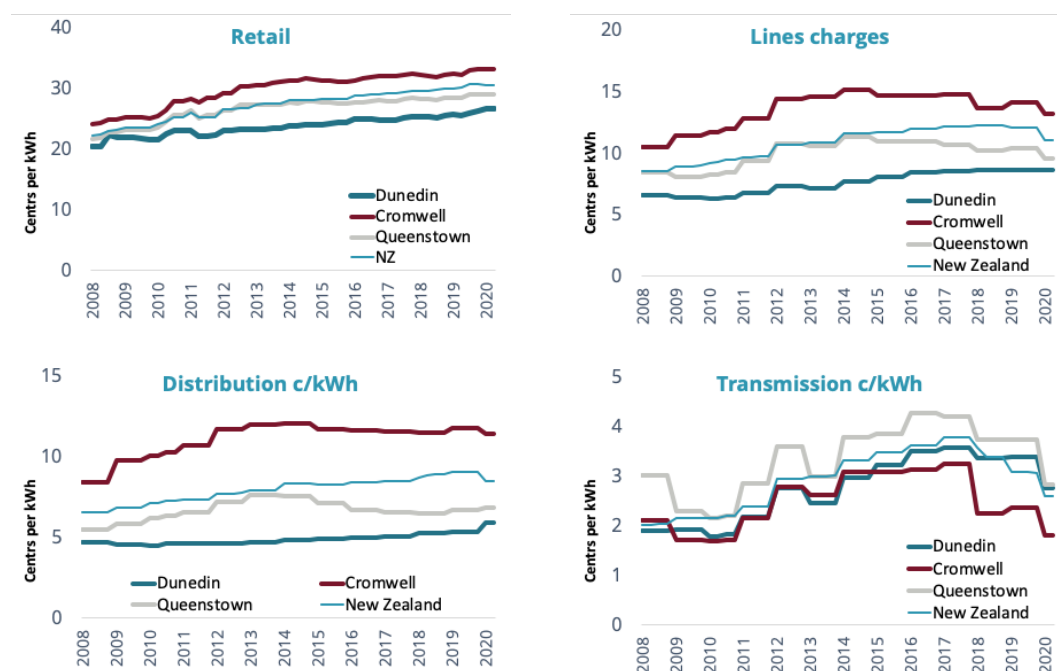
Differences in regional prices are longstanding

In recent years, the retail price of electricity has been about 6.75c per kWh (24%) higher for residential customers in Central Otago (Cromwell in MBIE's data shown in the figures below) than those in Dunedin.

These differences are longstanding and mostly explained by distribution charges. In the last three years, distribution charges explained about 90% of the difference in retail prices between the three regions.

Central Otago's distribution charges were 11.4 cents per kWh in August 2020, compared to 5.9 cents in Dunedin and 6.8 cents in Queenstown. The New Zealand average is 8.50 cents.

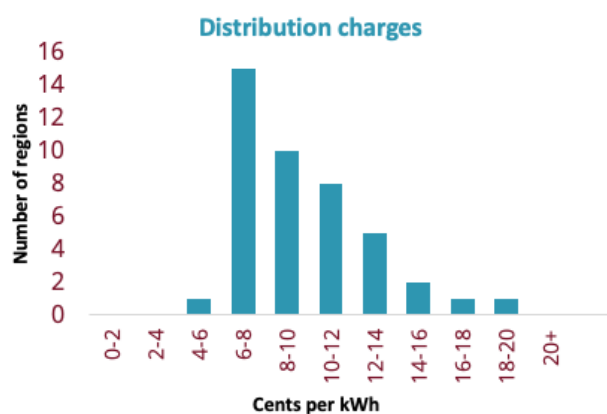
FIGURE 1 DOMESTIC ELECTRICITY PRICES 2008-2020



Source: MBIE, Quarterly Survey of Domestic Electricity Prices, 15 August 2020

At 11.4c/kWh, Central Otago's charges are not an outlier in the New Zealand context (Figure 3).

FIGURE 2 DISTRIBUTION OF DISTRIBUTION CHARGES AUGUST 2020

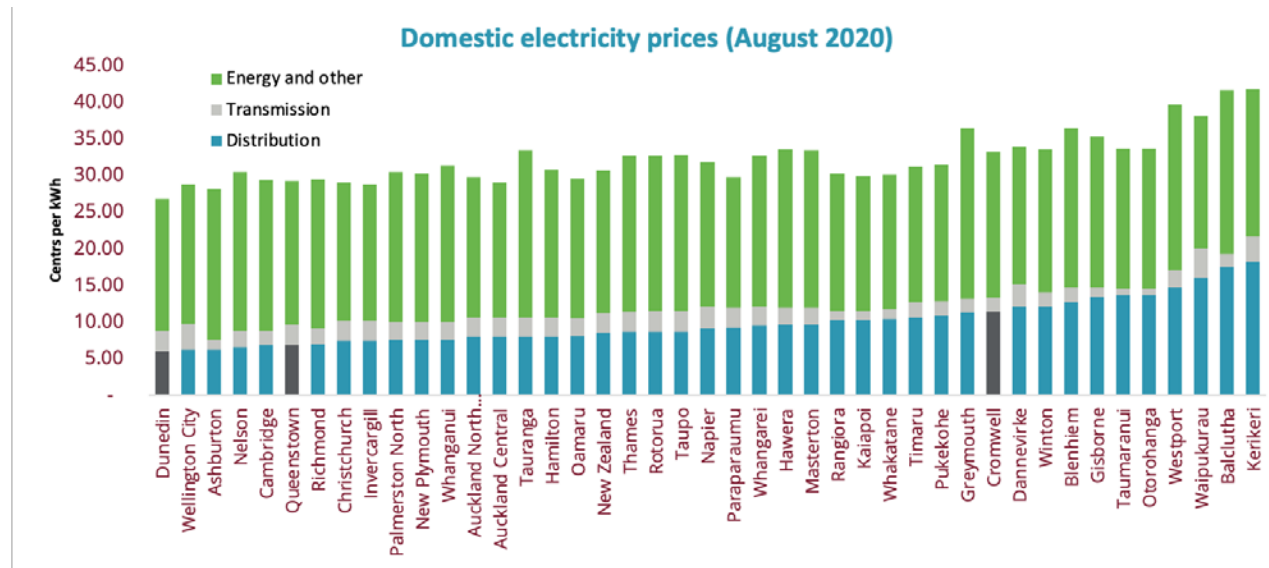


Source: MBIE, Quarterly Survey of Domestic Electricity Prices, 15 August 2020



Residential consumers' distribution charges in Dunedin are the lowest in the country. Central Otago's (Cromwell) are 34% higher than the national average (Figure 2).

FIGURE 3 URBAN CENTERS TEND TO HAVE LOWER DISTRIBUTION COSTS — DUNEDIN'S ARE THE LOWEST



Source: MBIE, Quarterly Survey of Domestic Electricity Prices, 15 August 2020

Central Otago's transmission costs are relatively low on a per kWh basis, having declined in 2018, after an amendment to the transmission pricing methodology (Figure 1). Energy demand peaks in summer also make Central Otago's transmission charges lower on a per kWh basis.



Review of Aurora's pricing methodology

The approach to regional allocation is broadly cost-reflective

The regional pricing methodology has been in place for years – for example, the 2020 pricing methodology document is essentially the same as the 2007 pricing methodology.

The allocation of costs, or target revenues, to regions is broadly cost-reflective (noting key exceptions over the page) in as far as Aurora allocates:

- distribution costs in line with the value of its distribution assets in the three regions
- transmission costs on the basis of each region's coincident peak demand at RCPD periods
- recoverable costs such as industry levies in line with each region's share of connections (ICPs).⁶

How the methodology turns allocated costs into regional prices

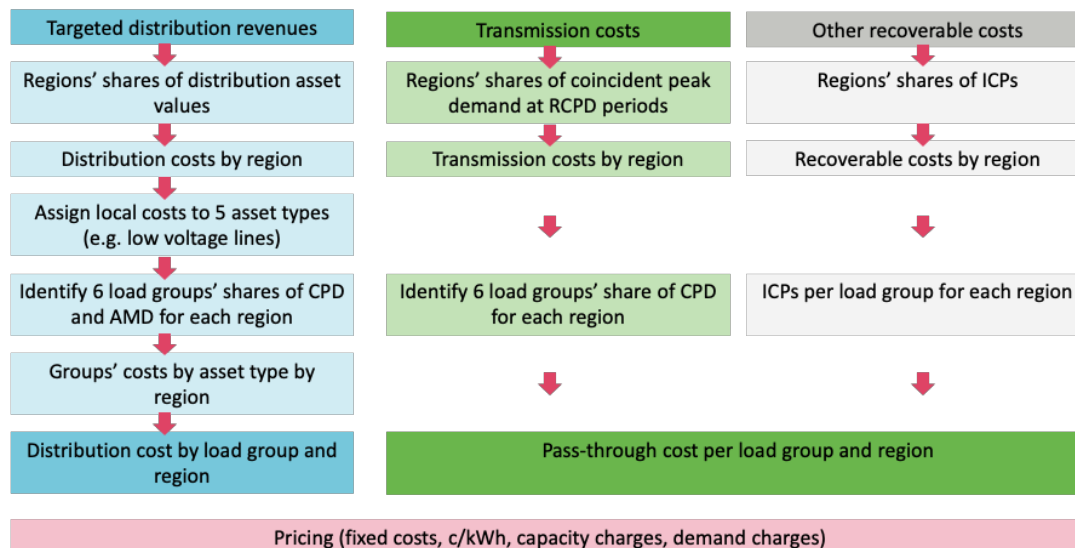
Figure 4 summarises how target distribution revenues and pass-through costs are translated into amounts to be recovered from different customer groups within each region.

The choice of customer groups seems appropriate – e.g. residential consumers, general customers grouped by 'fuse capacity', and large commercial/industrial customers.

The cost allocations by load group in each of the three regions are then used to calculate the line charges.

The approach to cost allocation is broadly consistent with the Authority's pricing principles.

FIGURE 4 ASSIGNING TARGET REVENUES TO REGIONS AND LOAD GROUPS



⁶ Industry levies etc amount to \$1.3m from a total \$97m of charges.



Weaknesses in the regional cost allocation of distribution costs

It is generally reasonable to assume network costs are correlated with asset values

Under its pricing methodology, Aurora allocates distribution network costs on the basis of each region's share of network assets. Aurora's regional networks are physically distinct so there are no complications from having to allocate costs of shared network assets.

The cost-allocation methodology used in the CPP application is the same as set out in its 2020 pricing methodology.⁷

About 40% of Aurora's \$48m operating expenditure in 2020 relates to network costs (Table 3): vegetation management, maintenance and asset renewals. These costs correlate with asset values – some more strongly than others. For example, Aurora's annual information disclosure data indicates this is true for vegetation management – though there are likely to be more cost-reflective allocators that could be considered.

Most of recent growth has been in non-network expenditure – the other 60% of operating expenditure in 2020. It covers 'system operations & network support' and 'business support'. These items include overhead and customer service costs that are not necessarily linked to asset values. This suggests that allocating them on asset values may not be optimal. The implications are explored further below.

Aurora noted that the growth in non-network operating spend since 2017 reflects a change in operating model, when Aurora started to set up and deliver business functions previously provided by Delta.

TABLE 3 AURORA ENERGY'S OPERATING EXPENDITURE 2013-2020 \$ MILLION

\$ million	2013	2014	2015	2016	2017	2018	2019	2020	17-20 aapc
Network opex	9.0	11.2	12.4	15.4	16.0	16.2	16.7	19.0	6%
Non-network opex	9.6	11.1	11.3	9.8	11.4	19.2	26.0	29.1	36%
Total	18.6	22.3	23.6	25.2	27.5	35.3	42.7	48.0	20%
Non-network share	52%	50%	48%	39%	42%	54%	61%	61%	

Source: Schedule 6b Commerce Commission Information Disclosures

Is actual spending in regions in line with the regional cost allocation?

Allocating network operating costs on regions' shares of the optimised replacement cost of assets is appropriate if network spending (e.g. service responses, maintenance, asset renewals, depreciation) is correlated with these asset values.

⁷ Aurora is considering changes to its cost allocation method to make it more cost-reflective, and that may address some of the issues also identified in this note. For example, the CPP application states (para 792) non-network costs should be allocated across the entire customer base so customers can reap the benefits of scale. We agree, although this is not how non-network costs are currently being allocated.



This assumption seems reasonable for many costs. However, actual operational spending or depreciation costs for each region may not arise in proportion to regional replacement cost (for example because the age profile of assets differ by region). As such, a region may be under- or over-allocated costs.

The approach may still be appropriate if any year-to-year differences tend to cancel out over time. Aurora told us a historic reason for allocation on asset replacement costs was to smooth annual variations in costs, and thus regional prices, that could otherwise occur. Such reasoning is consistent with the distribution pricing principle that distributors have regard to transaction costs and customer impacts, for example.

However, it would be inconsistent with the pricing principles if the method results in a significant and persistently disproportionate allocation of costs.

To illustrate, Dunedin's share of optimised replacement (ORC) asset values averaged around 47% of total, and Central Otago's share 53%. Network operating costs and depreciation would have been allocated accordingly. But Aurora's data indicate that on average about 55% of actual network operating expenditure related to Dunedin and 45% to Central Otago (inc Queenstown) over the last decade. By contrast, 40% of depreciation costs related to Dunedin, and 60% to Central Otago.

The data indicate that, taken together, the net effect of an under-allocation of network operating costs and over-allocation of depreciation to Dunedin have generally balanced out over the years – and any price advantage to any region would have been small in the context of total annual revenues. But in the last three years there has been a growing and noteworthy advantage to Dunedin consumers. This reflects the pattern of recent capital investments. To illustrate, in 2020 a direct application of actual network operating expenses and depreciation costs to Dunedin might have increased their allocation of costs by around \$2.7m (+5%), and accordingly reduced the allocation to the other regions.

Non-network costs do not vary with asset values

Another issue is that non-network do not vary directly, or in step, with the value of assets. Non-network costs accounted for about 60% of Aurora's \$48m operating expenditure in 2020 (Table 3). These costs have grown rapidly in recent years.

To the extent that non-network costs relate to overhead and customer service costs, the Authority's pricing principles call for more efficient ways of allocating such costs than based on asset values. A more efficient allocation would involve spreading the cost as widely as possible, such as on a per customer basis, or allocating the cost on an ability-to-pay metric (e.g. energy use), as many other distributors do.

Using such a different method would impact cost allocations. To illustrate, Dunedin accounts for 60% of ICPs and 60% of electricity usage, but 46% of the ORC value of Aurora's assets. Thus assigning non-network expenses for 2020 according to regions' share of connections (ICPs) would reduce Central Otago (including Queenstown)'s 2020 total charges and increase those in Dunedin. The exact effect would depend on the allocator used and the composition of non-network costs, but is expected to be of consequence.



Conclusions

By and large, the regional cost allocation method is reasonably cost-reflective and consistent with the Authority's pricing principles, although it has some weaknesses. The effects of these weaknesses are becoming more significant in light of substantial recent and planned growth in capital and operating spending.

We note that Aurora is aware of many of the issues, had already indicated in its CPP application that it is working on introducing improvements to its pricing approach, and has made progress on the building blocks to do so.

For example, Aurora is considering using the 'regulatory asset base' (RAB) valuation for cost-allocation as that may better reflect the age of assets and thus depreciation cost with respect to each region. It has already done most of the work to be able to implement this change. It may also be more cost-reflective to allocate vegetation management costs per kilometer of line in a region instead of using asset values; and at least some non-network costs might be better allocated per connection, reflecting economies of scale in common costs.

Aurora's current estimate is that adopting a regulatory asset base valuation would increase asset-based costs for Queenstown and reduce them for Central Otago and Dunedin. Allocating vegetation management cost per km of overhead lines would probably reduce operating costs somewhat for Dunedin. We estimate that allocating non-network costs on a per connection basis would increase Dunedin's share of these costs and reduce the shares of Central Otago and Queenstown.

The net impact on regional pricing of such changes combined cannot be confirmed through this review, although it will likely benefit the consumers of Central Otago, and possibly of Queenstown, by reducing their relative charges somewhat. Even so, this does not alter the fact that significant regional differences in Aurora's network prices is consistent with the Authority's distribution pricing principles. This is because the majority of the difference in network charges by region is explained by differences in population density, resulting in Central Otago having twice as many assets as Dunedin per connection by value.



Appendix 1: Acronyms

AMD – Anytime maximum demand, usually referring to highest peak during a 12 month period

CPD – Coincident peak demand

ICP – installation control point, generally referring to a customer's point of connection

ORC – optimised replacement cost, usually referring to an estimate of the current cost of replacing an asset with one that can provide the service in the most efficient way

RCPD – regional coincident peak demand: average of 100 transmission coincident peak demand periods.