Embedded Generation and Transmission Charging Benefits

Information I **National Grid**   Last Updated 02/16

Charges to Transmission Users

Transmission Network Use of System (TNUoS) charges are levied on all licensable generators. Embedded generators are those generators which are connected to; and therefore export their power onto; distribution networks. Some embedded generators are licence exempt because they have capacity less than 100MW. TNUoS is also charged to suppliers of both half-hourly and non-half hourly demand.

These charges are set to recover the allowed revenues of the Transmission Owners (TOs). Other transmission charges include Balancing Services Use of System (BSUoS) charges which factors in Transmission Losses and recover the costs of operating the Transmission System.

In comparison with Transmission connected generators the TNUoS benefits available to embedded generation arise due to:

- The ability of a supplier to net off the embedded generation as negative demand against its actual demand for the purposes of TNUoS charges.

- The avoidance of the generation TNUoS charges by the embedded generator.

TNUoS Charges

1) Netting off of demand:

Suppliers are charged demand TNUoS on the basis of their net demand, i.e. their flow of electricity at the point it leaves the Transmission system and enters the Distribution Network. An embedded generator who generates directly onto the Distribution Network will counter some of the demand in that network, which reduces the TNUoS charges. Therefore embedded generation has a value to Suppliers equal to the saving they realise in Demand TNUoS charges. This value forms the first part of the embedded benefit arising from transmission charges:
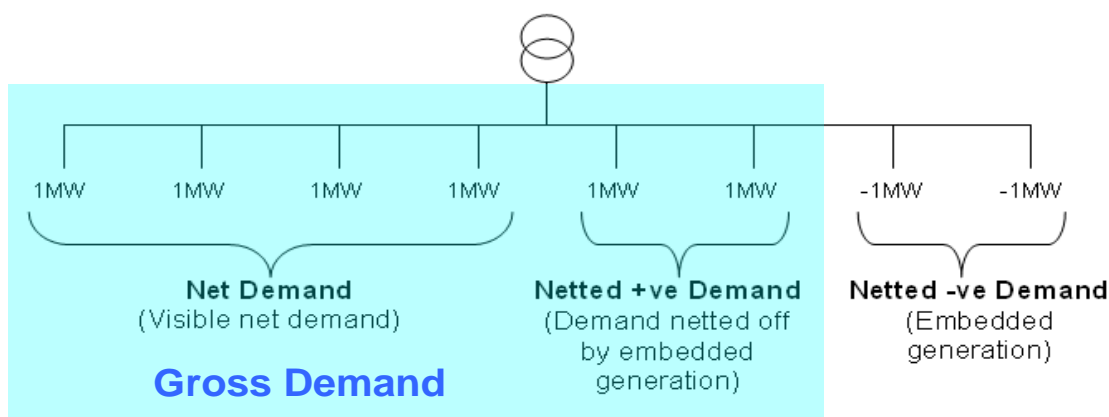
In the above example a Grid Supply Point has 6MW of gross demand, 2MW of which is netted off by embedded generation (negative demand), leaving suppliers charged TNUoS on 4MW of net demand.

2) Avoiding Generation TNUoS

Embedded generators which have a capacity lower than 100 MW do not pay generation TNUoS charges. The value of the avoided generation TNUoS is the second part of the embedded benefit. Therefore embedded generators benefit twice, both by netting off a supplier's demand and avoiding TNUoS directly.

The TNUoS charges are composed of two elements:

- A locational element reflecting the cost of the wider transmission system
- A residual element added to the tariff to ensure correct revenue recovery from generation and demand users.

At a high level the locational elements for generation and demand users can be consider equal and opposite. Similarly the embedded benefit can be considered to provide the inverse signal to a demand TNUoS charge. For example, where demand charges are highest, such as the South-East, an embedded generator should receive the largest signal due to avoided demand TNUoS charges.

Therefore the locational element of the TNUoS charges is justifiably netted off from Demand TNUoS, and justifiably avoided from Generation TNUoS.

So in comparison with Transmission connected generators the TNUoS benefits available to embedded generation can be considered as:

- The value of the ability of a supplier to net off the negative demand against its actual demand for the purposes of TNUoS charges can be considered to be equal to the demand residual of TNUoS.

- The value of the non-payment of the generation residual element of TNUoS charges by the embedded generator can be considered to be equal to the generation residual element of TNUoS.

BSUoS Charges

Through the current Balancing and Settlement Code (BSC) arrangements, embedded generation can sell their energy into a national energy account and have access to the GB-wide market. As both the embedded generator and the associated Supplier avoid BSUoS charges, the embedded BSUoS benefit is twice the BSUoS charge. As well as avoiding paying BSUoS, embedded generation are able to receive it either directly or through a supplier in the same manner as with the TNUoS benefit.

How this benefit is captured depends on the embedded generator's setup under the Balancing and Settlement Code (BSC) and their contractual relationship with National Grid and / or Supplier. The embedded generator can negotiate with the supplier to receive a proportion of this saving; the proportion of benefit shared would be commercially confidential. Embedded generators who contract directly with National Grid and set themselves up in the BSC as lead party for their output will receive the BSUoS directly.

BSUoS charges are charged on a £/MWh basis for each settlement period and apply to both generation and demand users.

Transmission Losses Charges

Arguably embedded generators, by virtue of being notionally located closer to where electricity is consumed, reduce the losses inherent in transmitting electricity across the transmission network. However this needs to be considered in the context of all other generation within GB. Additional generation, unless precisely and continuously matched with a local demand, will impact on the wider transmission network and other generation. In locations with an excess of overall generation at any voltage level, it will contribute to an overall increase in transmission losses.

The cost of losses is recovered through adjustments to the energy that users deliver or take from the market. As the BSC party responsible for a suppliers energy account can net embedded generation off their demand requirement, embedded generation essentially reduces a supplier's liability to pay for transmission losses. Again with the other benefits the total benefit is twice the absolute charge. The Competition Markets Authority has directed that these losses be calculated on a locational basis moving forward therefore giving the correct signal to generators and demand of all types of the inherent energy value in their location.

For more detail on determining an embedded generator's class of exemption, classification of size and registration of BM Units under the BSC see Elexon 's Guide to Embedded Generation.