31 January 2023

Attachment 8.9: Methodology for avoided TUOS

Ausgrid's 2024-29 Regulatory Proposal

Empowering communities for a resilient,

affordable and net-zero future.

Methodology for calculating Avoided TUOS payments

1   Background

Under the National Electricity Rules, Ausgrid is required to pay Avoided Transmission Use of System (ATUOS) to eligible Embedded Generators (EG) in Ausgrid's electricity distribution network.

ATUOS payments recognise that energy supplied to the DNSP by the embedded generator would have otherwise been supplied from the electricity transmission network. The National Electricity Rules require that the ATUOS payable to an eligible embedded generator is calculated 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.

2   Methodology for calculating ATUOS payment

Ausgrid's methodology for calculating ATUOS payments is based on the maximum demand KW charge applied to the maximum 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.

3   ATUOS calculation method – "with and without" method

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

where:

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

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

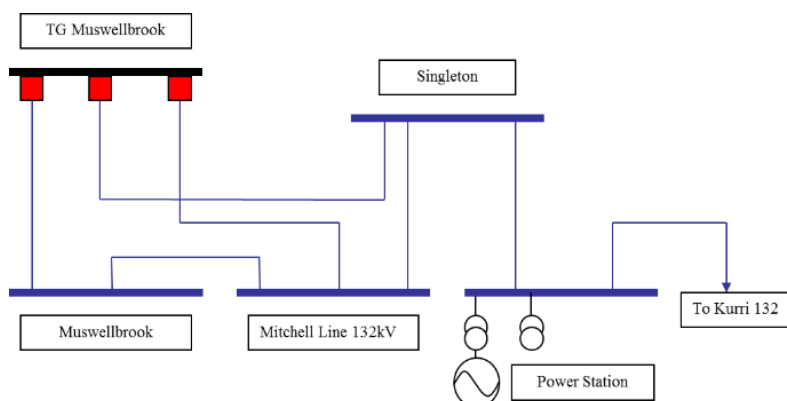*combining the above:*

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

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

Calculation example for Avoided TUOS

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

As outlined in section 5.5 (i) of the Rules, the ATUOS payments are calculated on a 'with and without' basis. For 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 Kirhcoff'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} = Billing of L_{With}

For 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 Musswellbrook 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.

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

The figure below shows the 'With' and 'Without' case half hourly load (selected days). For the 'With" case, demand charges for the actual Transgrid bill are based on the maximum demand visible on 22 December (3rd daily cycle shown). For the "Without" case, demand charges for a hypothetical Transgrid bill are based on the peak load visible on 21 December (2nd daily cycle shown).

Figure F.2. Load at Muswellbrook with and without generation from Power Station 1
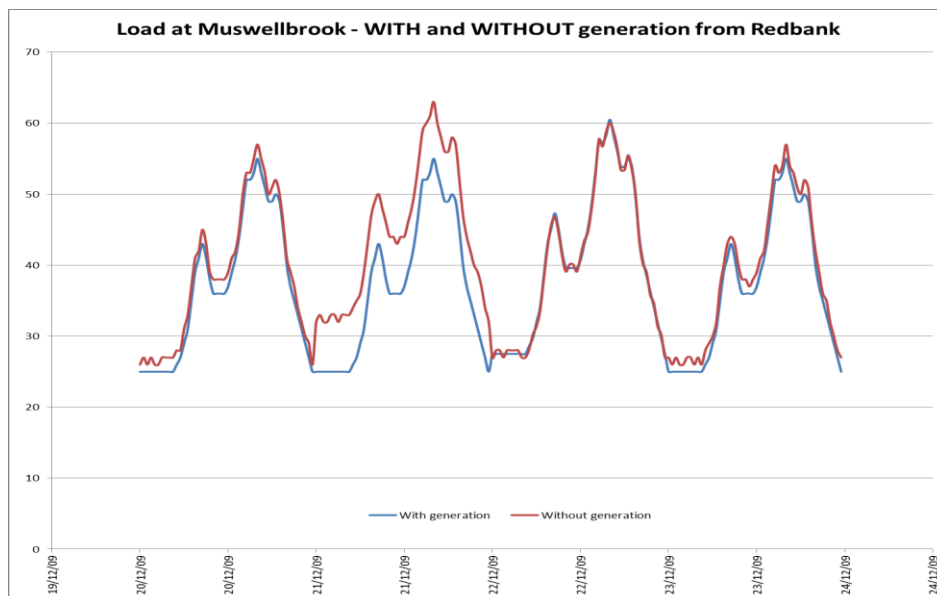
Determining the amount payable for avoided TUOS

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

ATUOS amount = $B_{Without} - B_{With}$

3 | Attachment 8.9: Methodology for calculating Avoided TUOS payments

4   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 register[1] 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 Transmission price for calculation of ATUOS payment

There are two types of locations of embedded generators within the Ausgrid's electricity network:

- Embedded generators near transmission connection points owned by Transgrid – Ausgrid in its capacity as a DNSP is directly invoiced by Transgrid for the use of these assets, so it is clearly appropriate to use the transmission charges at Transgrid owned transmission connection points for the purpose of calculating ATUOS payments for a specific embedded generator.

- Embedded generators near dual-function connection points owned by Ausgrid – Ausgrid in its capacity as a DNSP is not invoiced by Transgrid for the provision of these services. Ausgrid earns its annual revenue allowance for its dual-function assets via the setting of designated pricing proposal charges in its capacity as a DNSP. It is for this reason that Ausgrid's methodology for the calculation of ATUOS is based on the transmission charges at the Transgrid-owned transmission connection point (as opposed to the Ausgrid-owned transmission connection point) nearest to the embedded generator.

5   Interaction with other embedded generators

In some instances, there are multiple embedded generators feeding into a transmission node. 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 $L_{Transgrid}$ figure by way of Kirchoff's Current Law.

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[1] AEMO National Metering Identifier Procedure August 2009, p.49.