# DCRP Consultation on Banding/Classification of Distributed Generation

## 1 Introduction

One recommendation from the consultation process of the DTI/Ofgem Working Group on Embedded Generation was that it would be beneficial to have a simple banding structure into which most generation could be classed, with the aim of standardizing and simplifying most aspects of new generation development. This action has been carried into the Technical Steering Group[1] (TSG) Work Stream 2 (Standardization of Information and Solutions).

It has been agreed by the TSG that the most appropriate place to lodge banding definitions for reference is the Distribution Codes. Subject to the development of the issues raised in this consultation paper, it is anticipated that the banding definitions would be accommodated in the Codes.

## 2 Scope

The characteristics that are sufficiently similar between different machines to justify banding are believed to include:

- the general design criteria for the machine(s);
- the general technical interface requirements in terms of equipment rating, earthing arrangements, protection arrangements, operational requirements etc;
- commercial treatment.

Issues driven by the networks, such as the amount of network reinforcement (for example) will not be encompassed by a banding structure.

## 3 Drivers of Banding

This section tries to demonstrate from different perspectives the reasons why classifying generation into a few bands should help simplify the connexion of new generation.

The need to find bands in which to describe and accommodate generation types is driven by a range of factors. The following list suggests some of the issues that need to be considered in designing bands.

### *3.1 Customer needs*

A primary driver is simplicity for customers. When a customer wishes to connect generation it will be a considerably simpler experience if the generation he wishes to install fits into one of a few bands such that his attention is drawn only to those commercial and technical issues that are important in his case.

### *3.2 Technology and manufacturing needs*

Having definite bands of generation that include the definition of the connexion requirements and treatment for distributed generation will help designers and manufacturers fit their offerings to the expectation and capabilities of the market. However, technology and manufacturing must not be constrained by bands – appropriate change arrangements are necessary for banding definitions.

[1] The Distributed Generation Co-ordinating Group has set up the TSG to assist in taking forward the recommendations of the DTI/Ofgem Embedded Generation Working Group

It is for debate to what extent differences such as those between synchronous and asynchronous machines, or those associated with inverter-connected machines, can be accommodated in any one band.

### *3.3 Commercial Treatment*

There are benefits to both customers and utilities in having the range of options limited where possible. Customers benefit from simplicity and companies benefit from simplicity and economies of scale that go with standarized treatment.

### *3.4 Legal and licensing issues*

There are existing licensing, Grid Code and BSC requirements on larger generation; currently starting at 50MW for so-called Medium Power Stations. Clearly this marks an upper boundary to the current exercise where an existing banding structure will remain.

### *3.5 Network Topology*

The network topology is a clear driver to differentiate the technical aspects of a generation connexion. An obvious criterion is the voltage of connexion, but other drivers include whether the connexion is to a radial or meshed network; what the standard protection operating times are; the fault level; the voltage profile. Many of these criteria interact: for example a network with a low fault level is likely to have a voltage profile that is difficult for a generator that needs to export to the network.

### *3.6 Generator capability to provide network services*

Some generators are likely to provide network services such as reactive power, frequency control, security etc.

## 4 Factors to be considered

In deriving bands, the scope of each band needs to be such that a range of factors, technical and commercial, also have an appropriate consideration such that there is generally common treatment within the bands. The following factors are believed to be important in this regard.

### *4.1 Metering*

Metering arrangements in terms of accuracy, registration of quantities, communication requirements.

### *4.2 Technical Connexion Requirements*

The requirements placed by the network on the generator should be similar. This does not mean that there cannot be specific requirements within a band for specific generation types, but these requirements can be expected to harmonize with those on other generation within the band, although possibly being characteristically different from those in adjacent bands. It is noted that the existing DNO technical documents, ie G83 (Draft), G59/1 and G75 have existing break points at 16A, <5MW and <20kV, >5MW or >20kV.

### *4.3 Connexion Agreements and Charging Arrangements*

The need for and content of any agreements between the network operator and generator, together with the method of charging for connexion, should be recognizably the same within the band.

### *4.4 Commercial Arrangements*

The scope and content of likely contracts with Suppliers and the need for any other industry contracts (BSC, CUSC etc) should be consistent within bands.

### *4.5 Reinforcement*

As indicated in the Scope above, accommodating works on networks remote from the connexion point are not expected to be amenable to treatment within any banding structure.

## 5 Criteria for fixing boundaries:

The following have been suggested as possible criteria for defining the boundaries between bands:

- Voltage of Connexion
- Current rating of standard network components
- Capacity of generation
- Export Capacity
- Licence or existing thresholds
- Generation Technology

### *5.1 Fixed or overlapping boundaries*

There is the possibility that the boundaries between bands might overlap. For example generation of 10MVA could conceivably be connected to either an 11kV system or to a 33kV system. Some of the technical requirements will be different, depending on the system used. The choice of connexion voltage will be heavily influenced by network topography and network capability, amongst other things. It might therefore be appropriate to have an area of overlap whereby 10MW of generation could fit into either of two bands. The choice of band would have to be agreed between developer and network operator.

### *5.2 Over-riding economic banding*

It should be noted that although a generator lies in any particular band, the most economical connexion, considering all the costs of connexion, might be using a connexion appropriate to a higher band. A typical example would be a generator of say less than 5MW rating that would normally expect a 11kV connexion. In remote rural areas the nearest line might be a 33kV circuit, and the additional costs of the 33kV connexion are less than constructing an 11kV system extension to the site.

## 6 Definition of Boundaries and Governance

To be effective, the bands will need to be defined in a visible way, such that all interested parties have ready access to the details.

Two ways of accommodating this spring to mind: firstly to publish a stand-alone document and secondly to incorporate into a suitable existing document.

The Grid Code already has a banding structure within it: Small Power Stations (0 to 50 MW); Medium Power Stations (50MW to 100 MW) and Large Power Stations (above 100MW). It is suggested that this simple structure laid out in the Definitions section of the Grid Code has

worked well. These bands have been used internally in the Grid Code for differentiating between technical requirements, and cited in other industry work as a means of differentiating between requirements for differing machines sizes. This has doubtless been helped by the alignment with the DTI's thresholds for licensing requirements having break points at 50MW and 100 MW too.

This structure seems appropriate for the banding of distributed generation, with the definitions of the bands sitting within the Distribution Codes. This also then provides a route for the governance of the banding definitions going forward. Further, if it is thought appropriate to have overlapping bands, the definition of the overlap in the Distribution Codes probably makes it appropriate for Ofgem to determine on the banding classification of any particular scheme should a dispute arise. Inclusion in the Distribution Codes would then be a point of reference, capable of being reflected in a multiplicity of documentation closer to customers, such as connexion guides, LC25 statements etc.

## 7 Proposals

Taking into account the above discussion, the following banding structure is suggested:

Band 1 Domestic CHP and all micro-generation– up to 16A per phase, including both single and three phase installations. It is for debate whether the 16A per phase cut-off should be preferred over the draft ESQC Regulations threshold of 5kW.

Band 2 Other small generation capable of being connected to a 100A whole current metered service position. Taking into account the continuous rating of a 3Ø 100A modern cutout this threshold has been suggested at 60kW. It is for debate whether this limit is appropriate and whether Band 2 should be split into two bands. It might also be appropriate to treat multiple and adjacent installations of Band 1 generation in Band 2.

Band 3 Other generation connected to the LV system. The upper limit of this band is taken as being 1MW which is the rating of the largest standard 11kV/LV transformer used on distribution systems. It is for consideration if there is another meaningful break point at 280kW which is a fairly standard LV distributor rating, or at either 150kW or 250kW which are break points that can be inferred from ETR 113[2].

Band 4 Generation connected to HV systems (ie <33kV). It is suggested that the upper limit for an 11kV connexion will be 12MW (7.2MW at 6.6kV and limited by switchgear current ratings in both cases). This suggestion does not align with the current break between ER G59/1 and ER G75. The lower limit (if indeed one is required) is for debate.

Band 5 33kV or higher connected voltage. The upper boundary is taken as being 50MW, as above this rating Grid Code considerations apply.

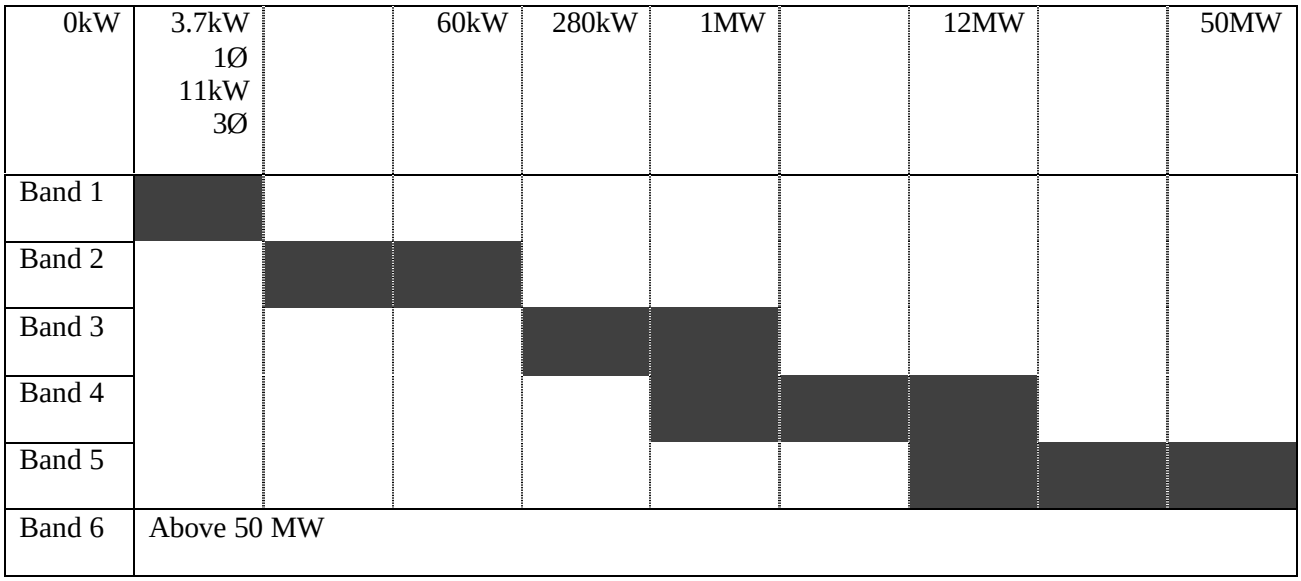
Band 6 Above 50 MW as per existing Distribution Codes and Grid Code requirements.

Note that all the ratings above are power station ratings irrespective of the number of generation units Strictly the Grid Code and Distribution Codes thresholds are for Registered Capacity which means power sent out, rather than the equipment ratings. It is suggested that this banding

[2] Electricity Association Engineering Technical Report No 113 (1995) – Notes of Guidance for the Protection of Embedded Generation Plant up to 5MW for Operation in Parallel with PES Distribution Systems

structure remains with equipment ratings as it these that will generally determine the technical arrangements. This lack of alignment only really applies to the upper boundary of Band 5.

The above banding structure is shown diagrammatically in the following table:




## 8 Consultation Issues

Comments are invited on the drivers for banding as described in this paper and the factors to be considered. Comment is also welcome on the suggested division into Bands, both in terms of the criteria to be applied in determining bands, and in the values chosen or to be chosen.

Finally, comments are welcome on the treatment of banding definitions when written in the Distribution Codes. The two principal options appear to be inserting the definitions into the other Code definitions in the Distribution Codes' Glossary and Definitions, or alternatively as a new Annex.

Responses should be made to the Panel Secretary either directly or through Panel members, whose details can be found on the Ofgem website: http://www.ofgem.gov.uk/dso/index.htm.

The closing date for responses is Friday 28 June.