



SP AusNet Reconciliation of Distribution Network Losses for FY 2006/07

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1 Background

In March of 2006, SPAusNet submitted to ESC the Distribution Loss Factors applicable for the financial year 2006/2007. These factors were based on actual energy purchases and sales during the financial year 2004/2005. Along with other Victorian Distribution Network Service Providers (DNSPs), this is the fourth time that SPAusNet carries out reconciliation of the distribution network losses in accordance with the Clause 3.6.3(h)(2) of the National Electricity Rule (the Rule).

The process used in this reconciliation document is based on the “Guidance Paper: Calculation Methodology For Distribution Loss Factors (DLFs) For The Victorian Jurisdiction” published by the ESC on 14 February 2007. Largely based on the “Methodology for Reconciliation of Distribution Network Losses” proposed to ESC by the Distribution Loss Factor Working Group (DLFWG), this document is expected to draw a standard approach from among Victorian distributors in the calculation of DLFs and DLF reconciliation.

2 National Electricity Rules

The Rule

Clause 3.6.3(h)(2) of the NER is as follows: “The methodology used to determine distribution loss factors for a financial year should incorporate provisions requiring a Distribution Network Service Provider to undertake a reconciliation between the aggregate of the adjusted gross energy amounts for its distribution network for the previous financial year determined in accordance with clause 3.15.4 using the distribution loss factors that applied for connection points in that distribution network in the previous financial year and the sum of: (i) the amount of electrical energy, expressed in MWh flowing at all connection points in its distribution network in the previous financial year; and (ii) the total electrical energy losses incurred on its distribution network in the previous financial year.”

The Rule defines ‘adjusted gross energy’ as:

“The energy adjusted in accordance with clause 3.15.5 (for a transmission network connection point) or clause 3.15.5A (for a virtual transmission node) or clause 3.15.4 (for any other connection point).”

Clause 3.15.4 is as follows:

“Where a connection point is not a transmission network connection point, the adjusted gross energy amount for that connection point for a trading interval is calculated by the following formula:

$$AGE = ME \times DLF \quad (1)$$

where : AGE is the adjusted gross energy amount to be determined

ME is the amount of electrical energy, expressed in MWh, flowing at the connection point in the trading interval, as recorded in the metering data in respect of that connection point and that trading interval, (expressed as a positive where the flow is towards the transmission network

connection point to which the connection point is assigned, and negative where the flow is in the other direction)

DLF is the distribution loss factor applicable at that connection point.”

3 Reconciliation of Distribution Network Losses

SPAusNet’s interpretation of this code requirement is presented in the following mathematical equation:

$$\sum_{i=1}^{i=N} ME_i \times DLF_i = \sum_{i=1}^{i=N} ME_i + \text{Total distribution network energy loss} \quad (2)$$

where N is the number of distribution connection points.

For SPAusNet, these connection points are as tabulated below with corresponding actual energy (MWhr) sales during the FY 2006/07.

Table 1: FY 2006/2007 actual energy sales per connection point, MWhr.

ACTUAL Net Energy Supplied (MWh) 2006/07						
	Sales (MWh) - Aggregated using Network Tariffs					
	Subtransmission	Zone Sub	HV Lines	Dist Trans	LV Lines	Total
Total	302,069		682,654	1,232,097	4,971,120	7,187,940
Qualified end users	283,371		49,621	0	0	332,992
Excluding Qualified end users	18,698		633,032	1,232,097	4,971,120	6,854,948

Table 2 shows the approximate split between Short and Long Sub-transmission line connected customers that are classified as “non-qualified” users. The split is based on the forecasted network model connection for FY 2006-2007 used in the “bottom-up” loss calculations.

Table 2: FY 2006/2007 actual energy sales for non-qualified users.

Energy Flow (MWh) - For Loss Factor Calculation based on ACTUAL 2006/07					
	DLF A	DLF B	DLF C	DLF D	DLF E
Short Subtransmission	9,833		332,897	647,931	2,614,195
Long Subtransmission	8,865		300,135	584,166	2,356,925
Total	18,698		633,032	1,232,097	4,971,120

Table 3: FY 2006/2007 DLFs for average customers (excluding qualified end users)

DLF (excluding qualified customers) 2006/07					
	DLF A	DLF B	DLF C	DLF D	DLF E
Short Subtransmission	1.0052	1.0120	1.0416	1.0602	1.0666
Long Subtransmission	1.0409	1.0476	1.0773	1.0959	1.1023

SPAusNet’s DLFs applicable to average customers (excluded qualified end users) are summarized in Table 3 above. To satisfy the left hand side of equation 2, Table 2 MWhr sales per category, i.e. HV, Dist. Trans., LV, etc., is multiplied to its corresponding DLF in Table3.

$$\sum_{i=1}^{i=N} ME_i \times DLF_i = (9833 \times 1.0052) + (10409 \times 1.0409) + (332897 \times 1.0416) + (300135 \times 1.0773) + (647931 \times 1.0602) + (584166 \times 1.0959) + (2614195 \times 1.0666) + (2356925 \times 1.1023) = 7,402,672 \text{ MWhr}$$

FY 2004/2005 data indicates that four (4) large customers were expected to be entitled for the qualified end-user category during the FY 2006/2007. Table 4 summarizes the actual consumption details of these customers at the end of FY 2006 /2007.

Table 4: FY 2006/2007 actual sales from qualified customers, MWhr.

Information withheld by the AER

The same DLF report submitted in March of 2006 contains the DLFs for Qualified Customers applicable for FY 2006/2007. This is summarized in Table 5.

Table 5: FY 2006/2007 DLFs for qualified customers.

Information withheld by the AER

$$\sum_{i=1}^{i=N} ME_i \times DLF_i = (210,461 \times 1.0077) + (55,215 \times 1.0346) + (49,621 \times 1.0965) + (17,695 \times 1.0079) = 341,457 \text{ MWhr}$$

Thus, the total AGE for SPAusNet is equal to the sum of AGE of average customers and AGE of qualified customers in the FY 2005/2006.

$$AGE_{total} = 7,402,672 + 341,457$$

$$AGE_{total} = 7,744,129 \text{ MWhr}$$

To determine the accuracy of the DLFs for the FY 2006-2007, the right portion of equation 2 has to be determined as well. If the left side of equation 2 equals the right side then the losses reconcile exactly. If the left side of the equation is more than the right side then the DLFs are too high. If the right side of the equation is more than the left side then the DLFs are too low.

$$\sum_{i=1}^{i=N} ME_i + \text{Total distribution network energy loss} \tag{2}$$

where;

$$\sum_{i=1}^{i=N} ME_i = 9,833 + 8,865 + 332,897 + 300,135 + 647,931 + 584,166 + 2,614,195 + 2,356,925 + 210,461 + 55,215 + 49,621 + 17,695$$

$$= 7,187,940 \text{ MWhr}$$

$$\text{Total distribution network energy loss} = \text{Net Purchases} - \text{Total Sales} \times (1 + 0.2\%)$$

where (1 + 0.2%) accounts for the assumed 0.2% theft and meter errors in calculating for “top-down” loss. However, from 2008/09 DLF Reconciliation, theft and meter errors will no longer apply. In a meeting with DLFWG on 11-Dec-2007, the ESC emphasised that since almost half of all customers are now on market contract and that no accurate assessment of the actual theft level has been undertaken, then the allocation of theft and meter errors is not anymore valid.

$$\begin{aligned} \text{Total distribution network energy loss} &= 7,760,088 - 7,187,940 \times (1 + 0.2\%) \\ &= 557,772 \text{ MWhr} \end{aligned}$$

$$\begin{aligned} \sum_{i=1}^{i=N} ME_i + \text{Total distribution network energy loss} &= 7,187,940 + 557,772 \\ &= 7,745,712 \text{ MWhr} \end{aligned}$$

4 Summary

Both sides of equation 2 are presented below where the left side of the equation is slightly lower than the right side by 1,583 MWh. This translates to about 0.02% of sales in 2006/07.

$$\sum_{i=1}^{i=N} ME_i \times DLF_i = \sum_{i=1}^{i=N} ME_i + \text{Total distribution network energy loss}$$

$$7,744,129 \text{ MWhr} < 7,745,712 \text{ MWhr by } 1,583 \text{ MWhr}$$