Distribution Loss Factor Methodology

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countryenergy

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1. BACKGROUND

Distribution Loss Factors (DLFs) are applied to retail energy purchases to account for electricity transportation losses between transmission control points and end use meters. DLFs must be determined in accordance with the requirements of the National Electricity Rules (the Rules). This document sets out Country Energy's methodology for calculating DLFs, in accordance with the principles and requirements set out in clause 3.6.3 of the Rules. Clause 3.6.3 of the Rules can be accessed at: http://www.aemc.gov.au/rules.php

Country Energy's DLF codes are listed and explained in our Network Price List which can be found at: http://www.countryenergy.com.au/networkpricing

2. COUNTRY ENERGY'S NETWORK

Country Energy's electricity network can be broken down into seven major system categories: 132kV lines, 132kV to 66kV transformation substations, 66kV lines, 66kV to 11kV transformation substations ("zone substations"), 11kV lines, 11kV to 415V transformation substations ("distribution substations"), low voltage network and customer metering and control equipment.

Energy enters the network in varying quantities at each voltage. There are 74 connections supplying energy from transmission service providers (TransGrid and Powerlink), ten connections supplying energy from other distributors, and 17 connections to embedded generators.

Energy leaves the network to supply consumers at every voltage. Approximately 80% of the energy supplied is at a low voltage level.

3. CAUSES OF LOSSES IN COUNTRY ENERGY'S NETWORK

Losses are the result of electricity being converted to heat due to the conductor's resistance. The flow through the conductor results in a pressure drop which is in direct proportion to the flow. The energy lost is equal to the product of the pressure drop and the flow which gives rise to the energy lost being proportional to the square of the flow. Theft is also built into DLFs, with industry experts estimating that theft may be in the order of 0.5% of total electricity delivered.

The ability of the conductor to dissipate the heat determines its capacity. Country Energy builds and maintains its network to provide the most economic balance of asset cost and the cost of losses. Methods used to reduce losses include:

- Using higher voltages to transfer energy over longer distances;
- Making sure the voltage never drops by more than 5% over any part of the low voltage network;

- Replacing low capacity single phase networks that use voltage boosters to maintain voltage, with three phase networks;
- Specifying low loss transformers for all new work;
- Managing peak demand by offering controlled load tariffs and time of use tariffs;
- Rigorous processes in place to reduce theft including inspecting customer switchboards, testing meters where there is an unusual change in consumption, and purchasing meters that report voltage anomalies and tampering; and
- Upgrading transformers that are approaching their load limit.

4. METHOD CALCULATION

In accordance with the Rules, Country Energy has calculated DLFs based on voltage levels, consistent with customer differentiation classes. DLFs are also based on the most recent available continuous twelve month period in compliance with the Rules. Country Energy has used a combination of load-flow samples, purchase and sales data, assumptions in relation to theft as a percentage of sales, and engineering data to re-assess the proposed loss factors.

The relative loss through each asset category has been assessed by taking a typical subset of that network at typical loadings and calculating the loss percentage. TPRICE loadflow software or similar methodologies are used together with a scaled system load profile. The profile of the major 132kV loads is netted off the system profile to derive a more representative profile for networks below 132kV.

DLFs for loads and generators over 10MW or 40 GWh per year are calculated separately using TPRICE and the network parameters and load profiles specific to that connection, as required by clause 3.6.3 of the Rules. Those DLFs are recalculated whenever there is a significant change in the arrangement of the connection, the size of the load, or the profile of the load.

Finally, losses in the low voltage network are set as the balancing item. This is done by multiplying each premise's annualised energy consumption by its DLF and comparing the total with the energy that enters the network. Low voltage losses are then adjusted so that both figures are equal. In 2007/08, all low voltage DLFs were equalised across Country Energy's distribution network.

The consumption data for each premise connected to Country Energy's network has been extracted from the billing system after all billing for the period has been completed. Only invoices generated within a twelve month period are included. Reversed invoices, demand units and service charge units are excluded. Wherever the days over which the energy was consumed is not 365 days, it is linearly prorated to 365 days.

The purchase data for each supply point is extracted from systems managed by Country Energy's meter data agent. The data is extracted as half hour energy, tested for missing data or other inconsistencies, assigned as incoming or outgoing, and summated by voltage level.

5. TECHNICAL LOSSES

Country Energy has calculated series losses and shunt losses at each voltage level based on the assumptions listed in Table 1 below. The generic loss factors for high voltage and above will be recalculated once every five years.

Table 1: Summary of network loss allocation methodologies

Network element	Voltage level	Series loss	Transformer Series loss	Transformer/Meter Shunt loss
Transmission substation	132kV / 33kV	N/A	sample of test certificates	sample of test certificates
Sub-transmission network	33kV	sample, calculated	N/A	N/A
Zone substation	33kV / 11kV	N/A	sample of test certificates	sample of test certificates
HV network	11kV	sample, calculated	N/A	N/A
Distribution substation	11kV / 415V	N/A	sample of test certificates	sample of test certificates
LV network	415V	residual	N/A	6W x 1.4m meters x 8760 hrs

6. NETWORK LOSSES BY VOLTAGE LEVEL

Table 2 below provides a summary of energy and losses at the various voltage levels making up the distribution network.

Table 2: Energy flow by voltage level

This table is available to the AER on a commercial-in-confidence basis upon request.

7. ALLOCATION OF LOSSES

Country Energy allocates series losses at each voltage level to site specific and tariff customers as per Table 3 below.

Table 3: Series loss allocation (MWh)

This table is available to the AER on a commercial-in-confidence basis upon request.

Shunt losses are transformer iron losses that occur at substations when voltage is stepped up or down. Table 4 below shows how Country Energy allocates shunt losses to our network customers.

Table 4: Shunt loss allocation (MWh)

This table is available to the AER on a commercial-in-confidence basis upon request.