TCFT BUSINESS SERVICES

Endeavour Energy Distribution Loss Factors
Proposed for 2011-12

Independent Review of Endeavour Energy's Application of its Distribution Loss Factors Calculation Methodology

8th March 2011

Executive Summary

TCFT Business Services (TCFT) has undertaken a review of the process undertaken by Endeavour Energy to derive the proposed distribution loss factors for 2011-12. TCFT has concluded that Endeavour Energy has used the appropriate data, has applied its established calculation methodology and that the results are a fair statement of the applicable loss factors.

1. Introduction

TCFT has been engaged by Endeavour Energy to undertake an independent review of the process undertaken by Endeavour Energy to develop distribution loss factors (DLFs) for 2011-12. The review was intended to establish a view on whether the process complied with the calculation methodology.

Endeavour Energy has determined a calculation methodology for distribution loss factors under Clause 3.6.3 of the National Electricity Market Rules. This document was published in January 2008 under the former name of Integral Energy.

TCFT has undertaken a review of the process through examination of several documents and a copy of the main calculation spreadsheet provided by Endeavour Energy and through discussion with Endeavour Energy staff. The review was intended to establish whether Endeavour Energy had followed the published methodology, not to check or repeat the actual calculation process.

TCFT undertook a similar review for the then Integral Energy in 2008, 2009 and 2010 and notes that Endeavour Energy has applied the same methodology in the calculations for 2011-12.

2. Process review

In the sections following, the requirements of the DLF calculation process are set out and commentary is provided on the process undertaken by Endeavour Energy.

2.1. Use of most recent data for a consecutive 12 month period

A DNSP must use the most recent actual load and generation data available for a consecutive 12 month period.

> Endeavour Energy has used load and generation data extracted from systems maintained by the company for the 2009-10 financial year, the most recent completed year. 15 minute metering data is the main source of data used. TCFT has seen examples of the data files and has confirmed that the data has been updated from the previous year.

2.2. Reconciliation for previous year

The NEM Rules require that each distributor undertake a reconciliation for the previous financial year of the adjusted gross energy for its entire network and the amount of energy flowing at all connection points in its network and the total losses incurred in its network.

Endeavour Energy has undertaken this reconciliation for the 2009-10 financial year (the most recent completed financial year). The results are included in the Endeavour Energy report on DLFs for 2011-12, together with the reconciliation for the previous four financial years for comparison. TCFT notes that the difference between the forecast losses and the actual losses for 2009-10 is a low figure – 0.54 per cent of total energy distributed.

2.3. Identification of connection points requiring site specific DLFs

Site specific DLFs are derived for connection points for embedded generators with actual generation of more than 10 MW, or connection points for an end-user with actual or forecast load of more than 40 GWh or a peak load of more than 10MW.

In addition, where a generator makes a request and meets the cost, a DNSP must calculate a site specific DLF for a generating unit of less than 10 MW or 40GWh per annum capacity.

Endeavour Energy has reviewed the generation output and load data for all generators and customers which have potential to meet this limit. This data is incorporated in the calculation spreadsheet. Site specific loss factors have been calculated for 2011-12 for the 23 load connection points and four generation connection points where a criterion is met. TCFT has reviewed the load and generation data and confirms the identification of relevant connection points.

Endeavour Energy advised TCFT that no requests were made for calculation of site specific DLFs for 2011-12 by generators which did not meet the criterion.

2.4. Forward looking data

The NEM Rules promote the use of forecast data to provide "forward-looking DLFs". In practice this means applying a forecast adjustment to the metering data.

Endeavour Energy has used forecast peak load data derived for each of its zone substations. This data was developed by Endeavour Energy's forecasting group. TCFT has seen examples of this data and has discussed with Endeavour Energy staff the process used to adjust the actual load data for 2009-10 to reflect the forecast loads for 2011-12.

In addition, a DNSP needs to consider planned changes in its network in the coming year. Endeavour Energy works from the capital program developed by its planning group to identify changes in the network during the forecast year. As well as inclusion of the new assets in the network modelling, adjustments are made to the load data to allow for the network changes. TCFT has discussed with Endeavour Energy staff the application of this process for 2011-12.

2.5. Treatment of electricity theft and metering inaccuracy

Although not specifically mentioned in the NEM Rules, correct calculation of distribution loss factors requires that appropriate allowance is made for theft and metering inaccuracy.

Endeavour Energy has assumed an overall amount for theft of 0.5% of total sales and has applied this figure for a number of years. TCFT has been advised that this amount was agreed by the former DLF working group as a reasonable approximation. TCFT has not seen any evidence to suggest a need to change this estimated figure.

2.6. The adjustment amounts from application of the DLFs should equal losses

The aggregate of the adjusted gross energy amounts for the distribution network using the DLFs should equal as closely as possible the sum of the measured energy flowing at connection points and the actual total losses in the network. This is the fundamental aim in calculation of losses.

Endeavour Energy achieves this by undertaking an overall estimation of losses in the coming year. Losses are then calculated using load flow studies or shunt loss calculations to derive the losses at progressively lower levels in the network. The residual losses are then assumed to occur in the low voltage network. This methodology inherently achieves the objective set out above.

2.7. Customer classes for loss calculation

The Rules require that each distribution connection point must be assigned to a class of distribution network connection points based on the location of, voltage of and pattern of electrical energy flows (Clause 3.6.3 (d), (e)). So far as practicable, this assignment must be consistent with the geographic boundaries of the pricing zones for use in distribution pricing and the voltage levels incorporated within those pricing zones.

Endeavour Energy does not apply geographic pricing zones so connection points are assigned to particular voltage categories for calculation of DLFs.

Endeavour Energy uses the standard classes for loss factor calculation, as set out in the former IPART guidelines, that is:

- 132kV network (addition to IPART categories)
- Transmission substation
- Sub-transmission network
- Zone substation
- High Voltage network (22 and 11kV, sometimes also referred to as medium voltage)
- Distribution substation
- Low voltage network

2.8. Calculation of Losses

The DLF for a non-specific DLF site is determined using a volume weighted average of the average electrical energy loss between the assigned transmission connection point or node and each distribution connection point in the relevant class.

Endeavour Energy calculates losses progressively on a hierarchical basis for each level of the distribution network. Average losses are calculated at each level progressively. Losses to a particular connection point are a weighted sum of the losses in each level of the network used to supply that point.

Endeavour Energy uses load flow techniques to calculate series losses down to, but not including, distribution networks at 11/22kV and 400/230V. A different load flow methodology is applied at the distribution substation level. Manufacturer's data on transformers is used to calculate shunt losses.

Endeavour Energy has developed a sophisticated set of software to manage the overall calculation process. TCFT has sighted the application and has observed some sample calculations for elements of the process.

TCFT's brief did not include detailed assessment of the application or appropriateness of the specific techniques employed. Nevertheless, it would be expected that this approach would yield robust results.

DLFs for specific customers are to be determined using the average electrical energy loss between the distribution network connection point and the transmission connection point to which it is assigned.

Endeavour Energy calculates the loss factor for each specific site customer using a similar approach to that for all other customers. However, at each level the losses due to specific site customers and other customers are separated. For series losses, separate load flows are run for the specific site customers and for the other customers. Shunt losses at each level are proportioned to site specific and other customers on the basis of average energy load. The losses for each specific site customer are then added from each relevant level and a loss factor calculated.

TCFT has reviewed the application of this process within Endeavour Energy's main DLF calculation spreadsheet.

For embedded generators, Endeavour Energy analyses losses with the generator in service and out of service to calculate the appropriate loss factor. TCFT has also reviewed the application of this process within Endeavour Energy's main DLF calculation spreadsheet.

3. Documents Reviewed

Endeavour Energy – Evaluation of Distribution Loss Factors 2011-2012. March 2011

Integral Energy – Calculation of Distribution Loss Factors. Special Report Study No. S537, February 2008

Endeavour Energy – Loss Factor Calculation spreadsheet - Loss Factor Calculation 2011-12 (result2_full 3_PP).

IPART – Assessment and Approval Process for Distribution Loss Factors proposed by DNSPs, Guideline. November 2007.