Industry Consultation

Grid Code and Distribution Code

Information on Embedded Small Power Stations (GC0042)

This consultation document seeks views on proposals to modify the Grid Code and the Distribution Code. Views are sought on proposals to expand Network Operators' (DNOs') Week 24 data submissions to include information on Embedded Small Power Stations of registered capacity of 1MW or more. Consequential modifications are required to the Distribution Code to provide Network Operators with the means to collect the required information which are also explained and consulted upon here.

This document is open for Industry Consultation. Any interested party is able to make a response in line with the guidance set out in Section 6 of this document.

Published on:	**25 February 2014**
Length of Consultation:	**20 Working Days**
Responses by:	**25 March 2014**

Recommendation:

To implement the proposals in this consultation to expand Network Operators' (DNOs') Week 24 data submissions to include information on Embedded Small Power Stations of registered capacity of 1MW or more as this will facilitate the effective and efficient development and operation of the National Electricity Transmission System

High Impact:
None identified

Medium Impact:
Distribution Network Operators

Low Impact:
Distributed Generators

Contents

About this document

This Industry Consultation outlines the information required for interested parties to form an understanding of a defect within the Grid Code and Distribution Code and seeks the views of interested parties in relation to the issues raised by this document.

Parties are requested to respond by 25 March 2014 to grid.code@nationalgrid.com

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1.0	25 February 2014	National Grid	Final Industry Consultation

1 Executive Summary

1.1 The increasing contribution of distributed generation to the electricity supply system in Great Britain is having a noticeable impact on the planning and operation of transmission networks.

1.2 With the existing information available to National Grid about embedded generators, it is not possible to determine accurately the contribution of embedded generation to supply demand in both the planning and operational timescales.

1.3 Following a Grid Code Review Panel paper submitted in January 2012, the GCRP recommend that a Workgroup be set up to discuss a potential need for Network Operators to provide additional information about distributed generation which would enable National Grid to have a clearer view of Embedded Small Power Stations.

1.4 The Workgroup discussed the need for additional information about Embedded Small Power Stations and agreed, as part of the Week 24 data submission beginning from 2015 that the following information should be provided for each Embedded Small Power Stations with registered capacity of 1MW or above:

- A name which was reference unique within each DNO licence area;
- The fuel type or technology type;
- The registered capacity in MW (as defined in the Distribution Code);
- The lowest voltage level node on most up-to-date single line diagram to which it connects or exports most of its power;
- The geographical location specified using latitude and longitude or grid reference coordinates of the primary or higher voltage substation, whichever is applicable. This is required only for wind and photo voltaic-based ESPS;
- The control mode (if it operates in voltage control or power factor control mode). Where it operates in voltage control mode the voltage set-point and reactive range to be provided. Where it operates in power factor mode the target power factor to be provided; and
- Loss of mains protection type and relay settings for all ESPS connected during or after the Week 24 data submission beginning 2015. For ESPS connected prior to this date, the information should be provided on a reasonable endeavour basis.

1.5 The Workgroup recommended for the Grid Code that PC.A.3.1.4, PC.A.5.1.3 and PC.A.5.1.4 of the Planning Code and DRC 6.1.11 and Schedule 11 of the Data Registration Code should be modified in order to capture the above information.

1.6 The Workgroup also recommended that changes should be made to the Distribution Code in order to ensure that all the required information is available to DNOs. The Grid Code Review Panel and Distribution Code Review Panel recommended that the required Distribution Code changes should be progressed alongside Grid Code changes in a single consultation document. Changes to the Distribution Planning and Connection Code and to the

Distribution Data and Registration Code are therefore included in this consultation.

1.7 Finally, the Workgroup noted the development of the European Commission's regulation on the submission and publication of data in electricity markets (543/2013) in parallel with its own work, and the further work being carried out to specify the form of information provided to meet the requirements of the regulation.

1.8 The Workgroup's recommendations were consistent with the regulation but made reference to the Regulatory Instructions and Guidance (RIGs) document in respect to fuel or technology type definitions. The proposals detailed in this consultation contain additional provisions relating to fuel type and technology type definitions. These are intended to minimise duplication and inconsistency between Grid Code and Distribution Code requirements and that of the European Commission's regulation.

1.9 It should also be noted that the Workgroup's proposals did not cover all of the Grid Code changes that might be needed to meet the requirements of the Commission's regulation as these (outage information requirements for example) were outside the scope of the Workgroup but are being progressed under Grid Code issue GC0083.

1.10 Views are invited upon the proposals outlined in this consultation, which should be received by 25 March 2014. Further information on how to submit a response can be found in Section 6.

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2 Why Change?

2.1 In the past, the relatively low volume of distributed generation did not have any substantial impact on the National Electricity Transmission System (NETS). However due to the growth of distributed generation, its impact is becoming more noticeable in the planning and operation of the transmission network.

2.2 In the development of the transmission networks, distributed generation is taken into account in the process of evaluating transmission system boundary capacity requirements. Depending on the location of the distributed generators and the nature of the boundary (i.e. whether it is exporting or importing), boundary flows can either increase or decrease in the presence of distributed generation. Having accurate boundary flow requirements is essential for network planners to determine the right level of network reinforcements required as well as the timing of these reinforcements.

2.3 For example over £1bn is being invested in the western HVDC link to reinforce boundary B6 by 2.2GW. The contribution of embedded generation to the B6 boundary transfer is approximately 600MW (see Figure 1 below), which is almost 30% of the link's capacity. This illustrates the material impact that embedded generation has on the need case for additional reinforcements

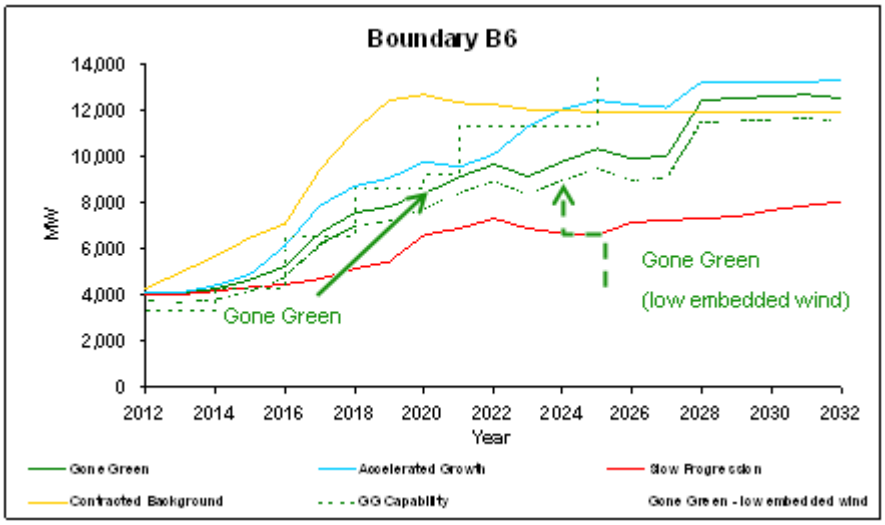

Figure 1- Impact of Embedded Generation on Required Transfers for Boundary B6

2.4 It is also likely that distributed generation is having an impact on the reactive demand seen from the transmission system in addition to a reduction in active demand, but not enough information is readily available to transmission companies to quantify this impact.

2.5 Figure 2 below shows a decline in both active and reactive demand seen from the transmission system. The reduction in reactive demand is more pronounced thereby causing the Q/P ratio to decrease year on year.

2.6 The day-to-day operation of the transmission network relies on accurate demand forecasts to ensure that the right amount of generation is contracted. Demand forecasting errors have gradually become more pronounced with the errors being partly attributed to the growing contribution of embedded generation.

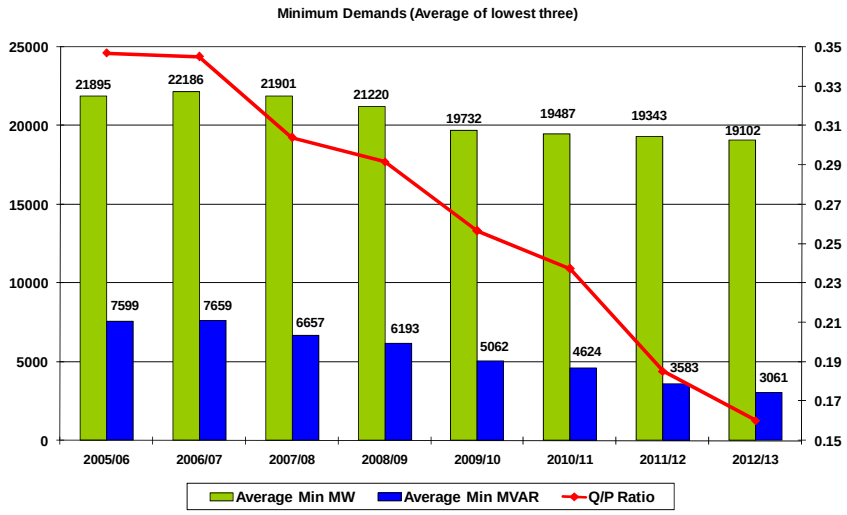

Figure 2- Trend in Reactive Demand 2005 -2012

2.7 Figure 3 below shows the mean demand forecast error evaluated at 12:30 during summer from 2007 to 2012. The positive bias depicted in the graph illustrates a tendency for National Grid to over-forecast demand. This may be due to the effect of demand suppression caused by distributed generation which cannot be forecast effectively with the information available currently.

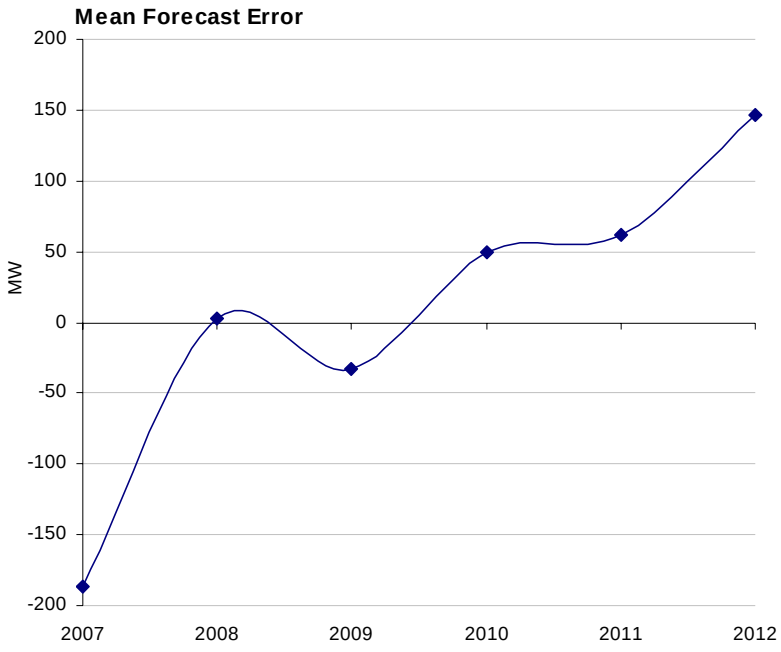

Figure 3- Mean Transmission Demand Forecast Error at Summer Peak

2.8 The current obligations on DNOs to provide information about Embedded Small Power Stations are stated in the Grid Code.

Under PC.A.3.2.1 (b), the following information is required:

- The registered capacity of each Embedded Small Power Station in MW

Under PC.A.3.1.4 (a), the following information is required:

- Number of Small Power Stations
- Number of generating units or Power Park Modules within these power stations
- The summated capacity of all generating units

Under PC.A.4.3.2 (a), the following information is required:

- The total contribution of Embedded Small Power Stations used to evaluate the net demand at each connection point at four specific time

DRC Schedule 11 specifies the form in which the required information should be provided and asks for the following items expressed by financial year:

- Number of Small Power Stations
- Number of generating units or Power Park Modules within these power stations
- The summated capacity of all generating units

2.9 The above information which National Grid presently receives with respect to the Embedded Small Power Stations is limited and as a result it is becoming increasingly difficult to accurately determine the influence of the embedded generators on the demand both in the planning and operational timescales.

2.10 The visibility of the Embedded Small Power Stations and their impact on the transmission system will be improved if further information is provided to National Grid. As a result, a Workgroup was formed to determine the additional information that would be required and to identify the most effective way for National Grid to obtain the information.

3 Solution

3.1 The Workgroup agreed that the information listed in Table 1 should be supplied to National Grid. This would be required for each Embedded Small Power Station (ESPS) with a registered capacity of 1MW or more.

	Item	Requirement
1	A reference unique to each Network Operator	To enable National Grid to distinguish between each ESPS above 1 MW
2	Fuel type or technology type for each ESPS	To enable National Grid to apply appropriate load assumptions for different plant types. Knowing the different plant types would enable National Grid to establish the correct load factors for different weather conditions and this is essential for accurate demand forecasting.
3	The registered capacity (as defined in the Distribution Code) for each ESPS (MW)	To enable National Grid to evaluate the contribution of ESPS at different times by applying the respective scaling factors. This would also help in demand forecasting.
4	The lowest voltage node on the most up-to- date single line diagram to which each ESPS connects or exports most of its power.	To enable National Grid to model the electrical location of power in-feed from the ESPS.
5	The geographical location of each Wind and PV based ESPS, whose outputs are location dependent.	To enable National Grid to accurately forecast the output of generators (especially intermittent types) where the source of energy driving the prime mover varies with geographical location
6	The control mode of the ESPS i.e. whether it operates in voltage control or power factor control	To enable National Grid to evaluate the reactive power contribution from the ESPS at specific times.
7	Loss of Main Protection Types and relay settings of each ESPS	To enable National Grid to use such data combined with Frequency Management tools to estimate the system risk in case of loss of in-feed as a result of various rate of change of frequency levels.

Table 1 – Information Requirements for Embedded Small Power Stations

3.2 The Workgroup agreed that the most effective method of enabling the provision of the additional information required by National Grid was to amend the following sections of the Grid Code:

- PC.A.3.1.4, PC.A.5.1.3 and PC.A.5.1.4 of the Planning Code; and
- DRC.6.1.11 and Schedule 11 of the Data Registration Code.

3.3 The proposed legal text to this effect can be found in Annex 1 of this consultation document. The information requirements shown in Table 1 have

been applied to PC.A.3.1.4, making the information part of the Standard Planning Data submission. PC.A.5.1.3 and PC.A.5.1.4 are part of the section of the Grid Code covering Detailed Planning Data and have been changed to retain consistency with the new PC.A.5.1.4. The DRC amendments reflect the new information that PC.A.3.1.4 asks for.

3.4 The drafting also provides flexibility in Fuel and Technology type definitions to facilitate the introduction of the new European wide reporting guidelines required to meet the European Commission's transparency regulation.

3.5 The Workgroup identified that consequential Distribution Code changes were required in order to ensure that DNO's could gather the required information with respect to voltage and reactive power control and Loss of Mains protection settings (Items 6 and 7 in Table 1). The proposed legal text to this effect, showing the required changes to the Distribution Connection and Planning Code, and the Distribution Data Registration Code, can also be found in Annex 1 of the consultation document.

4 Summary of Workgroup Discussions

Purpose & Scope of Workgroup

4.1 At the January 2012 GCRP, National Grid presented the paper pp12/02 which proposed that a Workgroup comprising National Grid, Network Operators and any other interested parties be developed to discuss a set of changes to the existing Planning Code (PC) and Data Registration Code (DRC). The GCRP agreed that this issue required further investigation and approved the Terms of Reference

4.2 The first Workgroup meeting was held on the 04 December 2012 and met 4 times over the period between 04 December 2012 and 19 June 2013.

4.3 A copy of the full Workgroup Report can be found on the National Grid website[1].

4.4 The detailed scope of the Workgroup was to:

- Review the information currently provided by Network Operators to National Grid concerning Embedded Small Power Stations;
- Review how this information is used to develop, plan and operate the Transmission System;
- Identify any inconsistencies between how Small Power Stations connected to Users' networks can be accounted for in the development, planning and operation of the Transmission System compared to Medium and Large Power Stations;
- Identify any information which is necessary and not provided;
- Identify any information which is provided but is no longer necessary;
- Develop recommendations to eliminate inconsistencies, omissions or unnecessary information provision where there is a material benefit in doing so; and
- Take account of relevant international practice and the approach taken in European Code development.

4.5 A copy of the Terms of Reference can be found in Annex 2 of the consultation document.

Requirement for Information on Small Embedded Power Stations

4.6 Initial discussion began with National Grid explaining why more information about Embedded Small Power Stations is required. The impact of distributed generation on both the planning and operations businesses within National Grid was explained.

[1] http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/Grid-code/Modifications/GC0042/

4.7 For the planning stages, demand security assessment and wider boundary flows were addressed.

4.8 For demand security purposes, it was highlighted that the contribution of embedded generation to demand needed to be assessed using reasonable planning assumptions such that super-grid transformers are adequately sized to meet the demand in the event that the contribution from embedded generation is substantially reduced.

4.9 For wider boundary flows, it was shown that for certain boundaries, embedded generation can lead to increased power flows. This can potentially have an impact on the amount and timing of network reinforcements. It is therefore essential for National Grid to have better information about the embedded generation connected to the network.

4.10 For the purposes of system operations, it was stated that demand forecasting was becoming increasingly difficult to manage due to the uncertainty of the contribution from embedded generators. The current information received by National Grid does not have enough granularity to enable appropriately accurate estimations to be made.

List of Requirements

4.11 This section presents the list of items that were discussed in the Workgroup.

4.12 National Grid expressed a need for the following information to be provided depending on the size of each ESPS:

For ESPS above 1MW:

- Unique reference for each ESPS
- Fuel type for each ESPS
- The registered capacity for each ESPS
- The existing node on the single line diagram to which each ESPS connects to
- The geographical location of each ESPS
- The Short Circuit Contribution for 3 phase faults (with a reasonable attenuation factor applied to account for the impedance between the ESPS and the node on the single line diagram)
- The mode of operation that each ESPS can operate in. (e.g. Voltage control, Power Factor control)
- Loss of main protection type and relay settings

For ESPS below 1MW:

- An equivalent power station per node on the single line diagram to represent an aggregation of all wind generation
- An equivalent power station per node on the single line diagram to represent an aggregation of all Photo Voltaic generation

- An equivalent power station per node on the single line diagram to represent an aggregation of all other SEPS
- The geographical location of each node on the single line diagram where weather related intermittent power station (below 1MW individual capacity) have been identified.
- Loss of Main Protection type and relay settings

Other Requirements

- Pure demand which is the demand that the system would see if there were no contribution from embedded generation.

Unique reference for each ESPS

4.13 The requirement for a unique identifier for each ESPS above 1 MW was discussed with the DNOs representatives as a concern was raised that simply asking for a site name could lead to ambiguous information being provided. It was explained that this information would enable National Grid to distinguish between each ESPS. It was added that having a unique identifier enables units to be easily recognised and directed to if there are queries relating to particular units in the future.

4.14 It was suggested that the Meter Point Administration Number (MPAN) can be provided along with the site name to provide a unique identifier for the ESPS but this proposition was declined on the grounds that that there could be commercial issues with publishing MPANs. The Workgroup agreed to recommend a reference unique to each DNO licence area. This which would become further distinct when combined with the additional information provided (i.e. fuel type, registered capacity etc.)

Fuel or Technology type of each ESPS

4.15 The requirement for the fuel type of each ESPS was also discussed as this would enable National Grid to forecast the output of intermittent generation (e.g. wind and PV generators) which is dependent on location and weather conditions. It was highlighted that about 3.5 GW of weather related embedded generation (2GW of wind and 1.5GW of PV) is introducing errors in the demand forecasts, being currently not visible to National Grid. It was therefore explained that this information would enable network operators to forecast demand to a better accuracy thereby reducing the demand forecasting errors currently obtained.

4.16 National Grid highlighted that for planning studies specific scaling factors for different plants types are used, and as a result having information about the fuel types would be very useful.

4.17 The list of fuel type-definitions was discussed by the Workgroup and it was agreed that the types defined in the Regulatory Instructions and Guidance (RIGs) document (Ref: 83/07 version 2 published in April 2007) should be adopted as best practice. It was noted that the RIGs refers to the term ‘technology types’ instead of ‘fuel types’. Both terms are interchangeable for the purposes of this consultation.

Registered Capacity of each ESPS (MW and MVar)

4.18 The requirement for the registered capacity (MW and MVar) of each ESPS was discussed within the Workgroup on the basis that it would help National Grid to forecast the contribution of ESPS to active and reactive demand under different scenarios. DNO representatives were reasonably happy to provide the MW capacity but not the MVar capacity claiming that in general ESPS are assumed to operate at unity power factor although they typically have a capability of between 0.95 Power Factor lead and 0.95 Power Factor lag.

4.19 It was agreed within the Workgroup that only the MW capacity would be provided by the DNOs and that National Grid would assume that ESPS operate at unity power factor unless informed otherwise by the DNOs. It was agreed that DNOs would inform National Grid if certain plants were specifically instructed to contribute to reactive power and provide voltage support.

Connection Node on the single line diagram

4.20 The requirement for the connection node on the single line diagram where each ESPS connects to was articulated by National Grid as being an essential a piece of information that would allow locational demand to be evaluated more accurately.

4.21 It was agreed following the discussions that the connection point information would be provided at the lowest voltage level node, on the most up-to-date single line diagram, through which the ESPS would be expected to export the majority of its energy.

The geographical location of each ESPS

4.22 The requirement for the geographical location of each ESPS was discussed within the Workgroup where it was stated that the information is required to enable National Grid to accurately forecast the output of the ESPS based on a location specific weather condition. It was agreed this requirement would be only applicable to Wind and PV based ESPS as the outputs of other types of ESPS are independent of location.

4.23 National Grid also confirmed that only one geographical location would be required for each ESPS even if they comprised of a number of dispersed generators as this would be adequate for forecasting purposes.

4.24 For convenience, National Grid agreed to receive the location of the primary substation or higher voltage substation (whichever applies) as the DNOs already have the information directly available.

4.25 It was agreed within the Workgroup that the location of the primary substation (or higher voltage substation) would be specified using either geographical coordinates consisting of latitudes and longitudes or grid reference coordinates.

The Short Circuit Contribution of each ESPS

4.26 This topic was addressed within the Workgroup where National Grid requested that the fault in-feed for three phase faults were to be supplied at the relevant nodes on the single line diagram (or Bulk Supply Points – BSPs). DNOs were also requested to provide impedances between the nodes on the single line

diagram for meshed networks so that the fault current contribution of some ESPS could be evaluated at different BSPs.

4.27 DNO representatives explained that short circuit in-feed data is provided to National Grid for each node shown on the single line diagram via schedule 5 of the Week 24 submissions. However, this assumes that all ESPS are connected and can therefore contribute to the fault current.

4.28 To strengthen the need for this information, National Grid stated that that the running arrangements of certain substations had to be changed (i.e. split) due to the fault in-feed from the distribution networks. In operational timescales, some ESPS would not be connected, thereby reducing the overall fault in-feed. The running arrangement initially implemented because of a high fault level condition might no longer be optimal in operational timescales.

4.29 The Workgroup discussed how fault contributions from ESPS could be evaluated accurately in operational timescales by using the real time availability of the ESPS, the short circuit models of each individual unit and appropriate network models. Since the provision of all this information would be time consuming and out of the scope of the Workgroup, the requirement for the short circuit contributions was put aside by National Grid. It was agreed that if additional short circuit information relating to specific sites was required by National Grid under reasonable grounds, DNOs could then consider the request.

The voltage or power factor control of each ESPS

4.30 Reactive power contribution from ESPS was then discussed and National Grid explained that understanding the behaviour of ESPS with regards to reactive power could potentially help in better managing the voltage on the transmission system.

4.31 DNO representatives expressed concern that the information was not readily available and requested that the benefits be quantified before any resources and time was spent in obtaining the additional information. The DNOs explained that the ESPS mostly operate at unity power factor and therefore do not provide any reactive power support to the network.

4.32 It was agreed that the control mode (Voltage control or Power Factor control) of each ESPS would be provided to National Grid. Where the ESPS operated in Voltage control mode, the voltage set-point and the reactive range would be provided and where the ESPS operated in Power Factor control, the target power factor would be provided.

Loss of Mains protection types and settings

4.33 It was also highlighted that it would be highly beneficial to receive information about the Loss of Mains Protection types and relay settings as this would allow National Grid to estimate the amount of generation that could potentially trip following a large in-feed loss.

4.34 The group noted there was another Workgroup addressing the issue of RoCoF settings[2] and that there was a risk of duplicating work. National Grid explained that the Workgroup would only provide RoCoF (Rate of Change of Frequency) information on a one-off basis whilst the current Workgroup was seeking this information on an on-going basis.

4.35 It was concluded that DNOs should provide the Loss of Mains protection types and their relay settings for all ESPS connected during and after the Week 24 submission beginning 2015. For all ESPS connected prior to this date, the information should be provided on a reasonable endeavours basis. The group noted that there will be a need to review the Distribution Code to ensure that this information can be collected.

Requirements for ESPS below 1MW

4.36 A request was made by National Grid for DNOs to provide the following information about Embedded Small Power Stations with registered capacity below 1MW in order to increase the visibility of these small units. It was proposed that an accuracy level of 1MW on either side would be acceptable for each node.

- An equivalent power station per node on the single line diagram to represent an aggregation of all wind generation
- An equivalent power station per node on the single line diagram to represent an aggregation of all PhotoVoltaic (PV) generation
- An equivalent power station per node on the single line diagram to represent an aggregation of all other types of ESPS
- The geographical location of each node on the single line diagram where weather related intermittent power station (below 1MW individual capacity) have been identified.
- Loss of Mains protection types and relay settings

4.37 It was stated that DNOs were likely to have information for ESPS connected under the Engineering Recommendation (ER) G59 which covers generating units with a rating of above 16A per phase, equivalent to about 3.7 kW for single phase connections and 11.1 kW for 3 phase connections. However most PV-based ESPS, for which National Grid is seeking data, would be connected outside the scope of ER G59 and very often these generators do not inform DNOs about their connections. DNOs would therefore not have the required information for these units. It was also suggested that Feed-in-Tariff registers could be used to get a view of the ESPS below 1MW but the idea proved to be too complicated and was therefore dismissed.

4.38 It was recognised by National Grid that obtaining information about ESPS with registered capacities above 1MW was already a good step forward and that it might be too burdensome on the DNOs if more information was to be requested at this stage. There was a general consensus amongst the DNOs

[2] http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/Grid-code/Modifications/GC0035/

that the process should be staged and that it would be better to address the ESPS below 1MW in the future.

4.39 The Workgroup agreed not to progress proposals for information about ESPS below 1MW for the time being. It was recommended that National Grid should engage further with the DNOs in the future to ensure that an appropriate quality and quantity information can be obtained for the ESPS below 1MW.

Form of Demand Data

4.40 A request for demand data to be submitted in its pure form i.e. irrespective of the contribution from distributed generators was articulated by National Grid on the grounds that it would facilitate net demand forecasting. It was stated that knowing the pure demand along with registered capacity and fuel types of ESPS, would make the estimation of the net demand easier and more accurate.

4.41 To justify the requirement for pure demand further it was explained that the meshed nature of some DNO networks implied that having knowledge of the exact location and magnitude of demand independently from knowledge of the exact location and magnitude of ESPS will enable significantly more accurate network models to be developed for security analysis purposes.

4.42 The common view expressed by the DNOs to this effect was that National Grid was already provided, as part of the Week 24 submissions, with the net demand and the summated contribution from embedded generation at the GSPs. Therefore to obtain the pure demand, the net demand and the sum of the output from ESPS would need to be added.

4.43 It was highlighted by National Grid that the generation data submitted through the Week 24 route did not take into account all the ESPS and therefore the above methodology for calculating the pure demand would not be adequate. It was confirmed by the DNOs that the generation data submitted contained all the half-hourly metered ESPS. However below a certain threshold (30kW mentioned), data is not available on a half-hourly basis.

4.44 Since the Workgroup had concluded it was not appropriate to require DNOs to submit any information relating to ESPS below 1MW, the group decided not to pursue the concept of pure demand further. In addition, it was stated that the issue of “pure demand” would likely be a more relevant subject for discussion at other working groups such as that reviewing Engineering Recommendation P2/6, where the implications of understanding the security contribution from ESPS may be more pertinent.

Active Network Management

4.45 Active Network Management was also discussed and it was confirmed by the DNOs that National Grid would be informed, via the statement of works process, if any restriction was imposed on the power output from ESPS. This could happen for example if overloads occurred on National Grid’s assets in the case of an exporting Grid Supply Point or where a limit in export impacts on the management of the wider transmission system.

Alignment to European Codes

4.46 The Workgroup agreed that the information requested from the DNOs about the ESPS should be aligned to European legislation and that any definitions of terms used within the Grid Code with respect to the information requested from ESPS be aligned with the definitions of terms used in the European Codes as well as the GB Distribution Code.

4.47 The Workgroup discussed the implications of the European Commission's Regulation on transparency and provision of information in electricity markets. The group noted that the information that TSOs (which includes National Grid) and market participants were likely to be entitled to receive (and TSOs could be obliged to publish) under the Regulation with respect to ESPS was consistent with the dataset under discussion. The new regulation stipulated that static data for generation of 1MW and above (e.g. capacity) should be made available to all.

Data Submission and Implementation date

4.48 The proposed time scale of the data submission was confirmed to be together with the Week 24 Data submission. It was recognised that more information will need to be provided in the yearly submission but this would not substantially change from year to year given that the static data on each ESPS would rarely change. This would therefore reduce the on-going effort to maintain the data for subsequent years.

4.49 The implementation date for the changes to become effective was discussed. National Grid suggested the 2014 Week 24 data submission as a possible target date. However, considering the amount of data processing that DNOs would have to carry out as well as the time required for amending parts of the Distribution Code, the implementation date was postponed to the 2015 Week 24 data submission, which was considered more achievable.

4.50 The Workgroup noted there may be a need to gather some of the proposed data items prior to the implementation date of 2015 to satisfy the European Transparency regulation. This could be enacted via a staged implementation in the Grid Code or a separate information request. The Workgroup favoured implementing a single process change for 2015.

Workgroup Recommendations

4.51 The Workgroup recommended that changes to the Grid Code be progressed to Industry Consultation. The objective of these changes is to improve clarity with regards to the contribution of Embedded Small Power Stations (ESPS) to demand.

4.52 The Workgroup agreed that the additional information to be provided to National Grid would only apply to the Embedded Small Power Stations with a registered capacity of 1MW or more at this stage.

4.53 The Workgroup recommended that the following additional information be provided for each ESPS with registered capacity of 1 MW and above:

- A reference unique to each DNO licence area
- The fuel type or technology type, as per the definitions laid out in the

Regulatory Instructions and Guidance Document (RIGs), Ref: 83/07, version 2 published in April 2007.

- The registered capacity in MW (as defined in the Distribution Code)
- The lowest voltage level node on most up-to-date single line diagram to which it connects or exports most of its power
- The geographical location specified using latitude and longitude or grid reference coordinates of the primary or higher voltage substation, whichever is applicable. This is required only for wind and photo voltaic-based ESPS.
- The control mode (if it operates in voltage control or power factor control mode). Where it operates in voltage control mode the voltage set-point and reactive range to be provided. Where it operates in power factor mode the target power factor to be provided.
- Loss of main protection type and relay settings for all ESPS connected during or after the Calendar Week 24 data submission beginning 2015. For ESPS connected prior to this date, the information should be provided on a reasonable endeavour basis.

4.54 The Workgroup recommended that PC.A.3.1.4, PC.A.5.1.3 and PC.A.5.1.4 of the Planning Code and DRC 6.1.11 and Schedule 11 of the Data Registration Code be modified in order to capture the above information.

4.55 The implementation date for the provision of additional information about the ESPS was agreed to be the in line with the Week 24 data submission starting 2015.

4.56 The Distribution Code would need to be reviewed to ensure DNOs could capture any additional information that they may not currently capture relating to the ESPS (e.g. Loss of Mains protection type and relay settings).

Further development to the Workgroup's Recommendations

4.57 The Grid Code Review Panel and Distribution Code Review Panel asked for the Workgroup's recommendations to be taken forward in a single consultation covering the necessary Grid Code and Distribution Code changes. The proposals presented in this consultation have been refined in response to comments received from Panel members.

4.58 The Workgroup's recommendations were consistent with the regulation but made reference to the Regulatory Instructions and Guidance (RIGs) document in respect to fuel or technology type definitions. The proposals detailed in this consultation contain additional provisions relating to fuel type and technology type definitions. These are intended to minimise duplication and inconsistency between Grid Code and Distribution Code requirements and that of the European Commission's regulation.

4.59 To achieve this, the legal text presented Annex 1 provides for data to be submitted with respect to existing generators using either:

- The RiGs list of fuel or technology type; or
- The production type list contained in the Manual of Procedures for the

ENTSO-E Central Information Transparency Platform[3].

4.60 For generators connecting after June 2014, use of ENTSO-E's definitions is stipulated.

4.61 It should also be noted that the Workgroup's proposals did not cover all of the Grid Code changes that might be needed to meet the requirements of the Commission's regulations as these (outage information requirements for example) were outside the scope of the Workgroup but are being progressed under Grid Code issue GC0083.

[3] The latest draft is available here:

https://www.entsoe.eu/fileadmin/user_upload/_library/resources/Transparency/131031_MoP_Master_for_ACER_opinion_v1.8.pdf

5 Impact & Assessment

Impact on the Grid Code and Distribution Code

5.1 This consultation document seeks view on amendments to the following parts of the Grid Code:

- PC.A.3.1.4, PC.A.5.1.3 and PC.A.5.1.4
- DRC 6.1.11 and Schedule 11 of the Data Registration Code (DRC)

5.2 This consultation document seeks view on amendments to the following parts of the Distribution Code:

- DPC7.4.2.1 and DPC7.4.2.2
- DDRC Schedule 5a and 5b

5.3 The text required to give effect to the proposal is contained in Annex 1 of this document.

Impact on National Electricity Transmission System (NETS)

5.4 The proposed changes will facilitate more efficient investment decisions in transmission system development and will facilitate more efficient transmission system operation by enabling transmission companies to account for embedded generation appropriately.

Impact on the Distribution Networks

5.5 None identified.

Impact on Grid Code Users

5.6 The proposed changes to the Grid Code will increase the work required by Network Operators (DNOs) to supply information to National Grid.

Impact on Distribution Users

5.7 There will also be an impact on existing distributed generators, who may be contacted by Network Operators should the latter currently not have the information requested by National Grid (e.g. loss of main protection types and relay settings).

Impact on Greenhouse Gas emissions

5.8 The Workgroup recommendation will facilitate a reduction in demand forecasting errors and therefore a small reduction in the emissions associated with operating reserve.

Assessment against Grid Code Objectives

5.9 The proposal will better facilitate the Code objective:

to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;

This proposal better facilitates this objective by providing the information required to better forecast the demand presented to the transmission system for the purposes of operating and developing the transmission system

to facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);

The proposal has a neutral impact on this objective

subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole; and

The proposal better facilitates this objective by providing the information required to forecast the demand presented to the transmission system

to efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency.

The proposal facilitates the provision of a number of items of information needed to fulfil the requirements of the European Commission's transparency regulation.

Assessment against Distribution Code Objectives

5.10 The proposal will better facilitate the Code objective:

permit the development, maintenance, and operation of an efficient, co-ordinated, and economical system for the distribution of electricity

The proposal better facilitates this objective by clarifying the information provided by Embedded Small Power Stations to DNOs

facilitate competition in the generation and supply of electricity

The proposal better facilitates this objective by providing the information required to forecast the demand presented to the transmission system

efficiently discharge the obligations imposed upon distribution licensees by the distribution licences and comply with the Regulation and any relevant legally binding decision of the European Commission and/or the Agency for the Co-operation of Energy Regulators.

The proposal facilitates the provision of a number of items of information needed to fulfil the requirements of the European Commission's transparency regulation.

Implementation

5.11 The proposals should be implemented 10 business days after an Authority decision. Views are invited on this proposed implementation date. The proposed changes would require new information to be provided in 2015 along with the Week 24 data submissions.

6 Consultation Responses

6.1 Views are invited upon the proposals outlined in this consultation, which should be received by 25 March 2014. A response proforma is available on the National Grid website at the following link:

http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/Grid-code/Modifications/GC0075/

Please email your responses to: grid.code@nationalgrid.com

6.2 Responses are invited to the following questions:

- Is it necessary for Network Operators to pass additional information on distributed generation to National Grid for the purposes of planning, developing and operating the National Electricity Transmission System efficiently?
- Are there alternative ways of ensuring that the impact of distributed generation is accounted for appropriately by Transmission Licensees? If so, please explain what they are.
- Does the proposed Grid Code drafting implement the intended changes effectively?
- Does the proposed Distribution Code drafting implement the intended changes effectively?
- Do you believe that the proposal better facilitates Grid Code objectives?
- Do you believe that the proposal better facilitates Distribution Code objectives?
- Do you believe that the proposed implementation approach and timescales are appropriate?

6.3 If you wish to submit a confidential response please note the following:

(i) Information provided in response to this consultation will be published on National Grid's website unless the response is clearly marked "Private and Confidential", we will contact you to establish the extent of the confidentiality. A response marked "Private and Confidential" will be disclosed to the Authority in full but, unless agreed otherwise, will not be shared with the Grid Code Review Panel or the industry and may therefore not influence the debate to the same extent as a non-confidential response.

(ii) Please note an automatic confidentiality disclaimer generated by your IT System will not in itself, mean that your response is treated as if it had been marked "Private and Confidential".

7 Annex 1 - Proposed Legal Text

7.1 This section contains the proposed legal text to give effect to the proposals. The proposed new Grid Code text is in red and is based on Grid Code Issue 5 Revision 6. The proposed new Distribution Code text is in red and is based on Distribution Code Issue 21.

Changes to the Grid Code: Planning Code, Part 1 – Standard Planning Data

PART 1 – STANDARD PLANNING DATA

…

PC.A.3 GENERATING UNIT AND DC CONVERTER DATA

…

Embedded

…

PC.A.3.1.4 (a) PC.A.4.2.4(b) and PC.A.4.3.2(a) explain that the forecast **Demand** submitted by each **Network Operator** must be net of the output of all **Small Power Stations** and **Medium Power Stations** and **Customer Generating Plant** and all installations of direct current converters which do not form a **DC Converter Station**, **Embedded** within that **Network Operator's System**. The **Network Operator** must inform **NGET** of:

i) the number of such **Embedded Power Stations** and such **Embedded** installations of direct current converters (including the number of **Generating Units** or **Power Park Modules** or **DC Converters**) together with their summated capacity; and

ii) beginning from 2015, for each **Embedded Small Power Station** of registered capacity (as defined in the **Distribution Code**) of 1MW or more:

A reference which is unique to each **Network Operator**

The technology type(s) used, selected from the list set out at paragraph 2.23 in Version 2 of the Regulatory Instructions and Guidance relating to the distributed generation incentive, innovation funding incentive and registered power zones, reference 83/07, published by Ofgem in April 2007 or ii) the production type as defined in the Manual of Procedures for the ENTSO-E Central Information Transparency Platform together with a statement as to whether the generation form parts of a CHP scheme.

For each **Embedded Small Power Station** connected to the **Users' System** during or after the calendar week 24 in 2015, the production type as defined in the Manual of Procedures for the ENTSO-E Central Information Transparency Platform together with a statement as to whether the generation form parts of a CHP scheme.

The registered capacity (as defined in the **Distribution Code**) in MW.

The lowest voltage level node that is specified on the most up-to-date **Single Line Diagram** to which it connects or where it will export most of its power.

Where it generates electricity from wind or PV, the geographical location using either latitude and longitude or grid reference coordinates of the primary or higher voltage substation to which it connects.

The control mode, i.e. if it operates in voltage control or **Power Factor** mode. Where it operates in voltage control mode, the voltage set-point and reactive range and where it operates in **Power Factor** mode, the target **Power Factor**.

Details of the types of loss of mains **Protection** in place and their relay settings for each **Embedded Small Power Station** connected to the **Users' System** during or after the calendar week 24 in 2015. For **Embedded Small Power Stations** connected to the **Users' system** before the 2015 calendar week 24, the requirement to provide the types of loss of mains **Protection** and their relay settings shall be on a reasonable endeavours basis.

b) On receipt of this data, the **Network Operator** or **Generator** (if the data relates to **Power Stations** referred to in PC.A.3.1.2) may be further required, at **NGET's** reasonable discretion, to provide details of **Embedded Small Power Stations** and **Embedded Medium Power Stations** and **Customer Generating Plant** and **Embedded** installations of direct current converters which do not form a **DC Converter Station**, both current and forecast, as specified in PC.A.3.2 to PC.A.3.4. Such requirement would arise where **NGET** reasonably considers that the collective effect of a number of such **Embedded Power Stations** and **Customer Generating Plants** and **Embedded** installations of direct current converters may have a significant system effect on the **National Electricity Transmission System**.

Changes to the Grid Code: Planning Code, Part 2 – Detailed Planning Data

PART 2 – DETAILED PLANNING DATA

P C.A.5 GENERATING UNIT, POWER PARK MODULE, DC CONVERTER AND OTSDUW PLANT AND APPARATUS DATA

PC.A.5.1 Introduction

Directly Connected

PC.A.5.1.1 Each **Generator** (including those undertaking **OTSDUW**), with existing or proposed **Power Stations** directly connected, or to be directly connected, to the **National Electricity Transmission System**, shall provide **NGET** with data relating to that **Plant** and **Apparatus**, both current and forecast, as specified in PC.A.5.2, PC.A.5.3, PC.A.5.4 and PC.A.5.7 as applicable. Each **DC Converter Station** owner, with existing or proposed **DC Converter Stations** (including **Generators** undertaking **OTSDUW** which includes an **OTSDUW DC Converter**) directly connected, or to be directly connected, to the **National Electricity Transmission System**, shall provide **NGET** with data relating to that **Plant** and **Apparatus**, both current and forecast, as specified in PC.A.5.2 and PC.A.5.4.

Embedded

PC.A.5.1.2 Each **Generator**, in respect of its existing, or proposed, **Embedded Large Power Stations** and its **Embedded Medium Power Stations** subject to a **Bilateral Agreement** and each **Network Operator** in respect of **Embedded Medium Power Stations** not subject to a **Bilateral Agreement** within its **System** shall provide **NGET** with data relating to each of those **Large Power Stations** and **Medium Power Stations**, both current and forecast, as specified in PC.A.5.2, PC.A.5.3, PC.A.5.4 and PC.A.5.7 as applicable. Each **DC Converter Station** owner, or **Network Operator** in the case of an **Embedded DC Converter Station** not subject to a **Bilateral Agreement** within its **System** with existing or proposed **DC Converter Stations** shall provide **NGET** with data relating to each of those **DC Converter Stations**, both current and forecast, as specified in PC.A.5.2 and PC.A.5.4. However, no data need be supplied in relation to those **Embedded Medium Power Stations** or **Embedded DC Converter Stations** if they are connected at a voltage level below the voltage level of the **Subtransmission System** except in connection with an application for, or under a, **CUSC Contract** or unless specifically requested by **NGET** under PC.A.5.1.4.

PC.A.5.1.3 Each **Network Operator** need not submit **Planning Data** in respect of **Embedded Small Power Stations** unless required to do so under PC.A.1.2 (b), PC.A.3.1.4 or unless specifically requested under PC.A.5.1.4 below, in which case they will supply such data.

PC.A.5.1.4 PC.A.4.2.4(b) and PC.A.4.3.2(a) explained that the forecast **Demand** submitted by each **Network Operator** must be net of the output of all **Medium Power Stations** and **Small Power Stations** and **Customer Generating Plant Embedded** within that **User's System**. In such cases ~~(PC.A.3.1.4 also refers),~~ the **Network Operator** must provide ~~inform~~ **NGET** with the information specified under PC.A.3.1.4 ~~of the number of such **Power Stations** (including the number of **Generating Units**) together with their~~

~~summated capacity~~. On receipt of this data further details may be required at **NGET's** discretion as follows:

(i) in the case of details required from the **Network Operator** for **Embedded Medium Power Stations** not subject to a **Bilateral Agreement** and **Embedded DC Converter Stations** not subject to a **Bilateral Agreement** and **Embedded Small Power Stations** and **Embedded DC Converters** in each case within such **Network Operator's System** and **Customer Generating Plant**; and

(ii) in the case of details required from the **Generator** of **Embedded Large Power Stations** and **Embedded Medium Power Stations** subject to a **Bilateral Agreement**; and

(iii) in the case of details required from the **DC Converter Station** owner of an **Embedded DC Converter** or **DC Converter Station** subject to a **Bilateral Agreement**.

both current and forecast, as specified in PC.A.5.2 and PC.A.5.3. Such requirement would arise when **NGET** reasonably considers that the collective effect of a number of such **Embedded Small Power Stations**, **Embedded Medium Power Stations**, **Embedded DC Converter Stations**, **DC Converters** and **Customer Generating Plants** may have a significant system effect on the **National Electricity Transmission System**.

Changes to the Grid Code: Data Registration Code, DRC.6 Data to be Registered

DRC.6.1.11 Schedule 11 - Connection Point Data

Comprising information relating to **Demand**, demand transfer capability, and ~~a summary of~~ the **Small Power Station**, **Medium Power Station** and **Customer** generation connected to the **Connection Point**

Changes to the Grid Code: Data Registration Code, Schedule 11 Connection Point Data

SCHEDULE 11 - CONNECTION POINT DATA
PAGE 2 OF 3

Embedded Generation Data											
Connection Point:											
DATA DESCRIPTION	Outturn	Outturn Weather Corrected	F.Yr 1	F.Yr 2	F.Yr. 3	F.Yr. 4	F.Yr. 5	F.Yr 6	F.Yr 7	F.Yr 8	DATA CAT
Small Power Station, **Medium Power Station** and **Customer** Generation Summary	For each **Connection Point** where there are **Embedded Small Power Stations**, **Medium Power Stations** or **Customer Generating Stations** the following information is required:										
No. of **Small Power Stations**, **Medium Power Stations** or **Customer Power Stations**											**PC.A.3.1.4 (a)**
Number of **Generating Units** within these stations											**PC.A.3.1.4 (a)**
Summated Capacity of all these **Generating Units**											**PC.A.3.1.4 (a)**
Where the **Network Operator's System** places a constraint on the capacity of an **Embedded Large Power Station**											
Station Name											**PC.A.3.2.2 (c)**
Generating Unit											**PC.A.3.2.2 (c)**
System Constrained Capacity											**PC.A.3.2.2 (c)(i)**
Reactive Despatch Network Restriction											**PC.A.3.2. (c)(ii)**

Where the **Network Operator's System** places a constraint on the capacity of an **Offshore Transmission System** at an **Interface Point**											
Offshore Transmission System Name											**PC.A.3.2.2 (c)**
Interface Point Name											**PC.A.3.2.2 (c)**
Maximum Export Capacity											**PC.A.3.2.2 (c)**
Maximum Import Capacity											**PC.A.3.2.2 (c)**

For each **Embedded Small Power Station** of 1MW and above, the following information is required, effective 2015 in line with the Week 24 data submissions.												
DATA DESCRIPTION	An **Embedded Small Power Station** reference unique to each **Network Operator**	Connection Date (**Financial Year** for generator connecting after week 24 2015)	Generator unit Reference	Technology Type / Production type	CHP (Y/N)	Registered capacity in MW (as defined in the **Distribution Code**)	Lowest voltage node on the most up-to-date **Single Line Diagram** to which it connects or where it will export most of its power	Where it generates electricity from wind or PV, the geographical location of the primary or higher voltage substation to which it connects	Control mode	Control mode voltage target and reactive range or target pf (as appropriate)	Loss of mains protection type	Loss of mains protection settings
DATA CAT	PC.A.3.1.4 (a)		PC.A.3.1.4 (a)	PC.A.3.1.4 (a)	PC.A.3.1.4	PC.A.3.1.4 (a)	PC.A.3.1.4 (a)	PC.A.3.1.4 (a)	PC.A.3.1.4 (a)	PC.A.3.1.4 (a)	PC.A.3.1.4 (a)	PC.A.3.1.4 (a)

SCHEDULE 11 - CONNECTION POINT DATA
PAGE 3 OF 3

NOTES:

1. 'F.Yr.' means '**Financial Year**'. F.Yr. 1 refers to the current financial year.

2. All **Demand** data should be net of the output (as reasonably considered appropriate by the **User**) of all **Embedded Small Power Stations**, **Medium Power Stations** and **Customer Generating Plant**. Generation and / or Auxiliary demand of **Embedded Large Power Stations** should not be included in the demand data submitted by the **User**. **Users** should refer to the **PC** for a full definition of the **Demand** to be included.

3. Peak **Demand** should relate to each **Connection Point** individually and should give the maximum demand that in the **User's** opinion could reasonably be imposed on the **National Electricity Transmission System**. **Users** may submit the **Demand** data at each node on the **Single Line Diagram** instead of at a **Connection Point** as long as the **User** reasonably believes such data relates to the peak (or minimum) at the **Connection Point**.

   In deriving **Demand** any deduction made by the **User** (as detailed in note 2 above) to allow for **Embedded Small Power Stations**, **Medium Power Stations** and **Customer Generating Plant** is to be specifically stated as indicated on the Schedule.

4. **NGET** may at its discretion require details of any **Embedded Small Power Stations** or **Embedded Medium Power Stations** whose output can be expected to vary in a random manner (eg. wind power) or according to some other pattern (eg. tidal power)

5. Where more than 95% of the total **Demand** at a **Connection Point** is taken by synchronous motors, values of the **Power Factor** at maximum and minimum continuous excitation may be given instead. **Power Factor** data should allow for series reactive losses on the **User's System** but exclude reactive compensation network susceptance specified separately in Schedule 5.

6. Where a **Reactive Despatch Network Restriction** is in place which requires the generator to maintain a target voltage set point this should be stated as an alternative to the size of the **Reactive Despatch Network Restriction**.

Changes to the Distribution Code: Distribution Planning and Connection Code (DPC), Generating Plant Performance Requirements

DPC7.4.2 **Control Arrangements**

DPC7.4.2.1 The **DNO** will specify in writing if a continuously acting fast response automatic excitation control system is required to control the **Generating Set** voltage without instability over the entire operating range of the **Generating Set** or **Power Station**. This will be dependent on the size and type **Generating Set** or **Power Station** and the adjacent part of the **DNO's Distribution System** to which it is connected.

DPC7.4.2.2 The **Generator** will notify, and keep notified, the DNO of the agreed set points of the control scheme for voltage control or **Power Factor** control. The information to be provided is detailed in **Schedules in 5a and 5b**.

Changes to the Distribution Code, Distribution Data and Registration Code (DDRC), Schedule 5a

POWER STATION DATA FOR ALL EMBEDDED POWER STATIONS EXCLUDING THE OTSO

DATA DESCRIPTION ***5a Power Station Data***	***UNITS***	***DATA CATEGORY***
APPLICANT'S DETAILS		
Customer's Details		
Company name	Text	**SPD**
Company registered number	Text	**SPD**
Postal address	Text	**SPD**
Contact name	Text	**SPD**
Email address	Text	**SPD**
Telephone number	Text	**SPD**
Facsimile number	Text	**SPD**
Consultant's Details (if applicable)		
Consultant's name	Text	**SPD**
Postal address	Text	**SPD**
Contact name	Text	**SPD**
Email address	Text	**SPD**
Telephone number	Text	**SPD**
Facsimile number	Text	**SPD**
POWER STATION LOCATION AND OPERATION		
Power Station name	Text	**SPD**
Details of any existing **Connection Agreements** for this **Power Station**	Text	**SPD**
Target date for the provision of the connection / commissioning of the **Power Station**	Text	**SPD**
Postal address or site boundary plan (1/500)	Text / Plan	**SPD**
Connection Point (OS grid reference or description)	Text	**SPD**
Connection Point voltage	V	**SPD**
Single line diagram of any on-site existing or proposed electrical plant or, where available, **Operation Diagrams**	Diagram	**SPD**

DATA DESCRIPTION ***5a Power Station Data***	***UNITS***	***DATA CATEGORY***
What security is required for the connection? (see note 1)	Text	**SPD**
Number of **Generation Sets** in **Power Station**	Number	**SPD**
Are all **Generation Sets** of the same design/rating? (If not complete the relevant Schedules 5b and 5c for each type)	Y/N	**SPD**
Will the **Power Station** operate in islanded mode?	Y/N	**SPD**
Will **Generating Plant** supply electricity to on-site premises?	Y/N	**SPD**
POWER STATION STANDBY IMPORT REQUIREMENTS (see note 2)		
Maximum **Active Power** import	MW	**SPD**
Maximum **Reactive Power** import (lagging)	MVAr	**SPD**
Maximum **Reactive Power** export (leading)	MVAr	**SPD**
POWER STATION TOP-UP IMPORT REQUIREMENTS (see note 3)		
Maximum **Active Power** import	MW	**SPD**
Maximum **Reactive Power** import (lagging)	MVAr	**SPD**
Maximum **Reactive Power** export (leading)	MVAr	**SPD**
POWER STATION EXPORT REQUIREMENTS (see note 4)		
Total **Power Station** output at **Registered Capacity** (net of auxiliary loads)		
Registered Capacity (maximum **Active Power** export)	MW	**SPD**
Maximum **Reactive Power** export (lagging)	MVAr	**SPD**
Maximum **Reactive Power** import (leading)	MVAr	**SPD**
Total **Power Station** output at **Minimum Generation** (net of auxiliary loads)		
Minimum Generation (minimum **Active Power** export)	MW	**DPD**
Maximum **Reactive Power** export (lagging)	MVAr	**DPD**
Maximum **Reactive Power** import (leading)	MVAr	**DPD**
Power Station performance chart (net, at **Connection Point**, as per DPC7 Figure 1)	Figure	**DPD**
POWER STATION MAXIMUM FAULT CURRENT CONTRIBUTION (see note 5)		
Peak asymmetrical short circuit current at 10ms (i_p) for a 3φ short circuit fault at the **Connection Point**	kA	**SPD**

DATA DESCRIPTION ***5a Power Station Data***	***UNITS***	***DATA CATEGORY***
RMS value of the initial symmetrical short circuit current (I_k") for a 3φ short circuit fault at the **Connection Point**	kA	**SPD**
RMS value of the symmetrical short circuit current at 100ms ($I_{k(100)}$) for a 3φ short circuit fault at the **Connection Point**	kA	**SPD**
Short circuit time constant T", corresponding to the change from I_k" to $I_{k(100)}$	s	**DPD**
Positive sequence X/R ratio at the instant of fault	-	**DPD**
POWER STATION INTERFACE ARRANGEMENTS (see note 6)		
Means of connection, disconnection and synchronising between **DNO** and **User**	Method statement	**SPD**
Site protection / co-ordination arrangements with DNO	Report	**DPD**
Precautions should neutral become disconnected from earth (LV only see ER G59/2-1)	Report	**DPD**
Site communications, control and monitoring (HV / LV)	Report	**DPD**

DATA DESCRIPTION **5a continued**	**UNITS**	**Data Category for Generators connected at LV**	**Data Category for Generators Connected at HV**
POWER STATION G59 PROTECTION (see note 7)			
U/V Stage 1	V and s	**SPD**	**SPD**
U/V Stage 2	V and s	**SPD**	**SPD**
O/V Stage 1	V and s	**SPD**	**SPD**
O/V Stage 2	V and s	**SPD**	**SPD**
U/F Stage 1	Hz and s	**SPD**	**SPD**
U/F Stage 2	Hz and s	**SPD**	**SPD**
O/F Stage 1	Hz and s	**SPD**	**SPD**
O/F Stage 2	Hz and s	**SPD**	**SPD**
LoM (RoCoF)	Hzs^{-1} and s	**SPD**	**SPD**
LoM (Vector Shift)	degrees	**SPD**	**SPD**

DATA DESCRIPTION 5a continued	UNITS	Data Category for Generators connected at LV	Data Category for Generators Connected at HV
LoM (Other)		SPD	SPD

Notes:

1. The **DNO** will assume a single circuit connection to the **Power Station** is required unless stated otherwise. Options include:-
    a. Single circuit connection
    b. Manually switched alternative connection
    c. Automatic switched alternative connection
    d. Firm connection (secure for first circuit outage)
2. This section relates to operating conditions when the **Power Station** is importing **Active Power**, typically when it is not generating. The maximum **Active Power** import requirement and the associated maximum **Reactive Power** import and/or export requirements should be stated.
3. This section relates to operating conditions when the **Power Station** is importing **Active Power**, typically when it is generating, but is not generating sufficient power to cater for all the on-site demand. The maximum **Active Power** import requirement and the associated maximum **Reactive Power** import and/or export requirements should be stated.
4. This section relates to operating conditions when the **Power Station** is exporting **Active Power**. The **Active Power** export and associated maximum **Reactive Power** range should be stated for operation at **Registered Capacity** and for operation at **Minimum Generation**.
5. See ER G74, ETR 120 and IEC 60909 for guidance on fault current data. Additionally, fault current contribution data may be provided in the form of detailed graphs, waveforms and/or tables. This information need not be provided where detailed fault level contribution / impedance data is provided for each **Generation Set** in Schedules 5b or 5c.
6. The interface arrangements need to be agreed and implemented between the **User** and the **DNO** before energisation and consideration should be given to addressing the Distribution Code requirements including DGC5, DGC8, DPC6.7, DPC7.2.6, DOC5, DOC7.4, DOC8.6.3, DOC8.6.4, DOC9 and DOC10. For example DOC7 requires that up to date contact details are provided and procedures are agreed to establish an effective means of communication between the **Generator** and the **DNO**.
7. This information need not be provided where the G59 interface protection is provided on each individual **Generation Set**. In such cases the information should be provide in Schedule 5b.

Changes to the Distribution Code, Distribution Data and Registration Code (DDRC), Schedule 5b

DATA DESCRIPTION **5b Generation Set Data**	**UNITS**	**Data Category for Generators connected at LV**	**Data Category for Generators Connected at HV**
GENERATION SET GENERAL DATA			
Number of **Generation Sets** to which this data applies	Value	**SPD**	**SPD**
Type of **Generation Set**: Synchronous Generator, Fixed Speed Induction Generator, Double Fed Induction Generator, Series Convertor Connected Generator, Other (provide details)	Text	**SPD**	**SPD**
Technology Type / Production Type	Text	**SPD**	**SPD**
CHP	N/Y	**SPD**	**SPD**
Operating regime – intermittent or non-intermittent (see note 1)	Text	**SPD**	**SPD**
GENERATION SET OUTPUT DATA			
Rated terminal voltage (generator)	V	**SPD**	**SPD**
Rated terminal current (generator)	A	**SPD**	**SPD**
Generation Set Registered Capacity	MW	**SPD**	**SPD**
Generation Set apparent power rating (to be used as base for generator parameters)	MVA	**SPD**	**SPD**
Generation Set rated **Active Power**	MW	**SPD**	**SPD**
Maximum measured **Active Power** P_{60} (see note 3)	MW	**DPD**	**DPD**
Maximum measured **Active Power** $P_{0.2}$ (see note 3)	MW	**DPD**	**DPD**
Minimum Generation (set connected; net of auxiliary loads)	MW	**DPD**	**DPD**
Generation Set Reactive Power capability at rated **Active Power** (gross, at generator terminals)			
Maximum **Reactive Power** export (lagging)	MVAr	**DPD**	**SPD**
Maximum **Reactive Power** import (leading)	MVAr	**DPD**	**SPD**
Generation Set performance chart (gross, at generator terminals, as per DPC7 Figure 1)	Figure	**DPD**	**DPD**

DATA DESCRIPTION **5b Generation Set Data**	**UNITS**	**Data Category for Generators connected at LV**	**Data Category for Generators Connected at HV**
GENERATION SET MAXIMUM FAULT CURRENT CONTRIBUTION (see note 4)			
Peak asymmetrical short circuit current at 10ms (i_p) for a 3φ short circuit fault at the **Generation Set** terminals	kA	None	**SPD**
RMS value of the initial symmetrical short circuit current (I_k") for a 3φ short circuit fault at the **Generation Set** terminals	kA	None	**SPD**
RMS value of the symmetrical short circuit current at 100ms ($I_{k(100)}$) for a 3φ short circuit fault at the **Generation Set** terminals	kA	**SPD**	**SPD**
Short circuit time constant T", corresponding to the change from I_k" to $I_{k(100)}$	s	None	**DPD**
Positive sequence X/R ratio at the instant of fault	-	None	**DPD**
GENERATION SET VOLTAGE CONTROL			
If operating in **Power Factor** control mode, allowable **Power Factor** range		**SPD**	**SPD**
If operating in **Power Factor** control mode, target **Power Factor**		**SPD**	**SPD**
If operating in voltage control mode, voltage set point	V	**SPD**	**SPD**
If operating in voltage control mode, reactive range		**SPD**	**SPD**
If operating in any other control mode, description of the parameters and set points	Text	**SPD**	**SPD**
GENERATION SET INSTALLED G59 PROTECTION (see note 5)			
U/V Stage 1	V and s	**SPD**	**SPD**
U/V Stage 2	V and s	**SPD**	**SPD**
O/V Stage 1	V and s	**SPD**	**SPD**
O/V Stage 2	V and s	**SPD**	**SPD**
U/F Stage 1	Hz and s	**SPD**	**SPD**
U/F Stage 2	Hz and s	**SPD**	**SPD**

DATA DESCRIPTION **5b Generation Set Data**	**UNITS**	**Data Category for Generators connected at LV**	**Data Category for Generators Connected at HV**
O/F Stage 1	Hz and s	**SPD**	**SPD**
O/F Stage 2	Hz and s	**SPD**	**SPD**
LoM (RoCoF)	Hzs^{-1} and s	**SPD**	**SPD**
LoM (Vector Shift)	degrees	**SPD**	**SPD**
LoM (Other)		**SPD**	**SPD**

Notes:

1. The Technology Type should be selected from the list set out at paragraph 2.23 in Version 2 of the Regulatory Instructions and Guidance relating to the distributed generation incentive, innovation funding incentive and registered power zones, reference 83/07, published by Ofgem in April 2007. The Production Type is as defined in the Manual of Procedures for the ENTSO-E Central Information Transparency Platform. The Production Type should be quoted for all new connection applications made after June 2014.
2. Intermittent and Non-intermittent Generation is defined in ER P2/6 as follows:
   - Intermittent Generation: Generation plant where the energy source for the prime mover can not be made available on demand
   - Non-intermittent Generation: Generation plant where the energy source for the prime mover can be made available on demand
3. For wind turbines only - IEC 61400-21 (P_{60} and $P_{0.2}$)
4. See ER G74, ETR 120 and IEC 60909 for guidance on fault current data. Additionally, fault current contribution data may be provided in the form of detailed graphs, waveforms and/or tables. This information need not be provided where detailed fault level contribution / impedance data is provided for the site in Schedule 5a or for each Error! Reference source not found. in Schedules 5c.
5. This information need not be provided where the G59 interface protection is provided on a per **Power Station** basis. In such cases the information should be provide in Schedule 5a.

8 Annex 2 - Terms of Reference

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GCRP Workgroup on Information on Embedded Small Power Stations and its Impact on Transmission System Demand

TERMS OF REFERENCE

Governance

1. This Workgroup, entitled "Information on Embedded Small Power Stations and its Impact on Transmission System Demand " is established by the Grid Code Review Panel.

2. The group shall formally report to the GCRP.

Membership

3. The Workgroup shall comprise a suitable and appropriate cross-section of experience and expertise from across the industry, which shall include:

Name	Role	Representing
Graham Stein	Chair	National Grid
Djaved Rostom	Technical Secretary	National Grid
Vandad Hamidi	National Grid Representative	National Grid
Brian Roberts	National Grid Representative	National Grid
Damien McCluskey	National Grid Representative	National Grid
Andrew Kensley	National Grid Representative	National Grid
Saeed Ahmed	DNO Representative	GTC
Andrew Akani	DNO Representative	Western Power
Peter Bolitho/ Paul Brennan	Generator Representative	Waters Wye
Ian Fletcher	DNO Representative	Northern Powergrid
Paul Graham	Generator Representative	UK Power Reserve
Mike Kay	DNO Representative	Electricity North West
Campbell McDonald	Generator Representative	SSE Generation
Kenny Stott/ Ammad Zulfikar	DNO Representative	SSE

Meeting Administration

4. The frequency of Workgroup meetings shall be defined as necessary by the Workgroup chair to meet the scope and objectives of the work being undertaken at that time.

5. National Grid will provide technical secretary resource to the Workgroup and handle administrative arrangements such as venue, agenda and minutes.

6. The Workgroup will have a dedicated section under the Grid Code part of National Grid's website. This will enable information such as minutes and presentations to be available to a wider audience.

Scope

7. The Workgroup will:

- Review the information currently provided by Network Operators to National Grid concerning Embedded Small Power Stations;
- Review how this information is used to develop, plan and operate the Transmission System;
- Identify any inconsistencies between how Small Power Stations connected to Users' networks can be accounted for in the development, planning and operation of the Transmission System compared to Medium and Large Power Stations;
- Identify any information which is necessary and not provided;
- Identify any information which is provided but is no longer necessary;
- Develop recommendations to eliminate inconsistencies, omissions or unnecessary information provision where there is a material benefit in doing so.
- Take account of relevant international practice and the approach taken in European Code development.

Deliverables

8. The Workgroup will provide updates and a Workgroup report to the Grid Code Review Panel which will:

- Detail the findings of the Workgroup;
- Draft, prioritise and recommend changes to the Grid Code, Distribution Code and associated documents in order to implement the findings of the Group; and
- Highlight any consequential changes which are or may be required.

Timescales

9. It is anticipated that this Workgroup will discuss the issue and determine appropriate timescales. Once these timescales have been determined, the Workgroup will confirm with the GCRP that they are suitable.

10. If for any reason the Workgroup is in existence for more than one year, there is a responsibility for the Workgroup to produce a yearly update report, including but not

limited to; current progress, reasons for any delays, next steps and likely conclusion dates.