ElectraNet
electricity transmission

Appendix A2

Transend's Use of Weather Stations to Support the Real-time Rating of Transmission Lines

Our Ref: D08/2959

17 January 2008

Mr John Haddow
Revenue Reset Consultant
ElectraNet
PO Box 7096
ADELAIDE SA 5000

Dear John

Transend's use of weather stations to support the real-time rating of transmission lines

In response to your enquiry in December last year in relation to Transend's use of weather stations to support the real-time rating of transmission lines, I am able to provide the following information.

Background

Transend is committed to the provision of real-time transmission line ratings as part of its NEM entry obligations conditional to both the firm and non-firm operation of its entire system. Transend considers that the provision of real-time ratings provides a cost-effective means of maximising the utilisation, and minimising constraints, of the existing Tasmanian transmission network.

Transend is an active member of the TNSP Ratings Cooperative Charter Real-time Working Group. This Working Group is committed to the study and facilitation of rating technology where it is of operational benefit in Australia. The Working Group comprises representatives from all NEM TNSPs and additionally includes Western Power and NEMMCO. As part of this group, Transend recognises the different environments, the resultant different solutions and therefore the different costs faced by the various TNSPs.

Transmission line ratings are a function of electrical, physical and meteorological inputs that must be calculated frequently and accurately. They also rely on the inputs to the calculation being as accurate and readily available as possible.

For the purpose of rating calculations, Transend has fifteen dedicated weather stations situated in five meteorologically representative regions. One weather/tension station is dedicated to specific de-icing duty.

Transend Networks Pty Ltd
ABN 57 082 586 892
PO Box 606
MOONAH TAS 7009
Phone 1300 361 811
Fax (03) 6274 3872
www.transend.com.au

There are three levels of back-up for a weather station:

- a station at the other end of the line
- another representative station
- or the basic ratings workbook.

Additional backups are in the form of SCADA embedded 'watchdogs' and reasonability limits. NEMMCO also has reasonability limits set for the data they receive.

Weather Station Costs

The most recent substation based weather stations Transend has commissioned were two in December 2004, at Farrell and Sheffield substations and one in July 2006, adjacent to Hadspen substation. All three sites were hard wired with mains power and communications direct to the respective existing Remote Terminal Unit (RTU).

Farrell and Sheffield each have stand-alone fabricated masts to support the weather equipment and were completed for a cost of $111,000 each.

Hadspen utilises an existing transmission tower adjacent to the substation to support the weather equipment and was completed for a cost of $91,400.

Transend's remote weather stations were all installed between five and ten years ago. Some of these stations were reworked a number of times as Transend gained knowledge and experience. These remote sites all utilised radio communications directed back to the closest substation RTU. Transend would estimate the cost for a new remotely located station, in today's dollars, to be in the order of $270,000–$300,000. This estimate would vary having regard to differing topographies and the communications requirements from site to site.

Transend has ongoing costs associated with weather station maintenance and calibration checking. However, reliability is important because weather stations, associated telemetry and accurate, continuous and automated calculating ability is the heart of a rating system; without which elements of the Tasmanian transmission system would almost always be constrained.

Weather Station Power Supply

For sites at or adjacent to substations a robust power supply is always available from the station service transformers and is the preferred source.

Remote sites in Tasmania are almost always remote from mains power and Transend uses solar panels as the primary source. Power requirements are significant and onerous due to short winter days and extended periods of cloudiness. Solar panels are in some cases duplicated and in one case augmented with a wind generator and in another with a fuel cell.

Costs associated with powering remote sites vary but are in the order of $40,000 each. Mains power, if available, would be the preferred source.

Tension Monitors

All remote sites are also fitted with tension monitors. Tension monitors provide an alternative method for conductor temperature derivation. They are currently used as a check for the weather derived ratings and as part of Transend's commitment to ratings research. Tension monitors are an integral part of de-icing technology.

Wind Measurements

Transend plans to replace its cup type anemometers with ultrasonic devices, at a cost of about $100,000, in order to improve the accuracy and smoothing of measurements at low wind velocities. This decision follows the successful operation of two ultrasonic units already installed at Hadspen and Sheffield.

In summary, Transend's experience has demonstrated that:

- weather stations need to be reliable and accurate and this has led to the 'engineering out' of weak points in their design over time
- remote weather stations have to be powered by non-mains power, but this has led to the requirement of building in redundancy, holding spares and increased maintenance that would otherwise be avoided if a mains connection were available
- multiple levels of instrumentation are required for accuracy and checking
- the construction of substation based weather stations have cost in the order of $100,000
- no new remote weather stations have been constructed recently but the continued use of radio communications is envisaged, and
- real-time ratings provide a cost effective means of maximising the utilisation, and minimising constraints, of the existing Tasmanian transmission network.

Yours sincerely

Bruce Longmore

Bruce Longmore
Transmission Lines Engineer, Transend Networks;
Chairman, National TNSP Real-time Working Group