GRAMPIANS NET SYSTEM PROFILE METHODOLOGY

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Contents

GLOSSARY

In this document, a word or phrase *in this style* has the same meaning as given to that term in the Retail Market Procedures (Victoria).

1 Introduction

This Grampians Net System Profile Methodology document is made in accordance with clause 2.8.2 of the Retail Market Procedures (Victoria), this document details the methodology used to calculate *Net System Load (NSL)* by application of Profile Preparation Service, Basic Meter Profiling and *Effective Degree Days*.

The specific data supplied by the *Distribution Businesses* is described in the *Gas Interface Protocol (GIP)* Participant Build Pack 2 Systems Interface Definitions document.

The NSL is an estimate of the quantity of gas used by all basic metered customers in a distribution area.

2 NET SYSTEM PROFILE METHODOLOGY

2.1 Profile Preparation Service (PPS)

2.1.1 Calculation of the NSL

AEMO must calculate the net system load (***NSL***) for each *distribution area* in accordance with this section 2.

For each *distribution area*, the *NSL* for each *gas day* is derived from the total energy entering the *distribution area* (***ET***) less the total energy leaving the *distribution area* (***EL***) and less the sum of all *interval metered* energy withdrawn at a *distribution supply point* within the *distribution area* (***EI***) adjusted for distribution unaccounted for gas within the *distribution area* (***$UAFG_D$***). AEMO calculated *NSL* for each *distribution area* for each *gas day* cannot be a negative value.

The *NSL* for a *gas day* can be represented by the following formula:

$$NSL_{i,D} = ET_{i,D} - EL_{i,D} - \left(\frac{\sum EI_{i,D}}{(1 - UAFG_D)} \right)$$

Where:

- $NSL_{i,D}$ is the NSL for *distribution area* D for *gas day i*;
- $ET_{i,D}$ is the total energy entering *distribution area* D during *gas day* i;
- $EL_{i,D}$ is the total energy leaving *distribution area* D during *gas day* i;
- $EI_{i,D}$ is the *interval metered* energy withdrawn at a *distribution supply point* within *distribution area* D during *gas day* i; and
- $UAFG_D$ is the relevant value assigned to:
    (a) the *Distributor* on whose distribution pipeline the *distribution supply point* is located; and
    (b) the quantity of gas withdrawn by a *Market Participant* at the *distribution supply point*,

in accordance with Part C of Schedule 1 of the *Distribution Code* or as defined in the Declared Metering Requirement.

2.1.2 Updating the NSL

2.1.2.1 The NSL is subject to changes as a result of revisions to either *custody transfer meter* data or *interval meter* data. Revisions to *custody transfer meter* data are less likely than revisions to *interval meter* data because most *interval meters* are read manually more than three *business days* after the relevant *gas day* (when prudential reporting is required).

2.1.2.2 The data validation procedures made by AEMO under Part 19 of the Rules and those provisions of Part 19 that deal with validation and substitution of metering data will be applied to estimate missing *interval meter* data. That data will be replaced with actual values when available.

AEMO must calculate the *net system load* for each *distribution area* for each *gas day* using revised or additional information provided or available to it in accordance with the timeframes specified in Division 2, Subdivision 6 and Division 2, Subdivision 7 of the Rules:

(a) for monitoring prudential exposure;

(b) for preliminary settlement statement;

(c) for final settlement statement; and

(d) for revised settlement statement.

2.2 Basic Meter Profiler (BMP)

2.2.1 Data for apportionment

The *consumed energy* data required by AEMO for the purpose of applying the *NSL* is provided to AEMO in accordance with sections 2.6.2(b) and 2.6.3 of the Retail Market Procedures (Victoria). AEMO must apply the validation rules described in the *Consumed Energy Scenarios (Victoria)* to the *consumed energy* data delivered to AEMO by the *Distributors*.

2.2.2 Load Apportionment Using the NSL

2.2.2.1 AEMO must apply the *NSL* prepared in accordance with section 2 to each *basic meter* for a *second tier supply point*, for which a *validated meter reading* is available, in accordance with this section 2.2.2. The aim of applying the *NSL* is to apportion the *consumed energy* for each such *meter* to each *gas day* in the *reading period*.

2.2.2.2 The load apportionment factor is the ratio of the *NSL* for the relevant *gas day* to the total *NSL* for the corresponding *reading period* as represented by the following formula:

$$LAF_d = \frac{NSL_d}{\mathbf{\Sigma}\ NSL}$$

Where:

- LAF_d is the load apportionment factor for *gas day* d;
- NSL_d is the *NSL* for *gas day* d (Note: where NSLd > 0, NSLd = NSLd and where NSLd < = 0, NSLd = 0.001); and
- ΣNSL is the sum of the *NSL* for each *gas day* in the *reading period*.

2.2.2.3 The load apportionment factor for a *gas day* is applied to the *consumed energy* for a *reading period* for a *basic meter* to estimate the *consumed energy* for a *gas day* for that *basic meter* as follows:

$$\textit{Consumed energy}_{d,j} = \text{accumulated } \textit{consumed energy}_j \times LAF_d$$

Where:

- *consumed energy* is the *consumed energy* for *basic meter* j for a *second tier supply point* for *gas day* d;
- accumulated *consumed energy* is the *consumed energy* for the *reading period* for *basic meter* j; and
- LAF_d is the load apportionment factor for *gas day* d.

2.2.2.4 If a *validated meter reading* is not available, the *consumed energy* for a *basic meter* for a *second tier supply point* will be calculated in accordance with section 2.2.3 of this document.

2.2.3 Calculating Daily Load when Meter Readings are not available

2.2.3.1 Where a *meter reading* is not available, AEMO must estimate the *consumed energy* for a *basic meter* for a *second tier supply point* based on the weather measured in *effective degree days* and the *base load* and *temperature sensitivity factor* provided to AEMO by *Distributors* under clause 2.8.1(c) and 2.8.1(d) of the Retail Market Procedures (Victoria) as follows:

$$\textit{Consumed energy}_{;dj} = BL_j + (TSF_j \times EDD_d)$$

Where:

- *consumed energy*$_{d,j}$ is the estimated *consumed energy* for *basic meter* j for a *second tier supply point* on *gas day* d;
- BL_j is the *base load* for *basic meter* j;
- TSF_j is the *temperature sensitivity factor* for *basic meter* j; and
- EDD_d is the *effective degree days* for *gas day* d.

2.2.3.2 When a *validated meter reading* for the *basic meter* becomes available, the *consumed energy* based on the *validated meter reading* will supersede the *consumed energy* estimated in accordance with this section 2.2.3.

2.2.3.3 Where the sum of the allocated *consumed energy,* supplied by the *Distributors*, and the *generated consumed energy,* as calculated by AEMO, is greater than the *NSL* for a *gas day,* AEMO will proportionately scale down the *generated consumed energy* to no less than zero such that the addition of the *generated consumed energy* to the allocated *consumed energy* does not cause the total energy to be profiled to exceed the NSL for that *gas day*.

2.2.4 Timeframe for BMP Calculations

2.2.4.1 The majority of *meter readings* for *basic meters* will not be available three *business days* after the *gas day* and hence the estimation method specified in section 2.2.3 of this document must be used by AEMO to calculate *consumed energy* for each *gas day* for *basic meters* for *second tier supply points*.

2.2.4.2 AEMO must calculate the aggregate *consumed energy* for each *second tier supply point* for each *gas day* using revised or additional information provided or available to it in accordance with the timeframes specified in Division 2, Subdivision 6 and Division 2, Subdivision 7 of the Rules:

(a) for monitoring prudential exposure;

(b) for preliminary settlement statement;

(c) for final settlement statement; and

(d) for revised settlement statement.

2.2.4.3 AEMO must use the most up to date *NSL* each time it performs the calculations referred to in sections 2.2.2 and 2.2.4.2 of this document.

2.2.5 Base Load & Temperature Sensitivity Factor

2.2.5.1 The *base load* is derived from the smallest *consumed energy* measured in a *reading period* during the summer period (defined as between 1 October and 31 March within the current 12 month period) according to the following formula:

BL = SE / PSE

Where:

- BL is the *base load;*
- SE is the smallest *consumed energy* between two consecutive scheduled reads during the summer period; and
- PSE is the number of days in the *reading period* during the summer period.

2.2.5.2 The *temperature sensitivity factor* applies a weather impact to the *base load* by reference to the *effective degree day* for each day in the *reading period*. The *temperature sensitivity factor* is derived from the difference between:

(a) the largest *consumed energy* measured in a *reading period* during the winter period (between 1 April and 30 September within the current 12 month period); and

(b) the smallest *consumed energy* between two consecutive scheduled reads measured in a *reading period* during the summer period,

divided by the sum of the *effective degree days* for the *reading period* over which the largest *consumed energy* value was derived. This is represented by the following formula:

TSF = max{0, (LE – (BL x PLE)) / **Σ** EDD (LE)}

Where:

- TSF is the temperature sensitivity factor;
- LE is largest consumed energy between two consecutive scheduled reads during the winter period;
- BL is the base load;
- PLE is the number of days in the reading period during the winter period; and
- **Σ** EDD (LE) is the sum of the effective degree days over the reading period during the winter period.

2.3 Effective Degree Days

2.3.1 Purpose of Effective Degree Day

Effective degree days are required for the calculation of the *temperature sensitivity factor*. The *effective degree day* is used to measure coldness which is directly related to gas demand for area heating. The *effective degree day* is a composite measure of weather coldness incorporating the effect of temperature, wind, sunshine and day of the year.

2.3.2 Calculation of Effective Degree Days

2.3.2.1 The *effective degree day* is calculated as follows:

EDD = DD (temperature effect)

+ 0.038 x DD x average wind (wind chill factor)

- 0.18 x sunshine hours (warming effect of sunshine)

$$+ 2 \times \text{Cos}\left(\frac{2\pi\,(\text{day} - 200)}{365}\right)$$ (seasonal factor)

Where:

- EDD is the *effective degree day*;
- DD is the degree day and is described in section 2.3.2.2 of this Attachment;
- average wind is described in section 2.3.2.3 of this Attachment;
- sunshine hours is described in section 2.3.2.4 of this Attachment; and
- Cos is cosine and is described in section 2.3.2.5 of this Attachment.

EDD will be 0 if the calculated value is negative.

2.3.2.2 The degree day is calculated as follows:

DD = 18 – T if T < 18

0 if T ≥ 18

Where:

- DD is degree day;
- T is the average of 8 three-hourly Melbourne temperature readings (in degrees Celsius) from midnight to 9.00 pm inclusive as measured at the Weather Bureau Melbourne Station;

Note: The gas day is defined as 6:00am day-0 to 6:00am day+0 so the effective degree day formula implies a 6 hour lag in demand to changes in ambient temperature.

and

- 18 degrees Celsius represents the threshold temperature for residential gas heating.

The colder the average temperature the higher the degree day and, accordingly, *effective degree day*.

2.3.2.3 The average wind is the average of the 8 three-hourly Melbourne wind (measured in knots) from midnight (day-1) to 9.00pm inclusive (day+0) as measured at the Bureau of Meteorology Moorabbin and the Laverton weather stations. Average wind is represented by the following formula:

Average wind = 0.604 x average (Moorabbin, Laverton) wind

2.3.2.4 Sunshine hours is the number of hours of sunshine above a standard intensity as measured at the Bureau of Meteorology Laverton weather station for the same duration of time between midnight (day-1) to 9.00 pm inclusive (day+0).

2.3.2.5 The cosine term models seasonality in *customers'* response to different weather. Residential consumers more readily turn on the heaters or leave heaters on in winter than in other seasons (early spring, late autumn) for the same change in weather conditions. This change in *customers'* behaviour is captured in the cosine term in the *effective degree day* formula, which implies that for the same weather conditions heating demand is higher in winter than in the shoulder seasons or in summer.