

## Appendix J: Proposed Methodology for calculating Avoided TUOS payments

### Background

Under National Electricity Rules owners or operators of eligible Embedded Generators are eligible to receive Avoided TUOS (ATUOS) payments from Ausgrid.

ATUOS payments recognise that energy supplied to the DNSP by the Embedded Generator would have otherwise been supplied from the state's transmission network. The payment of ATUOS is required to be made using a 'with and without' approach involving:

- Calculation of the actual TUOS charges payable by the DNSP;
- Calculation of the hypothetical TUOS charges payable by the DNSP if the Embedded Generator had not existed; and
- Payment of the full difference in the above to the embedded generator as ATUOS.

### Proposed methodology for calculating ATUOS payment

Ausgrid's methodology for calculating ATUOS payments is based on the maximum demand KW charge applied to the peak demand of the Embedded Generator (kWh) using the "with and without" methodology. Importantly, this methodology does not take into account the economic benefit provided to the rest of the electricity transmission network. For example, the peak demand of the generator may not necessarily occur at a time that causes a reduction in the overall transmission network peak demand.

### Proposed ATUOS calculation method – "with and without" method

$$ATUOS = TUOS_{withoutEG} - TUOS_{withEG}$$

where:

$$TUOS_{withoutEG} = Demand\_Tariff \times Transmission\_Peak\_Demand_{withoutEG}$$

$$TUOS_{withEG} = Demand\_Tariff \times Transmission\_Peak\_Demand_{withEG}$$

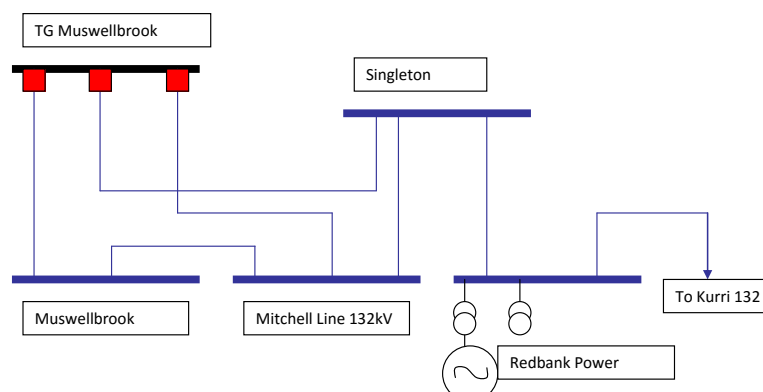
combining the above:

$$ATUOS = Demand\_Tariff \times (Transmission\_Peak\_Demand_{withoutEG} - Transmission\_Peak\_Demand_{withEG})$$

This document details the ATUOS calculation method by way of illustrative example.

### Calculation example for Avoided TUOS

Figure 1 - the 132kV network near Muswellbrook, with Hypothetical Power Station 1 receiving an ATUOS payment from Ausgrid.



As outlined in section (i) of the Rules, the ATUOS payments are calculated on a 'with and without' basis. **The 'With case'** (ie. Including actual generation at Power Station 1):

Determine the load for the TransGrid metering points at Muswellbrook. The result is labelled  $L_{With}$ , which, through Kirchoff's Current Law, 'automatically' takes into account the generation at Hypothetical Power Station 1.

Therefore we write:

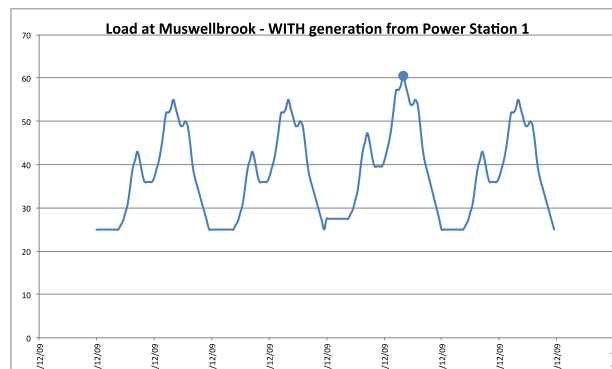
$$L_{Actual} = L_{With} = L_{TransGrid} - L_{PowerStation1}$$

Now apply the TransGrid prices to the  $L_{With}$  load to determine the  $B_{With}$  TransGrid bill.

$$B_{With} = \text{Billing of } L_{With}$$

The figure below shows the 'With' case half hourly load (selected days). Demand charges for the actual TransGrid bill are based on the peak load visible on the 22<sup>nd</sup> of December (3<sup>rd</sup> daily cycle shown).

**Figure 2 – Load at Muswellbrook with generation from Power Station 1**



**The 'Without case'** (ie. No generation at Hypothetical Power Station 1):

Determine the load for the TransGrid metering points at Muswellbrook, had Power Station 1 not been generating. This is the sum of the metering points at TransGrid Muswellbrook and the actual generation at Hypothetical Power Station 1. This results in  $L_{Without}$  because:

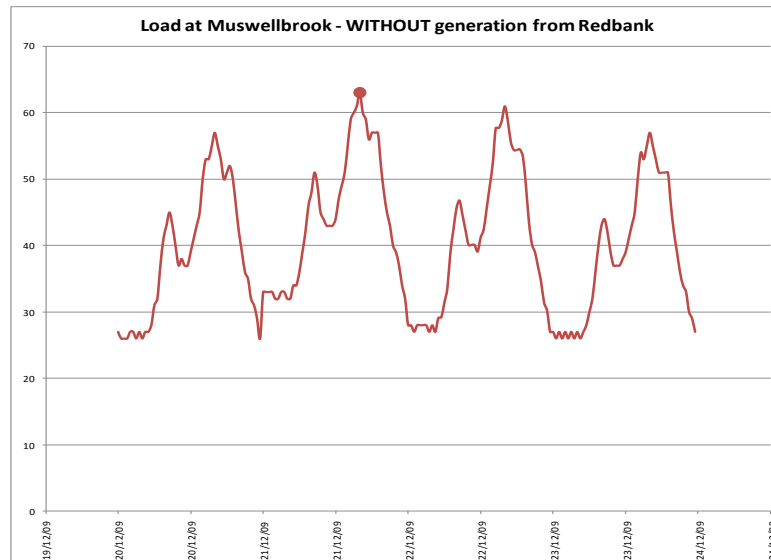
$$L_{Actual} + L_{Powerstation1} = (L_{TransGrid} - L_{Powerstation1}) + L_{Powerstation1} = L_{TransGrid} = L_{Without}$$

Now apply the TransGrid prices to the  $L_{Without}$  load to determine the  $B_{Without}$  TransGrid bill.

$$B_{Without} = \text{Billing of } L_{Without}$$

The figure below shows the 'Without' case half hourly load (selected days). Demand charges for a hypothetical TransGrid bill are based on the peak load visible on the 21<sup>st</sup> of December (2<sup>nd</sup> daily cycle shown).

**Figure 3 – Load at Muswellbrook with generation from Power Station 1**



**Determining the amount payable for avoided TUOS**

The amount payable by the DNSP to the embeded generator is therefore:

$$\text{ATUOS amount} = \mathbf{B_{Without}} - \mathbf{B_{With}}$$

**Metering Considerations**

The load figures used in the above calculations are not necessarily net at each point. For instance:

- The TransGrid charges at Muswellbrook are based on the E<sup>1</sup> register only, so the above calculations should use E only, not the (E-B) figures.
- The National Electricity Rules state describe the ‘Without’ case as if the Embedded Generator had ‘not injected any energy’ [5.5(i)(1)(i)]. Thus it is appropriate to use the pure injection volume rather than the net injection volume (B register rather than (B-E) figure). This corresponds with the viewpoint that since Power Station 1 pays network charges for its auxiliary supply (the E register), it has the right to use load when it sees fit, and must be considered separately to ATUOS considerations.

**Selection of relevant Transmmission price for calculation of ATUOS payment**

There are two types of locations of embeded generators within the Ausgrid’s electricity network:

- Embeded Generators near Transmission Nodes supplied by TransGrid transmission. These transmission nodes are directly invoiced by TransGrid, so it is clearly appropriate to use the invoice’s relevant nodal price for each ATUOS calculation.
- Embeded Generators near Transmission Nodes supplied by Ausgrid’s transmission assets. These transmission nodes are not invoiced on a per unit basis by TransGrid – Ausgrid pays a set annual fee for these connections. Thus it is arguable that Ausgrid does not avoid Transmission expenses due to these assets and that Avoided TUOS is not required. However, paragraph 5.5j of the rules appears to apply, requiring an equivalent price to be applied in lieu of an actual price. Therefore, the relevant price used is the nearest nodal price published by TransGrid in their annual price list. (TransGrid nodal price list attached in this document).

<sup>1</sup> For a discussion on the definition of meter registers, see BSP documentation.

### ***Interaction with other Embedded Generators***

In some instances, there are multiple embedded generators feeding into a transmission node. For example, at Muswellbrook, Redbank, Glenbawn and Singleton Solar all operate. The ATUOS calculations for each site assume that all other embedded generators operate independently of the embedded generator of interest. The other embedded generators are implicitly included in the  $L_{\text{TransGrid}}$  figure by way of Kirchoff's Current Law.