

OPERATING CODE NO. 6B

(OC6B)

EMBEDDED GENERATION CONTROL

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(This contents page does not form part of the Grid Code)

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OC6B.1 INTRODUCTION

OC6B.1.1 **Operating Code No. 6B** ("OC6B") is concerned with the provisions to be made by **Network Operators** to permit the reduction of **Active Power** output from **Embedded Power Stations** in the event of too much **Active Power** being available to meet **Demand**, and in emergency circumstances including in the event of breakdown or operating problems (such as in respect of **System Frequency**, **System** voltage levels or **System** thermal overloads) on any part of the **National Electricity Transmission System**.

OC6B.1.2 **OC6B** deals with the following:

- (a) ~~Embedded Generation Disconnection~~ initiated by ~~Network Operators~~ (other than following the instruction of ~~The Company~~);
- (b) ~~Embedded Generation Control Disconnection~~ instructed by ~~The Company~~; and
- (c) ~~automatic high frequency Embedded Generation Disconnection; and~~
- (d) ~~emergency manual Embedded Generation Disconnection.~~

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Commented [A1]: Probably not required?? but symmetrical with OC6. LFSMO would usually be part of managing high frequency

The term "**Embedded Generation Control**" is used to describe any or all of these methods of achieving a reduction in the **Active Power** output of **Embedded Power Stations**. **Generators** that may be included in **Embedded Generation Control** include **Embedded Power Stations** connected to the **Network Operator's System** and which are owned or operated by **Generators** that are not **BM Participants**.

OC6B.1.3 The procedure set out in **OC6B** includes a system of warnings to give advance notice, where possible, of **Embedded Generation Control** that may be required by **The Company** under this **OC6B**.

OC6B.1.4 Data relating to **Embedded Generation Control** should include details relating to **Active Power measured in Megawatts (MW)**.

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OC6B.1.5 The Electricity Supply Emergency Code as reviewed and published from time to time by the appropriate government department for energy emergencies provides that in certain circumstances consumers are given a certain degree of "protection" when rota disconnections are implemented pursuant to a direction under the Energy Act 1976. Where relevant in terms of the incidental disconnection of demand as part of **Embedded Generation Control**, no such protection can be given in relation to **Embedded Generation Control** under the **Grid Code**.

OC6B.1.6 ~~Connections between Large Power Stations and the National Electricity Transmission System and between such Power Stations and a User System will not, as far as possible, be disconnected by The Company or instructed to be disconnected by The Company to Network Operators pursuant to the provisions of OC6B insofar as that would interrupt supplies)~~

- (a) ~~for the purposes of operation of the Power Station (including Start-Up and shutting down);~~
- (b) ~~for the purposes of keeping the Power Station in a state such that it could be Started-up when it is off-Load for ordinary operational reasons; or~~
- (c) ~~for the purposes of compliance with the requirements of a Nuclear Site Licence.~~

Commented [A2]: Left largely as OC6 version for discussion, could put exceptions in here or further detail on the priorities as in the ESQ/DNO guidance note

Commented [A3R2]: I don't think this is needed. Large power stations could be instructed directly rather than via a DNO and would usually although not always be part of the BM.

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~~**Embedded Generation Control** pursuant to this **OC6B** therefore applies subject to this exception.~~

OC6B.2 OBJECTIVE

OC6B.2.1 The overall objective of **OC6B** is to require the provision of facilities to enable **The Company** to achieve reduction in the **Active Power** output of embedded **Power Stations** that will either avoid or relieve operating problems on the **National Electricity Transmission System**, in whole or in part, and thereby to enable **The Company** to instruct **Embedded Generation Control** in a manner that does not unduly discriminate against, or unduly prefer, any one or any group of **Generators** or **Suppliers** or **Network Operators**. It is also to ensure that **The Company** is notified of any **Embedded Generation Control** utilised by **Users** other than following an instruction from **The Company**.

OC6B.3 SCOPE

OC6B.3.1 OC6B applies to **The Company** and to **Users** which in **OC6B** means:

- (a) **Generators**; and
- (b) **Network Operators**.

OC6B.3.2 Explanation

OC6B.3.2.1 (a) Although OC6B does not apply to **Suppliers**, the implementation of **Embedded Generation Control** may affect their **Customers**.

- (b) In all situations envisaged in **OC6B**, **Embedded Generation Control** is exercisable by reference to a **Network Operator's System**; ~~and/or~~
- (c) **Embedded Generation Control** in all situations relates to the physical organisation of the **Total System**, and not to any contractual arrangements that may exist.

OC6B.3.2.2 (a) Where **Embedded Generation Control** instructions are issued by **The Company** to **Network Operators** these ~~may~~:

- i) be specific and require the **Network Operator** to disconnect specified **Embedded Power Station(s)**;
- ii) be for the **Network Operator** to ~~achieve a reduction in Active Power output of disconnect~~ **Embedded Power Stations** supplied via one or more specified **Grid Supply Point(s)** ~~with an aggregated Active Power output~~ **Registered Capacity** of a specified value; or
- iii) be for the **Network Operator** to ~~achieve a reduction in Active Power output of disconnect~~ **Embedded Power Stations** supplied via one or more specified **Grid Supply Point(s)** such that a specified proportion of the aggregate ~~Active Power output~~ **Registered Capacity** is disconnected.

In any such case the **Network Operator** will not be required to ~~reduce Active Power output of disconnect~~ **Embedded Power Stations to a value with an aggregated Active Power output** **Registered Capacity** greater than that of the **Embedded Power Stations** supplied via the specified **Grid Supply Point(s)**. An instruction from **The Company** to the **Network Operator** will be given to commence reconnection. Reconnection shall not take place until such an instruction has been received and shall be carried out in accordance with the instruction.

- (b) **Embedded Generation Control** instructions will not be issued by **The Company** to **Suppliers**, as **The Company** could not be assured of the disconnection of a specific proportion of aggregated ~~Active Power output~~ **Registered Capacity** where required and, where an instruction is specific to a particular area, since a **Supplier's Customers** may be spread throughout a number of **User Systems**, **The Company** would not know which **Supplier** to contact. These points mean that **Embedded Generation Control** could not be implemented effectively on the **Total System** through **Suppliers**.

OC6B.3.2.3 ~~Network Operators may where necessary (for example where timescales do not allow otherwise) implement Embedded Generation Control instructions by Embedded Generation Disconnection based on their Registered Capacity so long as reasonable endeavours are employed by the Network Operator to ensure that the reduction in Active Power output specified in the instruction from The Company is achieved.~~

OC6B.3.2.43 (a) **Suppliers** should note that, although implementation of **Embedded Generation Control** in respect of their **Customers** is not exercisable by them, their **Customers** may be affected by **Embedded Generation Control**.

- (b) **Embedded Generation Control** will be implemented by **Network Operators**
- (c) The contractual arrangements relating to **Customers** being supplied by **Suppliers** will, accordingly, need to reflect this.

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Commented [A5]: This is a keypoint: what is preferable to use? Registered Capacity or Active Power output?

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- (d) The existence of any other arrangements for the management of **Embedded Generation** by a **Network Operator** will not relieve a **Network Operator** from the **Embedded Generation Control** provisions of this OC6B.

OC6B.4 ~~PROCEDURE FOR THE NOTIFICATION OF EMBEDDED GENERATION CONTROL INITIATED BY NETWORK OPERATORS (OTHER THAN FOLLOWING THE INSTRUCTION OF THE COMPANY.)~~

OC6B.4.1 Each ~~Network Operator~~ will notify ~~The Company~~, in respect of the time periods prior to 1100 hours each day, of any ~~Embedded Generation Disconnection~~ or reconnection, on a ~~Grid Supply Point~~ and half-hourly basis, which will or may, either alone or when aggregated with any other ~~Embedded Generation Control~~ planned by that ~~Network Operator~~, result in a ~~Load change~~ equal to or greater than the ~~Embedded Generation Control Notification Level~~ averaged over any half-hour on any ~~Grid Supply Point~~, which is planned to be instructed by the ~~Network Operator~~ other than following an instruction from ~~The Company~~ relating to ~~Embedded Generation Disconnection~~.

OC6B.4.2 Each ~~Network Operator~~ will notify ~~The Company~~ in writing by 1100 hours each day (or such other time specified by ~~The Company~~ from time to time) for the next day (except that it will be for the next 3 days on Fridays and 2 days on Saturdays and may be longer (as specified by ~~The Company~~ at least one week in advance) to cover holiday periods) of ~~Embedded Generation Disconnection~~ which will or may result in a ~~Load change~~ equal to or greater than the ~~Embedded Generation Control Notification Level~~ averaged over any half-hour on any ~~Grid Supply Point~~ (or which when aggregated with any other ~~Embedded Generation Control~~ planned by that ~~Network Operator~~ is equal to or greater than the ~~Embedded Generation Control Notification Level~~), planned to take place during the ~~next Operational Day~~.

OC6B.4.3 When ~~Embedded Generation Control~~ including ~~Embedded Generation Disconnection~~ may result in a ~~Load change~~ equal to or greater than the ~~Embedded Generation Control Notification Level~~ averaged over any half-hour on any ~~Grid Supply Point~~ (or which when aggregated with any other ~~Embedded Generation Control~~ planned or implemented by that ~~Network Operator~~ is equal to or greater than the ~~Embedded Generation Control Notification Level~~) is planned (after 1100 hours) each ~~Network Operator~~ must notify ~~The Company~~ as soon as possible after the decision to implement this has been made. If the ~~Embedded Generation Disconnection~~ is implemented immediately after the decision to implement is made, each ~~Network Operator~~ must notify ~~The Company~~ within five minutes of implementation.

OC6B.4.4 Where, after ~~The Company~~ has been notified pursuant to OC6B.4.1 to OC6B.4.3, the planned ~~Embedded Generation Disconnection~~ is changed, the ~~Network Operator~~ will notify ~~The Company~~ as soon as possible of the new plans, or if the ~~Embedded Generation Control~~ or ~~Disconnection~~ implemented is different to that notified, the ~~Network Operator~~ will notify ~~The Company~~ of what took place within five minutes of implementation.

OC6B.4.5 Any notification made under OC6B.4.1 to OC6B.4.4 will contain the following information on a ~~Grid Supply Point~~ and half-hourly basis:

- (a) the proposed (in the case of prior notification) and actual (in the case of subsequent notification) date, time and duration of implementation of the ~~Embedded Generation Disconnection~~ or ~~Embedded Generation Control~~; and
- (b) the proposed reduction in ~~Active Power~~ generation by use of the ~~Embedded Generation Disconnection~~ or ~~Embedded Generation Control~~.

OC6B.4.6 Each ~~Network Operator~~ will supply to ~~The Company~~ details of the amount of reduction in ~~Active Power~~ generation actually achieved by the use of ~~Embedded Generation Disconnection~~ within ~~24 hours~~ (timescale) of the instruction being issued.

Commented [A7]: Workgroup concluded this section not required.

Commented [A8]: Current day

Commented [A9]: Should this include any restrictions associated with both ANM schemes, other switching schemes etc? I'm not sure of the practicality although it will be part of a DNO's considerations in implementing an instruction.

Commented [A10R9]:

Commented [A11]: Day ahead

Commented [A12]: Current day

Commented [A13]: I think we should put a timescale on this clause although there isn't one in the OC6 equivalent - but is it for operational reasons or just as an audit action?

Commented [A14R13]: Just for audit purposes. And remembering that this section only applies where the DNO carries out disconnections without instruction from NGESO

OC6B.5 PROCEDURE FOR THE IMPLEMENTATION OF EMBEDDED GENERATION ~~CONTROL DISCONNECTION~~ ON THE INSTRUCTIONS OF THE COMPANY

Commented [A15]: Need to do some renumbering due to deletion of previous section but left for now.

OC6B.5.1 A **National Electricity Transmission System Warning - High Risk of Generation Reduction** will, where possible, be issued by **The Company**, as more particularly set out in OC6B.5.4, OC7.4.8 and BC1.5.5 when **The Company** anticipates that it will or may instruct a **Network Operator** to implement **Embedded Generation Control** instructions ~~to disconnect Embedded Generators~~.

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OC6B.5.2 Where **The Company** expects to instruct Network Operators to ~~implement Embedded Generation Control instructions~~ disconnect **Embedded Generators** within the following 30 minutes, **The Company** will, where possible, issue a **National Electricity Transmission System Warning - Generation Control Imminent** in accordance with OC7.4.8.2 and OC7.4.8.11.

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- OC6B.5.3
- (a) Whether a **National Electricity Transmission System Warning - High Risk of Generation Reduction** or **National Electricity Transmission System Warning – Generation Control Imminent** has been issued or not, each **Network Operator** will abide by the instructions of **The Company** and will implement the instructions received in the timescales specified and without delay.
 - (b) Unless specified otherwise, ~~the Embedded Generation Control~~ **Disconnection** must be achieved within the **Network Operator's System** as far as possible uniformly across all **Grid Supply Points**.
 - (c) Unless specified otherwise, **Embedded Generation** ~~Control~~ **Disconnection** shall be achieved within ~~30 minutes~~ of an instruction being received from **The Company**.

Commented [A16]: To confirm

OC6B.5.6 Once an **Embedded Generation** ~~Control~~ **Disconnection** instruction has been implemented by a **Network Operator** at the instruction of **The Company**, the **Network Operator** may interchange the **Embedded Generators** who have been ~~subject to this~~ disconnected provided that,

- (i) the percentage or volume of **Active Power** disconnected ~~or unloaded~~ at all times within the **Network Operator's System** does not change; and
- (ii) at all times it is achieved within the **Network Operator's System** as far as possible uniformly across all **Grid Supply Points** (unless otherwise specified in the instruction issued by **The Company**).

until **The Company** instructs that **Network Operator** in accordance with OC6.

OC6B.5.7 Each **Network Operator** will abide by the instructions of **The Company** with regard to the restoration of those **Embedded Generators** previously ~~subject to Embedded Generation Control~~ disconnected under OC6B.5 and shall not commence restoration of such **Embedded Generators** until such an instruction is given.

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OC6B.5.8 In circumstances of protracted surplus of generation and when a reduction in **Embedded Generator** output is envisaged by **The Company** to be a prolonged requirement, **The Company** will notify the **Network Operator** of the expected duration.

OC6B.5.9 The **Network Operator** will notify **The Company** in writing that it has complied with **The Company's** instructions under OC6B.5, within five minutes of so doing, together with an estimation of the **Embedded Generation** ~~Control~~ **Disconnection** or restoration achieved, as the case may be.

OC6B.5.10 Each **Network Operator** will supply to **The Company** details of the amount of reduction in **Active Power** generation actually achieved by the use of **Embedded Generation** ~~Control~~ **Disconnection** within ~~30 minutes (timescale)~~ of the instruction being issued.

Commented [A17]: What's reasonable here? 30mins? It is estimated in OC6B5.9 within 5 mins.

OC6B.6 PRIORITIES FOR MAINTAINING CONNECTION OF EMBEDDED GENERATORS ON

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OC6B.6.1 The priority order in which Embedded Generators will be subject to Embedded Generation Control instructions implemented by Network Operators is at the discretion of each Network Operator to whom an instruction is given by The Company. In implementing an instruction and determining the order in which Generators will be disconnected, Network Operators are expected to take into account, where reasonably practicable, of the effectiveness of the disconnection to address the issues to be resolved, any other wider system issues and the potential consequences for Users, including where applicable taking account of the incidence of such instructions. This should be on the basis of the information available at the time and should consider the following points:

(a) Maximising value to the total system and local networks by reducing the requirement for other balancing actions;

(b) Minimising plant, environmental or system impact to local networks or Users;

(c) Interactions with other network considerations such as the inclusion of certain Generators in Active Network Management (ANM) or other automatic switching schemes and the need to maintain system inertia, particularly in very low demand situations; and

(d) Plant type, where in the absence of other considerations and if reasonably practicable in an emergency situation the following priority order should be respected:

ORDER	CATEGORY OF GENERATION	COMMENT
1	Non-synchronous generation	In order to maintain system inertia in a very low demand situation, and unless other means of replacing system inertia are achieved, the export from these technology types could be weather dependent and reasonable endeavours would be expected to be employed in ensuring that the Active Power reduction specified in an instruction from The Company was achieved. Although the instruction would be to disconnect 'registered capacity', it is still expected that this will deliver actual MW output change of between 80% and 100% of requested volume
2	Synchronous generators without any associated demand	Lower down the list due to the need to maintain system inertia, particularly in a very low demand situation
3	Generation with associated demand	For example, CHP installations, waste management facilities, and other industrial facilities with substantial on-site demand
4	Generation associated with critical national infrastructure sites	Never envisaged to be selected

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- Commented [A18]: How future proof is this? If codified then it would need another code change to modify it but in the meantime if system inertia concerns were solved then with some of the other technologies being looked at then maybe this order could change or be less prescriptive.
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OC6B.76

OPERATION OF THE BALANCING MECHANISM DURING EMBEDDED GENERATION
DISCONNECTION

Embedded Generation Disconnection will constitute an **Emergency Instruction** in accordance with BC2.9 and it may be necessary to depart from normal **Balancing Mechanism** operation in accordance with BC2 in issuing **Bid-Offer Acceptances**. The **Company** will inform affected **BM Participants** in accordance with the provisions of **OC7**.

Commented [A19]: It is expected that any available actions in the BM will already have been taken, and that therefore any affected embedded generators will not be BM participants...but as an emergency instruction this clause is necessary.