



Embedded Generation

This document provides:

- a description of the various categories of embedded generators
- an outline of the types of bilateral agreements that owners/lead Parties of embedded generators could enter into with NETSO
- an explanation of the benefits that may be available to embedded generators or lead Parties
- a guide on the BSC requirements that may apply to embedded generators or lead Parties

This document is aimed at:

- owners of embedded generation plants who intend to register Embedded BM Units;
- Suppliers who intend to register Embedded BM Units in Supplier Volume Allocation; and
- BSC Trading Parties who intend to register Embedded BM Units

What readers need to be aware of:

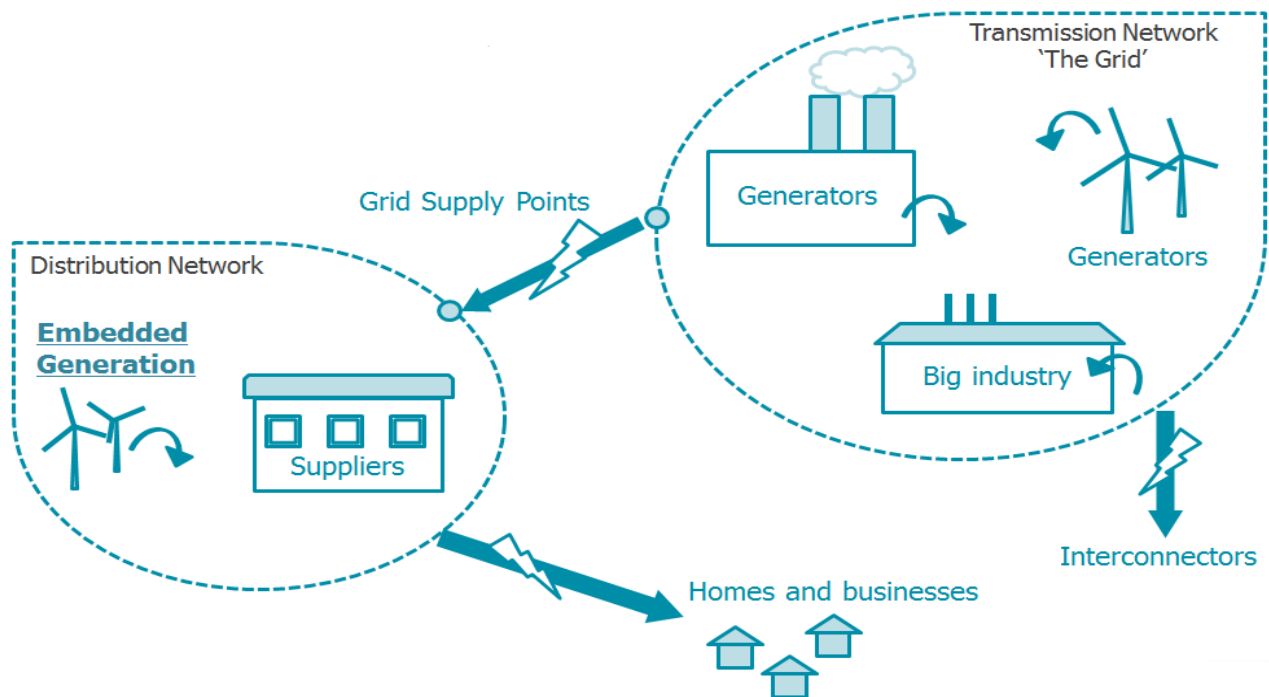
This document assumes some basic BSC knowledge such as what Balancing Mechanism Units (BM Units) and Grid Supply Point (GSP) Groups are, as well as the principles of the Supplier Volume Allocation (SVA) and Central Volume Allocation (CVA) arrangements. It also assumes some knowledge beyond the scope of the BSC, such as what Transmission Network Use of System (TNUoS) and Balancing System Use of System (BSUoS) charges are, and how these charges are derived.

Note that any content discussed, in respect of the types of bilateral agreements and benefits available to embedded generators, is beyond the scope of the BSC. It reflects ELEXON's understanding of their relevance to embedded generators, however, readers are advised to contact NETSO if further details are required on these areas.

WHAT IS EMBEDDED GENERATION?

Embedded generation is the production of electricity from power stations that are directly connected to a Distribution Network. The Distribution Network carries electricity from the Transmission Network and embedded generators to homes and businesses.

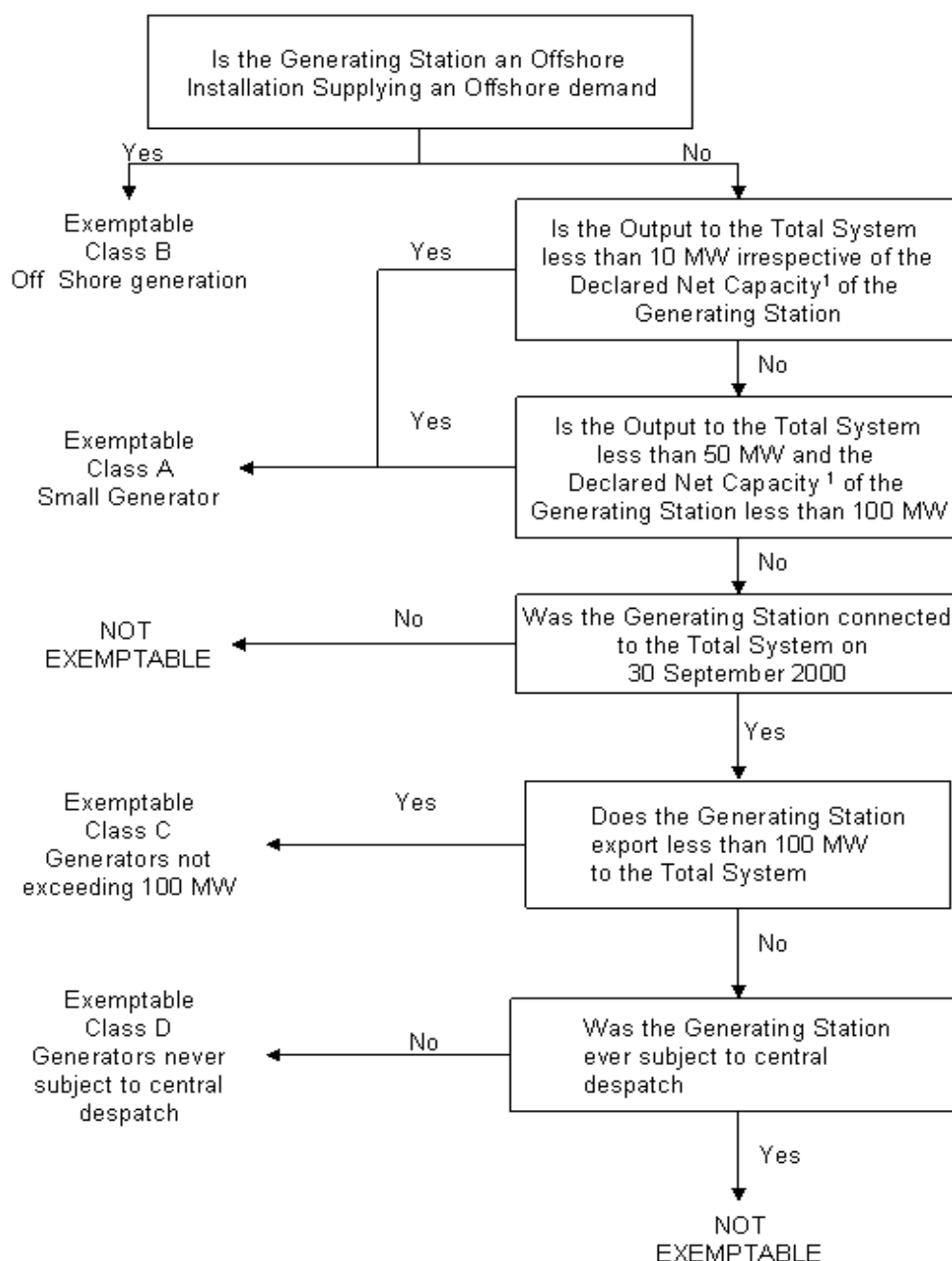
Figure 1. The GB electricity network



WHAT IS EXEMPTIBLE GENERATION?

All power stations, including embedded generators, normally require a Generation Licence before they are allowed to produce and sell electricity on the wholesale market. However, they may, upon meeting certain criteria, qualify for a Class Exemption. This removes the requirement to hold a licence. The following diagram outlines the different Classes of Exemption for which a power station may be eligible. It also describes the criteria that would be taken into consideration when determining the Class of Exemption that is applicable to the power station.

Figure 2. Process of determining if a Power Station is Exemptible



¹ The Declared Net Capacity of a Generating Station is the output of the Generating Station multiplied by the relevant following constant:

- | | |
|---|------|
| 1. Station driven by tidal or wave power..... | 0.33 |
| 2. Station driven by wind power..... | 0.43 |
| 3. Station driven by solar power..... | 0.17 |
| 4. All others..... | 1.0 |

Exemptions granted under Class C and Class D only apply to power stations that were connected to the transmission system and the distribution systems in England and Wales on 30th September 2000.

Power stations that are not exemptible under any of the above Exemption Classes, however, may be able to apply to receive individual exemption from the Secretary of State. Further information on exemptions is available from the DECC Website: <https://www.gov.uk/electricity-licence-exemptions>.

WHAT ARE THE DIFFERENT CATEGORIES OF GENERATION PLANT

Embedded generators can be categorised into three different sizes: **Small**, **Medium** and **Large**. However, if they are exempted from having a Generation Licence, the categorisation would instead be referred to as: **Embedded Exemptible Small Power Station (EESPS)**, **Embedded Exemptible Medium Power Station (EEMPS)** and **Embedded Exemptible Large Power Station (EELPS)**.

The category to which an embedded generator belongs is determined by: 1.) its output and 2.) the networks to which it is linked. For instance, an embedded generator that produces between 50MW to 99MW of electricity is categorised as **Large** (or **EELPS** if exemptible) if the Distribution Network it is connected to is linked to the Scottish Power Transmission Network. However, the same generator would be categorised as **Medium** (or **EEMPS** if exemptible) if the Distribution Network is linked to the NGC Transmission Network. The table below summarises the various categories.

Figure 3. GB Grid Code Power Station Sizes

Station Output (MW)	Licence Status	NGC Transmission Network	Scottish Power Transmission Network	Scottish Hydro Electric Transmission Network
0 ≤ Output < 10	Non-Exemptible	Small	Small	Small
	Exemptible	EESPS	EESPS	EESPS
10 ≤ Output < 30	Non-Exemptible	Small	Small	Large
	Exemptible	EESPS	EESPS	EELPS
30 ≤ Output < 50	Non-Exemptible	Small	Large	Large
	Exemptible	EESPS	EELPS	EELPS
50 ≤ Output < 100	Non-Exemptible	Medium	Large	Large
	Exemptible	EEMPS	EELPS	EELPS
100MW and over	Non-Exemptible	Large	Large	Large

BILATERAL AGREEMENTS THE SYSTEM

Once signed up to the Connection and Use of System Code (CUSC), a user will have to enter into a bilateral agreement with the NETSO. There are three types of bilateral agreement that are Bilateral Connection Agreement (BCA), Bilateral Embedded Generation Agreement (BEGA) and Bilateral Embedded Licence Exemptible Large Power Station Agreement (BELLA):

- The owner/operator of a Licensable Power Station or an Exemptible Power Station directly connected to the Transmission System must enter into a BCA with the NETSO.
- The owner/operator of an Exemptible Embedded Power Station other than an EELPS must enter into a BEGA with the NETSO.
- The owner/operator of an Embedded Exemptible Large Power Station (EELPS) has the choice to enter into either a BEGA or a BELLA with the NETSO except where that EELPS is embedded in part of a Distribution system which is not directly or indirectly connected to the GB Transmission System.

HOW ARE EMBEDDED GENERATORS REGISTERED UNDER THE BSC?

There are two different types of bilateral connection agreements available to generators wishing to connect to the distribution network:

- BEGA

This agreement type is available to embedded generators that require access to the Transmission Network. Although the generator is embedded, its size requires the NETSO to know about it as it may have an impact on the Transmission Network. A BEGA will provide a generator with a Transmission Entry Capacity (TEC), maximum capacity it is allowed to export into the Transmission Network, and give it rights to operate in the energy balancing market. Therefore, a generator with a BEGA must be a signatory of the BSC, the CUSC and the Grid Code. Where the owner/operator of an EELPS has entered into a BEGA with the NETSO they can register the Metering System themselves, or appoint another BSC Trading Party to register the Metering System. Under the BSC this would then be treated as a stand-alone Exempt Export Balancing Mechanism (BM) Unit for the Plant and Apparatus associated with the Power Station within Central Volume Allocation (CVA).

- BELLA

This agreement is available to generators that are considered as 'Large' and smaller than 100MW (EELPS), which makes it only applicable in Scotland, as it is only considered as 'Medium' in England and Wales (see Figure 3). Where the owner/operator of an EELPS has entered into a BELLA, they must appoint a Supplier or BSC Trading Party to be responsible for the output of the EELPS. **This Supplier or BSC Trading Party must also be a signatory to the CUSC.** The owner/operator of an EELPS cannot be responsible for the output of the power station under the terms of a BELLA.

Generally:

- Where a **Supplier** has been appointed to register the EELPS, they must register the Metering System associated with the EELPS in the Supplier Volume Allocation (SVA) System. The Supplier does not have to register a stand-alone Exempt Export BM Unit.
- Where a **BSC Trading Party** has been appointed to register the EELPS, they must register the Metering System associated with the EELPS in the Central Volume Allocation (CVA) System.

Embedded Exemptible Medium Power Stations (EEMPS) and Embedded Exemptible Small Power Stations (EESPS) would not normally be expected to enter into an agreement with the NETSO under the CUSC and would normally appoint another BSC Party to be responsible for their output. However,

if they want to realise embedded benefits in their own right, they must enter into a BEGA with the NETSO, be a signatory to the BSC and register an Exempt Export BM Unit in CVA. Costs associated with becoming a BSC Party and registering BM Units are detailed on our website under [BSC Costs & Charges](#).

WHAT ARE THE EMBEDDED BENEFITS?

The main embedded benefits are available under other industry arrangements e.g. Transmission System Use of System (TNUoS) charges, however, the ability to secure these benefits depends on a combination of the CUSC arrangements and the trading options adopted by the Embedded Exemptible Generator under the BSC.

1. Power Stations with a BCA or Licensable Embedded Power Stations

Power Stations that have a BCA with the Transmission System and Licensable Embedded Power Stations receive no embedded benefits.

2. Transmission Network Use of System (TNUoS) Charges

2.1 – Generation Charges

EELPS, EEMPS & EESPS are not liable for Generation TNUoS charges.

2.2 – Demand Charges

EELPS:

BEGA: If the average Half-Hourly metered volume of the Exempt Export BM Unit associated with the EELPS over the Triad results in an export, the EELPS or the Lead Party responsible for the Export Exempt BM Unit will be paid the amount of the relevant kW tariff multiplied by the average export of the Exempt Export BM Unit (**embedded benefit**). However, if the average Half-Hourly metered volume of the Exempt Export BM Unit over the Triad results in an import, the EELPS or the Lead Party responsible for the Exempt Export BM Unit will be charged the amount of the relevant kW tariff multiplied by this average import.

It should be noted that, if the BSC Trading Party is not a signatory to the CUSC, the EELPS will be liable for TNUoS payment/charges.

BELLA: It is a condition of a BELLA that a Supplier must register the EELPS in SVA or a BSC Trading Party, who must also be a CUSC signatory, registers the EELPS in CVA.

- If a **Supplier** registers the EELPS in SVA, it is likely that the Supplier will include the EELPS in its own Supplier Base BM Unit. The output of the EELPS will be included in the Supplier's Base BM Unit volume as a negative demand thus reducing the overall value of the demand and consequently the amount of TNUoS Demand Charges (Triad charges) for which the Supplier is liable (**embedded benefit**).
- If a **BSC Trading Party** registers the EELPS, it must register an Exempt Export BM Unit for the EELPS in CVA. If the average Half-Hourly metered volume of the Exempt Export BM Unit over the Triad results in an export, the BSC Party will be paid the amount of the relevant kW tariff multiplied by the average export of the Exempt Export BM Unit (**embedded benefit**). However, if the average Half-Hourly metered volume of the Exempt Export BM Unit over the Triad results in an import, the BSC Party will be charged the amount of the relevant kW tariff multiplied by this average import.

EEMPS and EESPS:

- If a **Supplier** takes responsibility for the output of an EEMPS or an EESPS:

It is likely that the Supplier will register the Power Station in SVA and will include it in its Supplier Base BM Unit. In this scenario, the TNUoS Demand Charges are realised by the Supplier. The output of the Power Station will be included in the Supplier's BM Unit volume as a negative demand, reducing the overall value of the demand and consequently the amount of TNUoS Demand Charges (Triad charges) for which the Supplier is liable (**embedded benefit**).

- If a **BSC Trading Party** takes responsibility for the output of an EEMPS or an EESPS and wants to realise TNUoS embedded benefits:

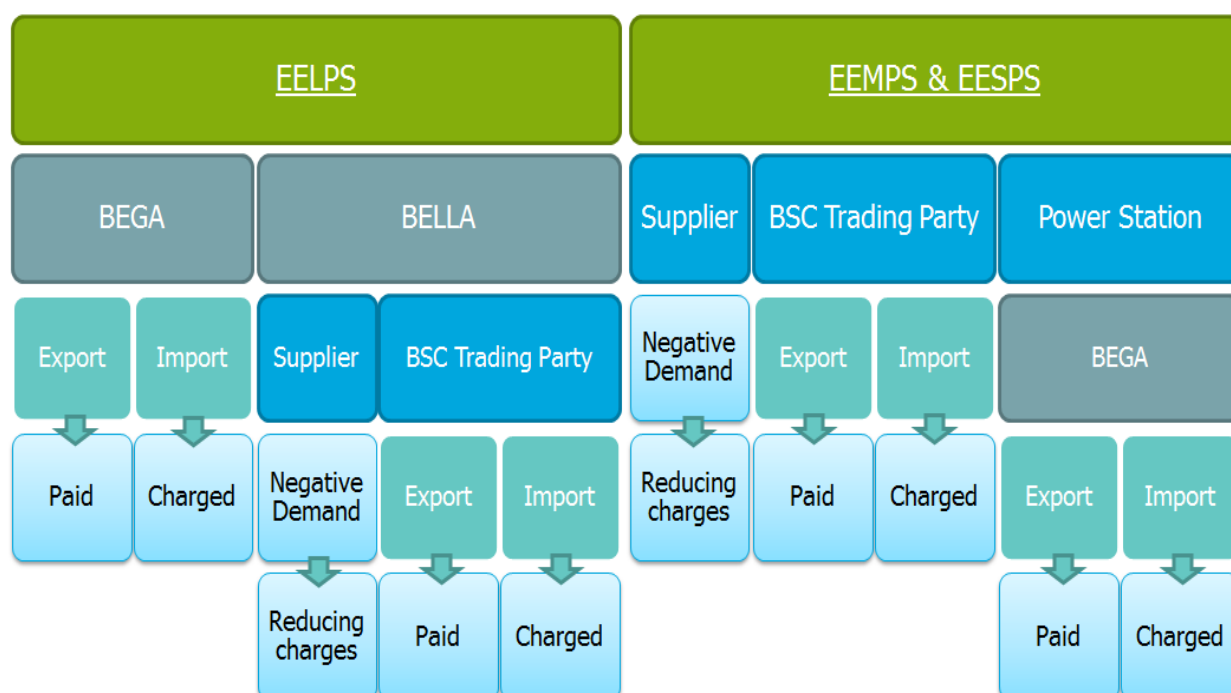
It must register an Exempt Export BM Unit in CVA and be a signatory to the CUSC. If the average Half-Hourly metered volume of the Exempt Export BM Unit over the Triad results in an export, the Trading Party will be paid the amount of the relevant kW tariff multiplied by this average export (**embedded benefit**). However, if the average half hourly metered volume of the Exempt Export BM Unit over the Triad results in an import, the Trading Party will be charged the amount of the relevant kW tariff multiplied by the average import of the Exempt Export BM Unit.

- If an **EEMPS or EESPS** wishes to take responsibility for its own output and realise TNUoS embedded benefits:

It must register an Exempt Export BM Unit in CVA and enter into a BEGA with the NETSO. If the average half hourly metered volume of the Exempt Export BM Unit over the Triad results in an export, the EEMPS or EESPS will be paid the amount of the relevant kW tariff multiplied by the average export of the Exempt Export BM Unit (**embedded benefit**). However, if the average half hourly metered volume of the Exempt Export BM Unit over the Triad results in an import, the Power Station will be charged the amount of the relevant kW tariff multiplied by the average import of the Exempt Export BM Unit.

Figure 4. illustrates how the Half-Hourly metered volume over the Triad results in Embedded Benefits being charged or paid to the Party that takes responsibility for the output.

Figure 4. TNUoS charges Embedded Benefits allocation



3. BALANCING SERVICES USE OF SYSTEM (BSUOS) CHARGES

EELPS:

BEGA: The Balancing Services Use of System Charging Methodology states that BM Units that are registered in Trading Units will be charged on a net Trading Unit basis i.e. if a BM Unit is delivering (exporting) and is within a Trading Unit that is off-taking (importing), the BM Unit in essence would be paid the BSUoS charges. Since, by default, all EELPSs are associated with a GSP Group Base Trading Unit and all GSP Group Base Trading Units are generally off-taking, then the EELPS or the Lead Party responsible for an Exempt Export BM Unit that is generating during a Settlement Period will be paid the BSUoS charge (**embedded benefit**) for that Settlement Period. However, the EELPS or the Lead Party responsible for an Exempt Export BM Unit that is importing during a Settlement Period will be liable for a BSUoS charge for that Settlement Period.

It should be noted that, if the BSC Trading Party is not a signatory to the CUSC, the owner/operator of the EELPS will be liable for BSUoS payment/charges.

BELLA: Benefits affecting BSUoS Charges for EELPS with a BELLA are calculated similarly to TNUoS Charges. Hence, as stated above, it is a condition of a BELLA that a Supplier must register the EELPS in SVA or a BSC Trading Party must register the EELPS in CVA.

- If a **Supplier** registers the EELPS, it is likely that the Supplier will include the EELPS in its Supplier Base BM Unit. The output of the EELPS will be included in the Supplier's BM Unit volume as a negative demand thus reducing the overall value of the demand and consequently the amount of BSUoS charges for which the Supplier is liable (**embedded benefit**).
- If a **BSC Trading Party** registers the EELPS, then the Trading Party must register an Exempt Export BM Unit for the EELPS in CVA. Even though the Export Exempt BM Unit is registered in CVA, by default the Export Exempt BM Unit is associated with the relevant GSP Group Base Trading Unit and since all GSP Group Base Trading Units are generally off-taking, if the EELPS is generating during a Settlement Period, the Trading Party will be paid the BSUoS charge (**embedded benefit**) for that Settlement period. However, the Trading Party will be liable for a BSUoS charge for any EELPS which is importing during a Settlement Period.

EEMPS & EESPS:

- If a **Supplier** takes responsibility for the output of an EEMPS or EESPS:

It is likely that the Supplier will register the EEMPS or EESPS in SVA and will include it in its Supplier Base BM Unit. The output of the EEMPS or EESPS will be included in the Supplier BM Unit volume as a negative demand thus reducing the overall value of the demand and consequently the amount of BSUoS charges for which the Supplier is liable (**embedded benefit**).

- If a **BSC Trading Party** takes responsibility for the output of an EEMPS or EESPS and wants to realise BSUoS embedded benefits:

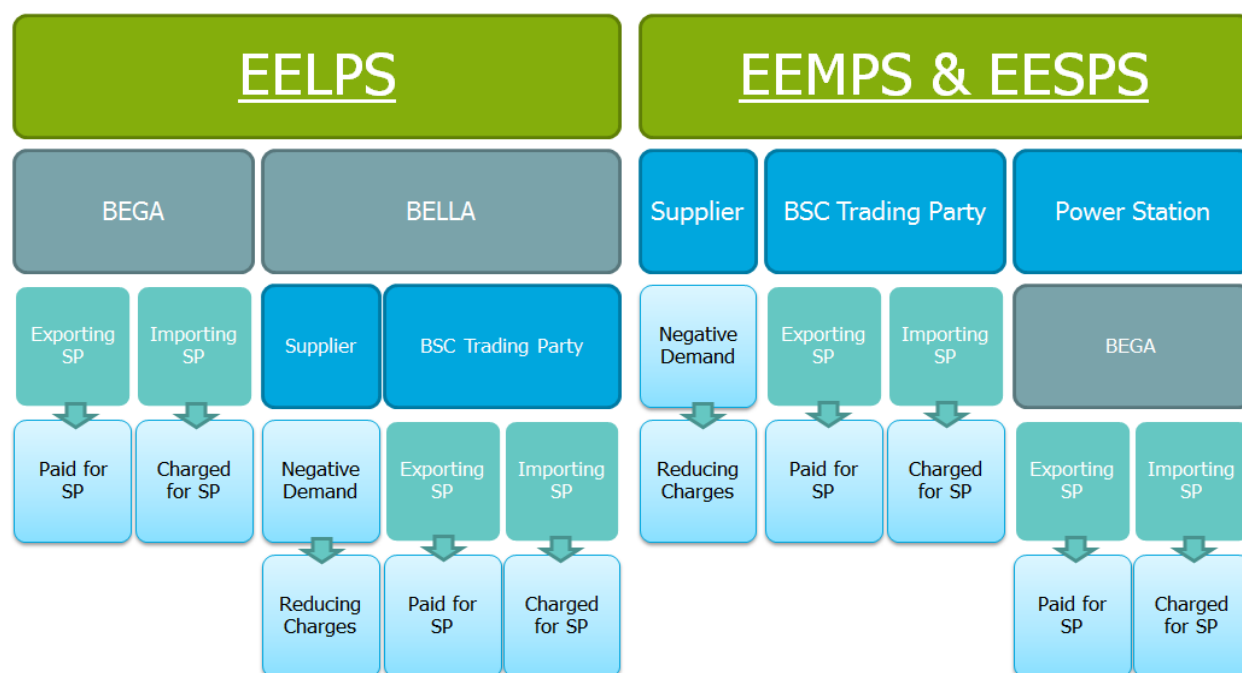
It must register an Exempt Export BM Unit in CVA and be a signatory to the CUSC. The Export Exempt BM Unit associated with the EEMPS or EESPS is registered into CVA and can be associated with the relevant GSP Group Base Trading Unit. Because those are off-taking by default, the EEMPS or EESPS will be paid the BSUoS charges if it is generating during a Settlement Period (**embedded benefit**). However, the EEMPS or EESPS will be liable for a BSUoS charge for any Export Exempt BM Unit which is importing during a Settlement Period.

- If an **EEMPS or EESPS** wishes to take responsibility for its own output and realise BSUoS embedded benefits:

It must register an Exempt Export BM Unit in CVA and enter into a BEGA with the NETSO. The Export Exempt BM Unit associated with the EEMPS or EESPS is registered into CVA and can be associated with the relevant GSP Group Base Trading Unit. Because those are off-taking by default, the EEMPS or EESPS will be paid the BSUoS charges if it is generating during a Settlement Period (**embedded benefit**). However, the EEMPS or EESPS will be liable for a BSUoS charge for any Export Exempt BM Unit which is importing during a Settlement Period.

Figure 5. illustrates how BSUoS charges are paid or charged to Power Stations that are included in an exporting or importing Trading Unit for each Settlement Period.

Figure 5. BSUoS charges Embedded Benefits allocation



4. TRANSMISSION LOSSES

The BSC determines two distinct Transmission Loss Multipliers (TLMs) for each Settlement Period. One of these multipliers is generally **less than 1** and is applied to BM Unit Metered Volumes associated with **delivering** Trading Units. The other is generally **greater than 1** and is applied to BM Unit Metered Volumes associated with **off-taking** Trading Units.

- However, these factors do not always apply directly to embedded generation plants the same way. CVA registered Exempt Export BM Units automatically belong to the GSP Group Base Trading Unit unless the Lead Party elects otherwise. A Supplier Base Trading Unit also contains all Supplier BM Units for that GSP Group. Where the GSP Group Base Trading Unit is off-taking, the Metered Volume of the Power Station's Exempt Export BM Unit will be multiplied by a TLM greater than 1, resulting in an increase in its Credited Energy. In effect, the Power Station or the Lead Party responsible for the Exempt Export BM Unit will be credited with the losses it is deemed to have saved by not transporting required energy through the Transmission Network and will be treated accordingly in the settlement process (**embedded benefit**).

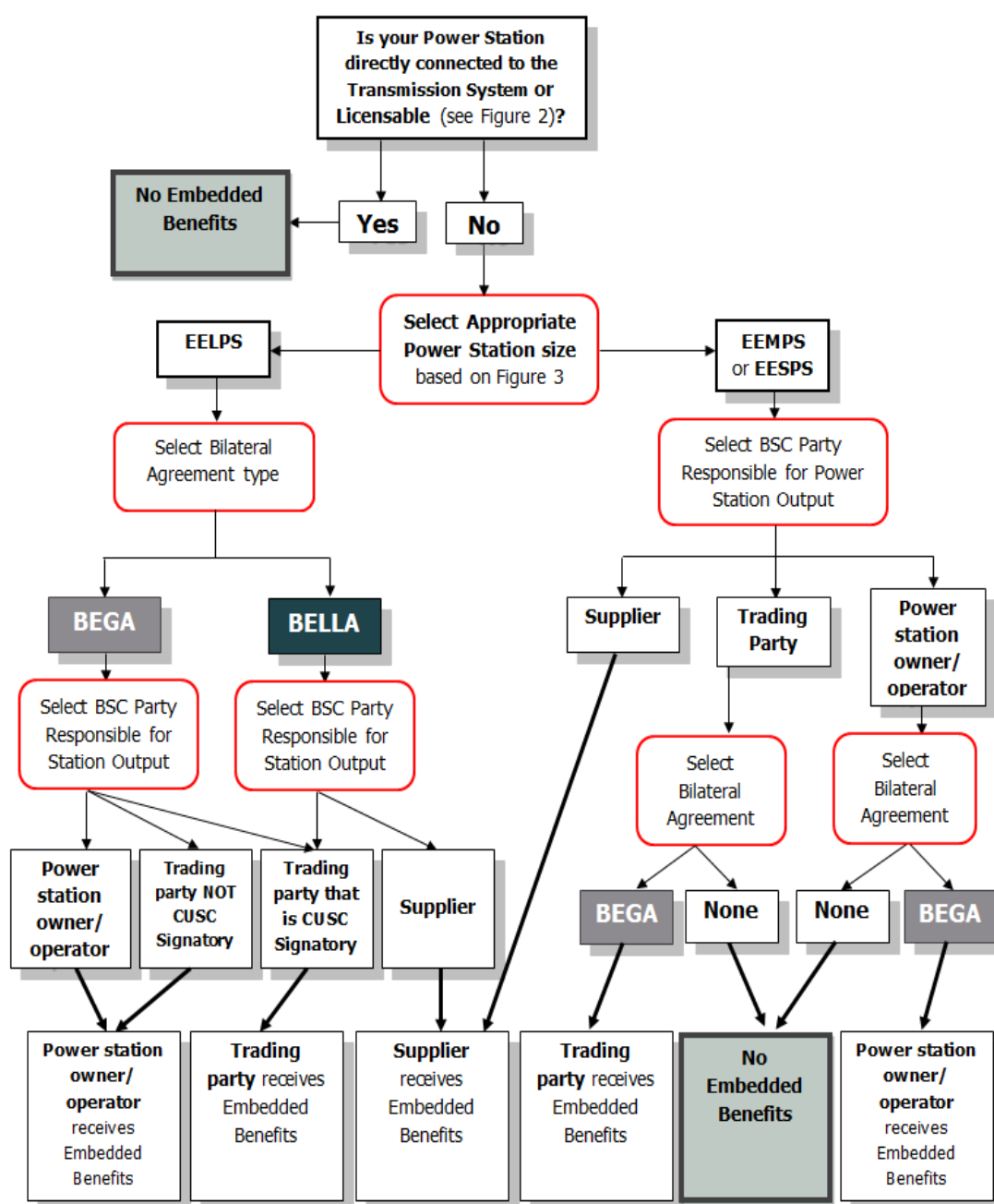
It should be noted that this benefit is realised by the BSC Party who is responsible for the Energy Account to which the Metered Volume of the Exempt Export BM Unit is allocated.

- SVA registered Exempt Export sites will be settled through a Supplier's Base BM Unit which is registered in the GSP Group Base Trading Unit. Where the GSP Group Base Trading Unit is off-taking, the Metered Volume of the Supplier's Base BM Unit will be multiplied by a TLM greater than 1. If the GSP Group Base BM Unit contains a net export, this will increase its Credited Energy and the Supplier will be credited with the losses it is deemed to have saved and will be treated accordingly in the settlement process (**embedded benefit**). If the Supplier has a net import the Exempt Export will have netted off from the Supplier's demand and the Supplier will only have Transmission Losses applied to this net position (**embedded benefit**).

HOW ARE EMBEDDED BENEFITS ALLOCATED?

Figure 6. describes the determination process to apply when registering a Power Station to find out who is going to receive the embedded benefits when appropriate.

Figure 6. Process to Determine TNUoS Demand and BSUoS Embedded Benefits



WHAT ARE THE BSC REGISTRATION REQUIREMENTS?

If the owner of an embedded generator is responsible for their own output

The owner of an embedded generator can trade directly in the Balancing Mechanism (BM). The BM is one of the services that NETSO, as system operator, uses to balance supply and demand in real time, for every Settlement Period. Being a participant in the BM allows the owner to submit Bids and Offer to decrease or increase the amount of energy on the System.

- Where the embedded generator is licensable:

The owner of a licensable embedded generator must enter into a BCA with the NETSO, sign up to the BSC and register as a Generator. They must also undergo CVA Qualification Testing to demonstrate their ability to communicate with the BSC Central Systems. Once these are completed, they must register their BM Units (as Embedded BM Units), Metering Systems for CVA, and Aggregation Rules. For more details on the registration processes, please refer to the Balancing Mechanism Units (BM Units) guidance note. This can be found in the [Registrations](#) section on the [BSC Guidance Notes](#) page of our [website](#).

- Where the embedded generator is exempted from holding a licence and has a BEGA

Embedded generators with a BEGA must be registered in CVA. The owner can choose to register as a Generator and follow the same steps as above. However, the owner must also apply for Exempt Export status if the embedded generator is exempted from a licence. The procedures to do so are covered in the Balancing Mechanism Units (BM Units) guidance note. The owner can also opt to register as a Supplier, in which case, they must undergo both CVA and SVA Qualification. Once these are completed, they must register their BM Units (as Supplier BM Units) and Metering Systems for CVA.

- Where the embedded generator is exempted from a licence and has a BELLA

The owner of an embedded generator that has entered into a BELLA with the NETSO cannot be responsible for its own output and must appoint another BSC Party or a Supplier.

If a BSC Trading Party takes responsibility for the output

The owner of an embedded generator may choose to sell its output through another BSC Party. In this case, the registration process would be managed by the BSC Party on the owner's behalf. The BSC Party can elect to register the Metering Systems associated with the BM Units in CVA or SVA, depending on their Party Role.

SVA-registered Exempt Export embedded generators will be settled through the Supplier's Base BM Unit. Typically, a Supplier BM Unit contains a collection of consumption meters which record the amount of energy consumed by their customers. The output of those generators will be included in the Supplier's Base BM Unit volume as a "negative demand" and thus reduce the overall value of the demand volume accredited to that BM Unit.

*If you have any questions relating to BM Unit registration, please contact the BSC Service Desk on **0370 010 6950** or by email at bscservicedesk@cgi.com.*

CREDIT COVER REQUIREMENTS

Under the BSC arrangements, payments to and from Trading Parties in respect of Trading Charges arising on any particular Settlement Day are made, on average, twenty-nine calendar days later. Thus, at any given time, Trading Parties may have debts (or be due payments) in respect of Trading Charges incurred, on average, over the previous twenty-nine days. The purpose of Credit Cover is to ensure that, should a Trading Party default, sufficient collateral is available to pay these debts.

Trading Parties decide on the level of Credit Cover that they wish to provide, and credit checking is intended to ensure that a Trading Party cannot accumulate a debt over the twenty-nine day period that exceeds the amount of Credit Cover provided. If a Party does not have sufficient funds it will enter the Credit Default process.

For the first five working days, the BSC Systems will estimate the potential imbalances incurred by BSC Parties based on Generation Capacity (GC) and Demand Capacity (DC) submitted as well as a load factor for generation and demand.

If a Supplier decides to take responsibility of an embedded generation site and includes it in one of its Base BM Units, the BSC Systems will not necessarily take the generation output into account in the credit process for the first five working days due to the Supplier status. This may lead to inaccurate estimated imbalance volumes being accounted for credit purpose and require the Supplier to lodge additional Credit Cover.

However, a Supplier having only generation registered in one of its Base BM Units may be able to apply for a Supplier Export Credit Assessment Load Factor (SECALF) and have its GC taken into consideration for the Credit Cover calculation.

More information can be found on our website under [Credit](#).

RESIDUAL CASHFLOW REALLOCATION CASHFLOW

For each Settlement Period, each Trading Party is charged or paid for any imbalance. The total amount of money paid out by all Trading Parties who are short of energy does not always equal the total amount of money paid to all Trading Parties who are long. This results in a surplus or deficit of funds, which needs to be redistributed to or recovered from all Parties. That is done through Residual Cashflow Reallocation Cashflow (RCRC).

- If an **owner of the embedded power station** wishes to take responsibility for its own output:

The proportion of surplus or deficit of funds allocated to the owner is determined by the Residual Cashflow Reallocation Proportion (RCRP) calculated for each of their Energy Accounts in each Settlement Period. This proportion is calculated as the Credited Energy Volume of that Energy Account as a proportion of the total Credited Energy Volumes across the market for that particular Settlement Period. The RCRP is then applied to the surplus or deficit of funds to determine the amount of money that the owner should be paid or have to pay for that particular Settlement Period.

- If a **Supplier** takes responsibility for the output of an EEMPS or EESPS:

The proportion of surplus/deficit of funds is not allocated directly to the owner but to the Supplier they appointed. Under this arrangement, the owner's output is included in the Supplier's Credited Energy Volumes and therefore any surplus or deficit of funds would be allocated using the Supplier's RCRP. The Supplier may choose to "pass through" some of the surplus or deficit to the owner. The proportion to be "passed through" is subject to negotiation between the Supplier and the owner.

FURTHER INFORMATION

In the event of any inconsistencies between this guidance note and the BSC, or the NGC Use of System Charging Methodology or the CUSC then BSC or the NGC Use of System Charging Methodology or the CUSC will take precedence. The BSC and all Code subsidiary documentation can be downloaded from the [BSC Website](#).

The Statement of the Use of System Charging Methodology and the CUSC can be downloaded from the [NGC Industry Information website](#).

*For more information please contact the **BSC Service Desk** at bscservicedesk@cqi.com or call **0370 010 6950**.*

Intellectual Property Rights, Copyright and Disclaimer

The copyright and other intellectual property rights in this document are vested in ELEXON or appear with the consent of the copyright owner. These materials are made available for you for the purposes of your participation in the electricity industry. If you have an interest in the electricity industry, you may view, download, copy, distribute, modify, transmit, publish, sell or create derivative works (in whatever format) from this document or in other cases use for personal academic or other non-commercial purposes. All copyright and other proprietary notices contained in the document must be retained on any copy you make.

All other rights of the copyright owner not expressly dealt with above are reserved.

No representation, warranty or guarantee is made that the information in this document is accurate or complete. While care is taken in the collection and provision of this information, ELEXON Limited shall not be liable for any errors, omissions, misstatements or mistakes in any information or damages resulting from the use of this information or action taken in reliance on it.