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NOTES ON AURORA LINE CHARGES FOR NETWORK DESIGNERS, CONSULTANTS AND ELECTRICAL CONTRACTORS

1. PURPOSE AND SCOPE OF THIS DOCUMENT

This document provides general advice for personnel involved in the alteration of existing network connections or the design of new connections to the Aurora Energy Ltd (Aurora) network, with the objective of minimising consumers' future electricity delivery charges. It should be read in conjunction with Aurora's:

- Network Connection Technical Requirements, available on request.
- Use-of-System Pricing Methodology, available at www.electricity.co.nz/disclosure.htm.

2. INTRODUCTION

To minimise energy delivery costs for consumers there are two simple principles. Consumers should be encouraged to:

(i) Firstly, put as much load "off-peak" as possible – wholly off-peak load incurs *no* CPD charge, but care needs to be taken that a higher anytime peak isn't created.

(ii) Spread consumption over as many hours as possible – this improves the load factor and connections with a better than average load factor will have lower energy delivery costs on a per kWh basis.

It's that simple, but we need to explain why.

3. LINE CHARGE STRUCTURES AND PRICES

Two line charge structures apply on the Aurora network - energy-based charges apply for Standard Domestic connections whilst capacity-based charges apply for Non Domestic and Non Standard Domestic connections. Prices also vary according to which transmission supply point supplies the connection.

3.1 Standard Domestic Connections

Connections are deemed to be "Standard Domestic" where the capacity is either 15 kVA or 8 kVA and the retailer advises Aurora that the ANZSIC end use code is domestic. In order to comply with this the premises will generally be as described in the definition of "domestic" under the Electricity Amendment Act 2001.

> "*Domestic premises" means any premises that are used or intended for occupation by any person principally as a place of residence, but does not include –*
>
> *(a) penal institutions*
> *(b) hospitals, homes or other institutions for care of sick, aged or disabled*
> *(c) police barracks*
> *(d) armed forces barracks*
> *(e) hostel, dormitory or similar accommodation*
> *(f) premises occupied by a club for provision of temporary accommodation*
> *(g) hotels, motels, boarding houses*
> *(h) camping grounds, motor camps or marinas.*

The retailer for these connections is invoiced line charges consisting of a small fixed charge and an energy-variable charge (¢/kWh). Different ¢/kWh rates apply (and different metering configurations are required) depending on the supply options retailer's offer their customers – principally influenced by the number and timing of service hours provided. Line charges are highest for uncontrolled supply (supply always available) and lowest for night-only loads (supply available only 11pm-7am).

The controlled-supply options presently offered by retailers trading on the Aurora network, and which require different metering configurations, are set out in schedules 1,2,3 and 4 of the Use-of-System Pricing Methodology document.

3.2 Non-Domestic and Non-Standard Domestic Connections

All remaining connections are invoiced under the capacity charge structure. These charges consist of two main components over which the designer/electrical contractor has some influence.

(a) ***Connection Capacity (kVA)***

Approximately 45% of line charge revenue is related to the connection capacity charges, which recover distribution costs local to each connection - low voltage lines and cables, distribution substations and high voltage lines and cables. The use of these assets is more closely related to the specific peak loads of individual connections.

Capacity charges vary according to the number of phases and fuse size, main circuit breaker setting, or for larger connections the transformer capacity – see the Aurora Connection Application Form for the standard capacities available.

Designers should ensure that the connection capacity is the minimum necessary to cope with the anytime maximum demand of the installation and that loads are balanced over phases. The key to achieving lowest capacity charges is to spread electricity usage over as many hours as possible – this improves the load factor and connections with a better than average load factor will have lower energy delivery costs on a per kWh basis.

(b) ***"Congestion Period" Demand – CPD (kW)***

Approximately 50% of line charge revenue is recovered via the CPD charge, which varies according to each connection's use of the network *at peak loading periods* (the top 150 to 250 hours per year and generally during winter months) and recovers costs associated with upstream network assets sized to meet network peak loads - zone substations, some subtransmission costs and much of the transmission costs from Transpower.

Congestion period demands are reviewed each September to take into account usage over the previous winter period and any change in CPD charge applies for the following 12 months. Two calculation methods are used depending on the connection capacity.

(i) **Connections greater than 150 kVA – Load Groups L3, L3A, L4 and L5**

The CPD kW is the average load taken by the connection at the time of peak network loads – i.e. when Aurora is "ripple-controlling". At most connections a separate CPD meter will be switched ON by ripple signal so that network usage accumulates for each network-peak period over the winter. At the end of the winter period the CPD meter is read and the accumulated usage is divided by the duration of the Congestion Period for that winter to obtain the average demand at network-

peak times. For some connections where a half-hour interval meter is installed, the average demand during the Comgestion Periods is calculated from the retailer's half hour metering data.

CPD kW = (Accum kWh) / (Sum of Congestion Period Hours)

The chargeable CPD kW for each connection is set at 1 October to the average of the calculated CPD kW (previous winter) and the previous chargeable CPD kW (at 1 October the previous year).

Congestion periods are likely to occur on cold winter days, any time between 7.30 am and 10.00 pm, and to last typically for two to three hours but could last for up to twelve hours on occasions. They are most likely to occur on 20 to 50 days during the May to September period with most activity during June, July and August.

Congestion periods are signalled by ripple control and an isolated relay contact is available to allow consumers to operate a warning device, to directly control deferrable load, to feed into a load management system or to start up a standby generator, whichever is most convenient.

By signalling network congestion in this way, Aurora is able to defer the investment in more network capacity, which is an expensive alternative. To reduce line charges consumer loads need only be interrupted during actual network peaks. Consumers do not have to respond every time the CPD signal is sent - many will respond only when it suits, and will achieve a proportion of the substantial savings available.

Understand that load supplied outside of congestion periods is *charged nothing* under the CPD component. Providing it does not also contribute to the capacity charge for the installation then NO line charge applies – **the electricity is delivered for free**. If you still do not understand this then please tell us and we will try to explain it more clearly.

(ii) **Connections of less than 150 kVA – Load Groups L1 and L2**

For these connections, where it is not presently economic to install CPD metering, then the upstream network costs are recovered through an Effective Congestion Period Demand charge. This is based on kWh consumption by the installation during winter days, adjusted for off-peak usage. Retailers supply Aurora with consumption data by their supply options for a four month period over winter.

The more load that is supplied under retailers' off peak supply options, the lower the resulting effective congestion period demand kW will be, lowering line charges for the consumer.

For calculation of the effective congestion period demand kW the various "off-peak" supply options offered by retailers are "discounted" as follows, according to the degree that they are actually outside the congestion period. A more comprehensive table including sample calculations of CPD kW appears in Appendix I.

Retailer Supply Option	CPD Discount Dunedin Connections	CPD Discount Central Connections
Night rate kWh	100%*	100%*
8 hour nightstore heating kWh	100%*	100%*
11 hour nightstore heating kWh	75%	75%
13 hour underfloor heating kWh		60%
14 hour irrigation JJA kWh		100% *
16 hour water heating kWh	50%	50%
20 hour water heating kWh		25%
Uncontrolled load kWh	0%	0%

* 100% discount means *no* CPD charge!

Generally the initial CPD kW to be allocated to a new or altered connection will be the average CPD kW for all connections on the same capacity. Where the load at the connection is predominantly off-peak then lower CPD kW should be requested from *DELTA*'s Network Connections Manager. Information on the retailer supply option chosen must also be provided to support the request.

During September each year the effective CPD kW will be updated (based upon consumption kWh and tariffs supplied by the retailer). The chargeable CPD kW for each connection is set at 1 October to the average of the calculated CPD kW (previous winter) and the previous chargeable CPD kW (at 1 October the previous year).

4 Conclusion

To minimise energy delivery costs for consumers there are two simple principles. Consumers should be encouraged to:

(i) Firstly, put as much load "off-peak" as possible – wholly off-peak load incurs *no* CPD charge, but care needs to be taken that a higher anytime peak isn't created.

(ii) Secondly, spread consumption over as many hours as possible – this improves the load factor and connections with a better than average load factor will have lower energy delivery costs on a per kWh basis.

Understand that load supplied outside of congestion periods is *charged nothing* under the CPD component. Providing it does not also contribute to the capacity charge for the installation then NO line charge applies – **the electricity is delivered for free**. If you still do not understand this then please tell us and we will try to explain it more clearly.

Also understand that Aurora places no restriction on the hours of service or what types of load can take supply when. *Anything is possible* - the resultant line charges will fairly recover Aurora's costs.

For further information, either general or for a specific connection, contact *DELTA*'s Network Connections Manager in the first instance – Evan Dickson, phone 03 479 6680, fax 03 477 5771, email evan.dickson@4delta.co.nz.

APPENDIX 1

Calculation of Effective Congestion Period Demand kW (Capacity less than 150 kVA)

Capacity kVA	Description of metering arrangements	Register Content	Example of tariff **	Subject to Load shifting	Assume Night rate %	Assume Controlled load %	Assume Winter 4 mths kWh	Discounted Winter 4 mths kWh	Effective Congestion Period Demand kW
8 / 15	Single register meter anytime load plus water heater controlled	IN19	016/017	Y	22%	20%	5,000	3,120	2.6
8 / 15	Single register meter with no controlled load	UN24	010, 101, 201	N	5%	0%	5,000	4,750	3.9
8 / 15	Single register meter with controlled load 8 hour night service	CN8	028, 108, 208	N	100%	0%	2,000	0	0.0
8 / 15	Single register meter with controlled load 8 hour night 3 hr afternoon boost	CN11	024, 104, 204	N	75%	0%	2,000	500	0.4
8 / 15	Two register meter with controlled wh load day/night- domestic	IN16	011	N	0%	20%	4,000	3,200	2.7
		IN8	012	N	100%	0%	1,000	0	0.0
8 / 15	Single register meter with controlled load 7 hour night 3*2 hr day boost	CN13	103, 203	N	60%	0%	4,000	1,600	1.3
8 / 15	Single register meter with controlled load min 20 hrs service	CN20	109, 209	N	0%	25%	2,400	1,728	1.5
8 / 15	Single register meter with controlled load min 16 hrs service	CN16	106, 206	Y	0%	50%	2,400	1,140	1.0
8 / 15	Single register meter with controlled load 14 hrs service JJA	CN10	145, 245 Irrigation	N	100%	0%	2,400	1,030	0.0
8 / 15	Two register meter with all controlled load day/night- non domestic- min 16 hour service	DC16	Day Controlled 013	N	0%	50%	4,000	2,000	1.7
		NC8	Night 014	N	100%	0%	1,000	0	0.0
8 / 15	Two register meter with uncontrolled load day/night- non domestic	D16	Day 015, 115, 215	N	0%	100%	4,000	4,000	3.3
		N8	Night 016, 116, 216	N	100%	0%	1,000	0	0.0

Capacity kVA	Description of metering arrangements	Register Content	Example of tariff **	Subject to Load shifting	Assume Night rate %	Assume Controlled load %	Assume Winter 4 mths kWh	Discounted Winter 4 mths kWh	Effective Congestion Period Demand kW
16+	Two register meter with uncontrolled load day/night-non domestic	D16	Day 015, 115, 215	N	0%	0%	4,000	4,000	2.0
		N8	Night 016, 116, 216	N	100%	0%	1,000	0	0.0
16+	Two register meter with all controlled load day/night-non domestic – min 16 hour service	DC16	Day Controlled 013	N	0%	50%	4,000	2,000	1.0
		NC8	Night 014	N	100%	0%	1,000	0	0.0
16+	Single register meter with no controlled load	UN24	Anytime 010, 101, 201	N	0%	0%	5,000	5,000	2.5
16+	Single register meter with all controlled load	CN16	Economy 006, 106, 206	N	0%	50%	5,000	2,500	1.3
16+	Single register meter with controlled load 7 hour night 3*2 hr day boost	CN13	103, 203	N	60%	0%	4,000	1,600	0.8
16+	Single register meter with controlled load 8 hour night 3 hr afternoon boost	CN11	024, 104, 204	N	75%	0%	2,000	500	0.3
16+	Single register meter with controlled load min 20 hrs service	CN20	109, 209	N	0%	25%	2,400	1,800	0.9
16+	Single register meter with controlled load min 16 hrs service	CN16	006, 106, 206	Y	0%	50%	2,400	1,200	0.6
16+	Single register meter with controlled load 14 hrs service JJA	CN10	145, 245 Irrigation	N	100%	0.0%	2,400	1,030	0.0
16+	Single register meter anytime load plus water heater controlled – domestic	IN19	016/017	Y	22%	20%	5,000	3,120	1.6

****** For Standard Domestic ICPs the number is the Aurora variable based tariff code listed in Use-of-System Price Methodology document, otherwise generic retailer descriptions or unique Aurora code used.