

Transmission Losses

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If you have any questions, please contact us using the details below.

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What are network losses?

When electrical currents travel on a network, some energy is dissipated in the form of heat, and is “lost” due to the electrical resistance in the network. This energy is known as network losses.

The transmission network is the high voltage network which carries electricity from generation to the distribution network, or to large electrical users which are directly connected to the transmission network. The places where the transmission and distribution networks connect are called grid supply points.

Distribution losses happen between a grid supply point¹ (GSP) and a household.

Please note this guidance document is about transmission losses, but we have included links to information on distribution losses at the end.

Why do losses matter when we charge and bill for transmission system usage?

Our charges are based on the amount of volume that users put on or take off the system, so we need to ensure that we adjust the way we calculate charges to account for any network losses.

Balancing Services Use of System (BSUoS) charges recover the System Operator’s costs of operating the transmission system (we ensure that electricity is balanced on the system).

In the calculation of BSUoS charges, transmission losses are allocated by scaling up or down (depending on whether the user offtakes or generates electricity) the metered MWh volume of each BSUoS user. These scaling factors are called Transmission Loss Multipliers (TLMs), and are produced by Elexon. Using these TLMs, transmission users’ metered MWh volumes are converted into adjusted BMU MWh volumes. National Grid ESO then uses the adjusted BMU values in BSUoS charging calculations.

Transmission Network Use of System (TNUoS) charges recover the allowed revenues of the Transmission Owners (they own and maintain all the assets on the system).

In the calculation of TNUoS charges, metered volumes are not scaled up or down by the TLM.

How are users affected by transmission losses?

Due to network losses, generators must produce more energy to ensure that demand users receive all the energy they need. Rules are in place to make sure that the cost of transmission losses is recovered from all transmission network users in their transmission network charges.

How are losses accounted for on the transmission network?

When calculating how much volume generators or suppliers put on or take off the transmission system, we need to consider overall transmission system losses. Transmission Loss Multipliers help us calculate the adjustment we need to make.

The TLM calculation uses a parameter called the Generation/Demand (G/D) split. This divides transmission losses between generators and demand users.

The Current G/D Split

45% of the losses are *deducted* from the metered volumes of generators, and the remaining 55% of the losses are *added* to the metered volumes of demand users.

¹ Grid supply points are the points on the transmission network that a distribution network owner (DNO) takes electricity off the network to supply to its customers.

Further details on the calculation of the TLM can be found detailed in the Balancing and Settlement Code, T2.

Elexon calculates TLMs on a zonal basis. You can find more information on TLMs on Elexon's webpage: <https://www.elexon.co.uk/operations-settlement/losses/>

Transmission Losses vs Distribution Losses

On the Transmission network, the percentage of network losses is lower than on the distribution network. Citizens Advice suggests that about 1.7% of the electricity transferred over the transmission network is lost, and a further 5-8% is lost over the distribution networks².

This is because transporting electricity via a lower current and high voltage causes lower network losses. The transmission network operates at ultra-high voltages to transfer bulk energy across long distances –which minimises losses. However, higher voltages require better electrical insulation which makes the cost of building and maintaining the transmission network more expensive.

What are the voltages on the networks?

In Great Britain, the transmission network operates at 275kV and 400kV, and in Scotland it also operates at 132kV. Distribution networks operate at 132kV and below.

How to adjust your BSUoS volumes for transmission losses

For each BMU (Balancing Mechanism Unit), its half-hourly metered volume is adjusted for transmission losses, before the BSUoS charge is calculated. The adjustment is done using the TLM factor. TLMs are zone specific, and there are 14 geographic zones (corresponding to the DNO zones). TLMs vary at different times of year due to different flows and the weather.

Post-Adjusted BMU value = Pre-Adjusted BMU value × TLM (with zone specific losses applied)

A set of Transmission Loss Factors (TLFs) are used in conjunction with the G/D split, to calculate TLMs. TLFs allow for the allocation of different transmission losses depending on the geographical location of the BM Unit, and the values of TLFs can be either positive or negative. TLFs are also seasonal to account for different flow patterns.

² <https://publications.parliament.uk/pa/cm201415/cmselect/cmenergy/386/38607.html>

Worked examples

The following formula can be used to calculate the indicative BSUoS charge for a generation or demand unit:

$$\text{BSUoS Charge} = \text{BSUoS Tariff} \times (\text{Metered Volume} \times \text{TLM})$$

Example 1:

A generator in Northern Scotland (zone 14) wants to work out their BSUoS charge for a settlement period in the summer. Table 1 gives the parameters below

Table 1-

Parameter	BSUoS Tariff	Metered Volume	G/D split	TLF (zone 14, Summer)	Average Transmission Loss %)
Value	£2/MWh	100MWh	45%	-0.01471	2%

BSUoS charge

$$= \text{BSUoS Tariff} \times (\text{Metered Volume} \times \text{TLM})$$

$$= \text{BSUoS Tariff} \times \text{Metered Volume} \times (1 + \text{TLF} + \text{Gen Loss Adjustment})$$

$$= 2 \times 100 \times [1 + (-0.01471) + (-1 \times 2\% \times 45\%)]$$

$$= 2 \times 100 \times 0.97629$$

$$= \text{£}195.26$$

Example 2:

A demand source in the same zone (zone 14) wants to work out their BSUoS charge for the same settlement period. Using the parameters in Table 1, the calculation is given below

BSUoS charge

$$= \text{BSUoS Tariff} \times (\text{Metered Volume} \times \text{TLM})$$

$$= \text{BSUoS Tariff} \times \text{Metered Volume} \times (1 + \text{TLF} + \text{Demand Loss Adjustment})$$

$$= 2 \times 100 \times [1 + (-0.01471) + 1 \times 2\% \times (1-45\%)]$$

$$= 2 \times 100 \times 1.02571$$

$$= \text{£}205.14$$

How are losses accounted for on the distribution network?

Distribution losses happen between a grid supply point³ (GSP) and a household. They're accounted for by Line Loss Factors (LLFs), which are multipliers and are used to scale energy consumed or generated to account for losses on the UK's Distribution Networks.

Elexon calculates LLFs on a zonal basis. You can find more information on distribution losses and LLFs on Elexon's webpage:

<https://www.elexon.co.uk/operations-settlement/losses/>

Where can I find further information?

For the full calculation that determines transmission loss allocation, please read BSC Section T2. A link to the BSC document on Elexon's website is here:

<https://www.elexon.co.uk/bsc-and-codes/balancing-settlement-code/>.

For distribution losses and LLFs, please see Elexon's webpage below. LLFs are only applicable to distribution losses.

<https://www.elexon.co.uk/operations-settlement/losses/>

Elexon have published a guidance paper on transmission loss allocation:

<https://www.elexon.co.uk/documents/training-guidance/bsc-guidance-notes/transmission-losses-2/>

Contact us

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³ Grid supply points are the points on the transmission network that a distribution network owner (DNO) takes electricity off the network to supply to its customers.

Disclaimer

In the event of any inconsistencies between this guidance note and the CUSC, the Statement of the Use of System Charging Methodology or the BSC, then the CUSC, the Statement of the Use of System Charging Methodology or the BSC will take precedence.

The CUSC and the Statement of the Use of System Charging Methodology can be downloaded from the National Grid ESO website.

For more information please contact the TNUoS team at TNUoS.Queries@nationalgrid.com or call 01926 654633.