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Mark de Villiers,
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CitiPower, Powercor & United Energy

Dear Mark

Re: LRMC Estimates for CitiPower, Powercor & United Energy

Objective

This letter outlines how OGW developed CitiPower, Powercor & United Energy's Long Run Marginal Cost (LRMC) estimates. It is written in a manner that will allow you to directly translate sections into their relevant regulatory submissions. It explains:

- The regulatory requirements underpinning the requirement for CitiPower, Powercor & United Energy to develop LRMC estimates;
- The approach that was adopted to determine CitiPower, Powercor & United Energy's LRMC estimates;
- The services for which LRMC estimates were generated;
- The information that was relied upon to develop the LRMC estimates; and
- The results of the LRMC modelling.

Regulatory Requirements

The existing Rules require that in developing tariffs, CitiPower, Powercor & United Energy must take into account the LRMC for the service or, in the case of a charging parameter, for the element of the service to which the charging parameter relates.

The requirement to take into account the LRMC reflects a fundamental economic concept - namely allocative efficiency. Allocative efficient outcomes will be promoted if customers consume electricity up to the point where the marginal benefit to them of consuming an additional unit of energy (kWh, kW or kVa, depending on the cost driver being priced) equals the marginal cost of providing that extra unit of energy to that customer.

When price deviates from the marginal cost of supply – in this case, the LRMC - customers will consume either:

- too much of the service attribute, which will occur if the marginal price is less than its true cost (i.e., some customers will consume electricity services, even though the cost of providing them with an additional unit of that service attribute exceeds the benefit that they receive from consuming that service attribute), or

- not enough of the service attribute, which will occur if the marginal price is greater than its cost of supply (i.e., some customers will NOT consume electricity services, even though the cost of providing them with an incremental unit of that service attribute is less than the incremental benefit that they would receive from consuming that additional unit).

Approach adopted

The LRMC for a network service can be calculated in several different ways. These include the Average Incremental Cost (AIC) approach, which is underpinned by a business' forecast of its future costs (numerator) that will change as a result of its forecast change in demand (denominator), with both the numerator and denominator discounted back to create a Net Present Value (NPV). An alternative approach is to use the perturbation approach, which in practical terms, seeks to ascertain how a business' expected future costs would change (in NPV terms) if there was an incremental increase (or decrease) in the future levels of demand for its services. This approach is generally considered to be more suited to wholesale supply systems where there is lumpy capital investment (exhibiting significant scale efficiencies) required to augment the system.

CitiPower, Powercor & United Energy has chosen to adopt the AIC approach for the purposes of calculating the LRMC outlined in this submission. CitiPower, Powercor & United Energy has adopted this approach for several reasons, including, but not limited to:

- It is commonly used by distribution networks, as it is generally considered to be well suited to situations where there is fairly consistent profile of investment over time to service growth in demand, and
- It does not rely on a forecast of growth in the demand for CitiPower, Powercor & United Energy's services that differs materially from the broader forecasts that underpin other components of this regulatory submission.

The AIC approach to determining the LRMC utilises the following formula[1]:

$$LRMC = \frac{\sum NPV(Forecast\ Augmentation\ Capex + Forecast\ Augumentation - related\ Opex\ )}{\sum NPV\ (Forecast\ Cumulative\ Growth\ in\ MVA)}$$

Services for which LRMC estimates have been developed

Typically, LRMC calculations focus on "peak demand" (or import services) as the service or cost driver. However, it's important to note that LRMCs can be calculated for other services or cost drivers. For instance, LRMC can be readily computed for "export services". CitiPower, Powercor & United Energy has developed estimates for both import and export services.

[1] This formula specifically relates to the development of LRMCs for demand (import), not export services. The formula adopted for export services is broadly the same, except that the denominator is the numerator is solar enablement-related capex, and the denominator is growth in kWH enabled as a result of the investment.

Types of costs and demand growth included in the LRMC estimates

CitiPower, Powercor & United Energy incurs several different 'types' of costs, not all of which are relevant to the derivation of its LRMC. It has only included forecast costs that it considers might be able to be mitigated by the broader customer base, if they were to respond to the price signal derived by the LRMC. In general, this means that only 'shared network augmentation' costs (for both import and export) that will vary with changes in future demand (and any associated opex[2]) have been included. For import services, these costs have been allocated to different network categories – Sub transmission, High Voltage Network, Zone substations and DSS and Low Voltage network.

CitiPower, Powercor & United Energy has used the cumulative growth in its forecast system-wide peak demand (by voltage level) as its denominator for the purposes of determining its import LRMC. For its export LRMC, it has used the energy it is forecasting will be released back into its network because of the expenditure it is proposing to spend on solar enablement.

Results

The results of the LRMC analysis are contained in the following table.

Figure 1: LRMC Results – Import - Powercor

Voltage Level	LRMC ($/kVA) by voltage level	LRMC ($/KVA) by connection
Sub transmission	$1.08	$1.08
High Voltage Network	$4.92	$5.99
Zone substations	$79.83	$85.82
DSS and Low Voltage network	$54.15	$139.98

Figure 2: LRMC Results – Import – United Energy

Voltage Level	LRMC ($/kVA) by voltage level	LRMC ($/KVA) by connection
Sub transmission	$42.56	$42.56
High Voltage Network	$6.90	$49.45
Zone substations	$0.00	$49.45
DSS and Low Voltage network	$58.80	$108.26

2 CitiPower, Powercor & United Energy has assumed that OPEX in a year is 0.005% of the cumulative capex that has been spent to that point.

Figure 3: LRMC Results – Import - Citipower

Voltage Level	LRMC ($/kVA) by voltage level	LRMC ($/KVA) by connection
Sub transmission	$0.00	$0.00
High Voltage Network	$22.77	$22.77
Zone substations	$64.18	$86.95
DSS and Low Voltage network	$36.28	$123.23

Figure 4: LRMC Results – Export - Powercor

Voltage Level	LRMC ($/kWh)
Export	$0.01

Figure 5: LRMC Results – Export – United Energy

Voltage Level	LRMC ($/kWh)
Export	$0.01

Figure 6: LRMC Results – Export - Citipower

Voltage Level	LRMC ($/kWh)
Export	$0.02

Kindest regards

Rohan Harris

Executive Director