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RAC0007UDY

Averaging of transmission loss factors – poin

Purpose of this document

This document summarises some of the issues which will be considered by the ACCC at its pre Determination Conference on Averaging Transmission Loss Factors, to be held on Thursday 19 July 2001.

Need for change to the Code

Clause 3.6.3 of the NEC specifies the responsibilities of DNSPs in relation to the assignment of a Transmission Connection Point (TCP) to contestable customers. At present, the Code requires DNSPs to accurately assign each customer to its TCP. There are two consequences that flow from this:

- For a large proportion of smaller customers, accurate assignment is not possible without involving considerable initial and ongoing resources.
- Especially in metropolitan areas, the network configuration represents a continuum surrounding the TCPs. The TCP for an individual customer can change regularly or even seasonally.

The present Code requirement is thus unworkable and as mass contestability looms closer, the risk that a DNSP's technical breach of the Code would result in a dispute is magnified.

Materiality of averaging transmission loss factors

The submission by the National Electricity Distributors Forum (NEDF) to NECA, which originally proposed the Code change, illustrated the calculation of a weighted average transmission loss factor (TLF) for the EnergyAustralia network. This calculation for the Sydney metropolitan area resulted in the following average, upper and lower bounds to the TLF.

Weighted average TLF	=	1.0071	
Lowest TLF	=	1.0060	(-0.0011)
Highest TLF	=	1.0078	(+0.0007)

Using these results, the likely effect on the delivered electricity price paid by range of smaller customers is considered below. The "typical" customers here are those selected by IPART for the comparison of NSW DNSP charges.

Customer Class	No. of Customers	Consumption kWh/pa	NUoS $ p.a.	Average tlf	dlf	Energy $45/MWh	Total bill $ p.a.	High tlf difference		Low tlf difference	
DOMESTIC	1,279,608										
Domestic		3,500	169	1.0071	1.0541	167	336	$0.12	0.035%	-$ 0.18	-0.054%
Domestic with controlled hot water		7,500	210	1.0071	1.0541	358	568	$0.25	0.044%	-$ 0.39	-0.069%
GENERAL SUPPLY	132,098										
Business non-TOU, 18MWh pa		18,000	779	1.0071	1.0516	858	1,637	$0.60	0.036%	-$ 0.94	-0.057%
Business non-TOU, 60MWh pa		60,000	2,333	1.0071	1.0516	2,859	5,193	$1.99	0.038%	-$ 3.12	-0.060%
LV ToU	11,582										
Business ToU, LF 30%		262,800	9,679	1.0071	1.0516	12,525	22,204	$8.71	0.039%	-$ 13.68	-0.062%
Business ToU, LF 50%		438,000	14,183	1.0071	1.0516	20,874	35,057	$14.51	0.041%	-$ 22.80	-0.065%
LV DEMAND	3,637										
LV Demand TOU (KVA), LF 20%		876,000	30,058	1.0071	1.0516	41,748	71,807	$29.02	0.040%	-$ 45.60	-0.064%
LV Demand TOU (KVA), LF 40%		1,752,000	121,937	1.0071	1.0516	83,497	205,434	$58.04	0.028%	-$ 91.20	-0.044%
LV Demand TOU (KVA), LF 60%		2,628,000	160,110	1.0071	1.0516	125,245	285,355	$87.05	0.031%	-$ 136.80	-0.048%
HV DEMAND	218										
HV Demand TOU, LF 40%		8,760,000	134,878	1.0071	1.0222	405,812	540,690	$282.07	0.052%	-$ 443.25	-0.082%
HV Demand TOU, LF 60%		13,140,000	140,878	1.0071	1.0222	608,718	749,597	$423.10	0.056%	-$ 664.87	-0.089%
HV Demand TOU, LF 80%		17,520,000	142,378	1.0071	1.0222	811,624	954,003	$564.13	0.059%	-$ 886.49	-0.093%

It can be concluded that the effect of averaging EnergyAustralia TLFs in the Sydney area to produce a virtual transmission node produces a worst-case difference in the total electricity bill of less than 0.1%. To place this in context, this difference is considerably less than the maximum allowable error of 1.5% for a Type 4 metering installation and entirely negligible compared with the approximations involved in the calculation of distribution loss factors (DLFs).

Attachment - Settlement of Customers at Virtual Transmission Node

This document sets out a process for carrying out settlements at the virtual transmission location. It is illustrated by means of a simple example, which forms the basis for a generalised solution.

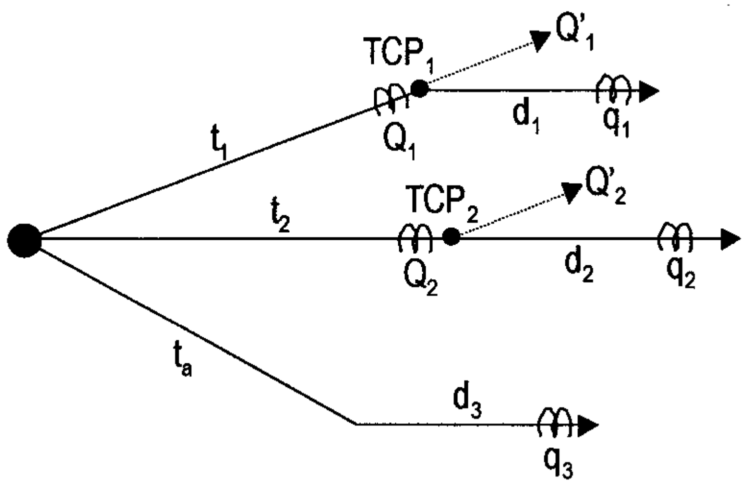

Figure 1

Figure 1 illustrates a small system with two Transmission Connection Points (TCPs) and a "virtual" or averaged connection point at which it is required that smaller loads be settled. The symbols in the diagram have the following meanings:

t_1, t_2	transmission loss factors at TCPs 1 and 2 (Bulk Supply Points)
t_a	averaged transmission loss factor at virtual connection point
Q_1, Q_2	metered energy at TCPs 1 and 2
d_1, d_2, d_3	distribution loss factors for loads settled in the market
q_1, q_2, q_3	metered consumption at distribution loads
Q'_1, Q'_2	residual consumption at TCPs after subtracting the loss adjusted consumption of market loads embedded in the distribution network

Total load settled in the market

The total load settled in the market is the metered consumption at both TCPs, adjusted for their transmission loss factor. That is:

$$S \quad = t_1 \times Q_1 + t_2 \times Q_2$$

The settlement quantity should remain the same, regardless of the customers that have entered the market.

Customers 1 and 2 settled in the market

For the present, assume that only customers at 1 and 2 are Tier 2 and therefore settled in the market. The settlement is carried out as follows:

$$\begin{aligned} S \quad &= t_1 \times (Q'_1 + \sum d_1 \times q_1) + t_2 \times (Q'_2 + \sum d_2 \times q_2) \\ &= t_1 \times Q_1 + t_2 \times Q_2 \end{aligned}$$

Settlement involving the virtual transmission connection then would take place as follows:

$$
\begin{aligned}
S \quad &= t_1 \times (Q''_1 + \sum d_1 \times q_1) + t_2 \times (Q''_2 + \sum d_2 \times q_2) + t_a \times \sum d_3 \times q_3 \\
&= t_1 \times \left(Q'_1 - \sum d_3 \times q_3 \times \frac{P_1}{P_1 + P_2} + \sum d_1 \times q_1 \right) \\
&\quad + t_2 \times \left(Q'_2 - \sum d_3 \times q_3 \times \frac{P_2}{P_1 + P_2} + \sum d_2 \times q_2 \right) \\
&\quad + \left(\frac{t_1 \times P_1 + t_2 \times P_2}{P_1 + P_2} \right) \times \sum d_3 \times q_3 \\
&= t_1 \times (Q'_1 + \sum d_1 \times q_1) + t_2 \times (Q'_2 + \sum d_2 \times q_2) \\
&= t_1 \times Q_1 + t_2 \times Q_2
\end{aligned}
$$

For the Tier 1 Retailer, the settled quantity is:

$$S \quad = t_1 \times Q'_1 + t_2 \times Q'_2 - t_a \times \sum d_3 \times q_3$$

And for the Tier 2 Retailer, the settled quantity is:

$$S \quad = t_1 \times \sum d_1 \times q_1 + t_2 \times \sum d_2 \times q_2 + t_a \times \sum d_3 \times q_3$$

Generalisation

There will be multiple transmission connection points and numerous Tier 2 customers in the market. The required adjustments for the general situation would be as follows.

Average transmission loss factor

If n is the number of transmission connection points to be averaged, then:

$$t_a \quad = \sum_{i=1}^{n} \frac{t_i \times P_i}{P_i}$$

Settlement adjustment

If there are m embedded distribution loads to be settled at the virtual transmission connection, then for each transmission connection point:

$$Q''_i \quad = Q'_i - \sum_{j=1}^{m} q_j \times d_j \times \frac{P_i}{\sum_{i=1}^{n} P_i}$$