Minutes

Meeting name	Information on Small Embedded Power Stations and Impact on Demand
Meeting number	3
Date of meeting	16th April 2013
Time	10:00am – 14:00pm
Location	Meeting Room B3.1, National Grid House, Warwick.

Attendees

Name	Initials	Company
Graham Stein	GS	National Grid
Damien McCluskey	DM	National Grid
Vandad Hamidi	VH	National Grid
Jack Barber	JB	National Grid
Brian Roberts	BR	National Grid
Djaved Rostom	DR	National Grid
Andrew Akani	AA	Western Power Distribution
Peter Bolitho	PB	Waters Wye Associates
Ian Fletcher	IF	Northern Powergrid
Paul Graham	PG	UK Power Reserve
Campbell McDonald	CM	SSE Generation
Kenny Stott	KS	SSE

Apologies

Name	Initials	Company
Joe Dunn	JD	SP Power Systems
Deborah MacPherson	DP	SP Power Systems
Mike Kay	MK	Electricity North West
Saeed Ahmed	SA	GTC

1 Introductions/Apologies for Absence

GS welcomed all the attendees to the third Workgroup meeting and invited all the participants to introduce themselves to the Workgroup.

2 Main points of meeting

1. GS kicked off the meeting by going through the agenda and the actions that were raised from the previous meeting. The minutes of the preceding meeting were agreed by all the attendees.

2. There were two actions on National Grid from the previous meeting, one of which was to update the list of requirements. This was circulated to the Workgroup members. The second action was for National Grid to confirm whether actual generation data at specific times was required in addition to the registered capacity of Small Embedded Power Stations (SEPS). BR and VH confirmed that only the registered capacity would be required although BR added that any forecast of generation for the SEPS would be welcomed if available from DNOs.

3. GS gave a presentation to remind the Workgroup members about the impact of embedded generation on boundary transfers and Q/P ratios. VH explained how SEPS can have an impact on investment decisions and used the Western HVDC link as an example of a network reinforcement whose need case is strengthened by the growth of SEPS in Scotland.

4. GS also recapped on the sections of the Grid Code that will be under review following the deliberations of the Workgroup.

5. KS queried the use of 65% as a scaling factor for Wind and VH explained the assumptions that are made under the GSR09 economy criteria of the SQSS which National Grid uses to plan the system.

6. BR clarified that for forecasting purposes, National Grid would prefer all demand data to represent the pure demand (i.e. the total demand prior to the effective reduction by the SEPS) at the nodes on the Single Line Diagram (SLD).

   IF and AA explained that presently, the DNOs provide National Grid with the net demand and the total sum of generation from SEPS at the GSPs as part of the Week 24 submissions. IF and AA explained that in order to obtain the pure demand, the net demand and the generation would simply need to be added.

   Both IF and AA expressed a strong preference in providing the demand information in a split format i.e. to provide net demand and generation independently rather than adding them up to provide a pure demand. IF and AA were concerned that certain departments within National Grid may still require the information as split and by providing the pure demand, the granularity of the information provided would be lost. IF and AA expressed their views against providing two sets of information to different departments in National Grid and preferred that National Grid takes the responsibility of carrying out the addition to obtain the pure demand.

   BR highlighted that the generation data submitted through the Week 24 route did not take into account all the Small Embedded Power Stations (SEPS) and therefore the summation of the quoted SEPS and the net demand would not yield the pure demand. BR emphasised that he would prefer that DNOs provided the demand irrespective of embedded generation as they should be in a better position to identify pure demand. National Grid would carry out its own forecast the output of the Small Embedded Power Stations to confirm compliance to licence standards. At their own discretion, DNOs could also provide the outturn data for Small Embedded Power Stations and a forecast of the output of the SEPS for the times identified in PC.A.4.3.1.

(Post Meeting note from IF: The week 24 submissions (for Northern Powergrid at least) take into account all half hourly metered Small Embedded Power Stations (SEPS). There is currently no way of determining what the pure demand on the network is for multiple reasons such as: half-hourly metering is only mandatory for supplies with peak demands exceeding 100kW, below that threshold its understood that the Registrant has some flexibility about specifying the type of metering, anything less than 30kW peak is almost certainly non-half hourly metered. It is uncertain at this stage whether smart metering will provide the level of granularity to determine pure demand.
Changing from net demand to pure demand in the week 24 submissions may require a change in forecasting methodology by DNOs otherwise higher demand forecast requirements would result).

7. BR explained that, at the time of the peak GB Transmission System Demand, demand data is required for each node shown on the SLD (PC.A.4.3.4) and this data must be consistent with those provided for the same time at the GSP level (PC.A.4.3.1 (b)).

(Post Meeting note: The ratio of GSP to distribution demand data is used by National Grid to populate all operational security studies (tens of thousands of operational studies). For operational safety, security and best industry practice, detailed modelling into the distribution network is required where the distribution network interconnect transmission connection points. Increasingly, the impact of Small Embedded Power Stations is modifying the net demand data and in an intermittent manner)

8. BR also explained that the meshed nature of some DNO networks means that knowledge of the exact location and magnitude of demand independently from knowledge of the exact location and magnitude of Small Embedded Power Stations will enable significantly more accurate network models for security analysis purposes facilitating, for the first time, the ability to flex the intermittent nature of the new mix of Small Embedded Power Stations thus yielding better confidence in operational planning.

(Post Meeting Note: In operational timescales, as the DNO flexes the distribution topology to meet its own security requirements, the changes must be communicated to National Grid so that they can be assessed via operational studies to determine whether they would have any potential impact on the transmission system. This communication is formally enacted in two ways by obligations documented in OC2.4.1.3.3 and OC2.4.2.2. For those parts of the distribution networks that interconnects transmission connection points, absolute clarity of network and location of demand and embedded generation is necessary. For simple radial distribution networks that are represented as a single node in the data submission to NGET this data exchange is consequentially simple.)

9. VH added that the embedded generation data provided as part of the Week 24 submissions does not contain any information about the fuel types of the Small Embedded Power Stations. If the fuel type or motive force was known, then this knowledge could be used for forecasting their output power. Combining this with knowledge of the distribution network configuration and with a good forecast of true demand will enable the impact on the transmission system to be studied and assessed for licence compliance.

10. GS briefly mentioned about ENTSO-E codes describing the exchange of information between DSOs and TSOs and proposed that the information requested from DNOs about SEPS should be aligned to those codes.

11. CM also requested that the definitions of terms used within the Grid Code with respect to the information requested from SEPS are aligned with the definitions of terms used in the Transparency Regulation. BR added that the information should also be in line with the Distribution code to avoid any confusion.

12. JB, senior energy analyst at National Grid, was invited to the Workgroup meeting to present on the impact of embedded generation on demand forecasting. JB described the different factors affecting demand and also explained the process involved in carrying out demand forecasting.

    The following key points were made in the presentation:

    - Unmetered weather related embedded generation (i.e. which National Grid does not have any visibility of) capacity amounts to about 3.5 GW (2GW wind and 1.5GW PV) and introduces errors in demand forecasting
    - Over the last three years, the forecasting errors have increased.
    - Growth of 500 MW of PV per year anticipated (based on the current growth rate of PV under the Feed-in Tariff), none of which is currently visible by National Grid
    - Including assumptions for unmetered embedded wind and PV generation within the demand forecasting model has helped to increase the accuracy of the national forecast. If better data is obtained for these units, the accuracy of the model could be improved further both at the nodal as well as national level.

13. GS asked JB whether he could quantify the errors in demand forecasting and there was an action on JB to provide numerical values for historical National Forecasting Errors.

14. VH described the table of requirements, starting with the amendments made to the previous version of the table. VH highlighted that it would be highly beneficial to receive information about the loss of Main Protection Settings (RoCoF settings) as this would allow National Grid to estimate the amount of generation that could potentially trip following a large in-feed loss. The general feeling amongst the DNO representatives was that it would be quite hard to obtain this information from all the generators. IF mentioned that there was another Workgroup that is addressing the issue of RoCoF settings and suggested that it might be best not to duplicate the work. VH explained that the latter Workgroup would only provide this information on a one-off basis but that National Grid would be seeking the RoCoF information on an on-going basis. IF and KS suggested that the information could be sought for new generators at the time of connection. VH concluded that DNOs should provide the RoCoF settings and Relay type information for new connections but also for existing SEPS only if the records are available.

15. The next topic addressed by VH was the requirement for the geographical location of the SEPS. BR explained that to accurately forecast the output of the SEPS, it was important to obtain the location of its connection point so that a location specific weather forecast can be used to forecast generation. IF commented that the geographical location would only be applicable for Wind and PV based SEPS as the outputs of other types of SEPS are independent of location.

    BR expressed a preference that only one geographical location would be required for each Small Embedded Power Station even if the Small Embedded Power Stations comprised of a number of dispersed generators as this should be adequate for forecasting purposes.

    There was a discussion as to which geographical location should be used. Two options were considered; the geographical location of the connection point of the SEPS or the geographical location of the primary substation. IF stated that he did not see any incremental benefit in providing the location of the connection point over that of the primary substation, especially as the latter information is already available. Although there can be a substantial distance between the actual location of the SEPS and that of the primary

substation, CM stated that the connection point could also be at a considerable distance from the actual SEPS. It was therefore agreed that the primary substation at which the SEPS connects to will be provided as the location.

16. The unique name for each SEPS was discussed and 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 SEPS. KS and PG were concerned that there could be commercial issues with publishing MPANs and the proposition was therefore declined. The Workgroup decided to go with the site name as the identifier, which would become unique when combined with the additional information provided i.e. fuel type, registered capacity etc.

17. VH discussed the requirement for the fuel types of each SEPS. In order to avoid confusion about the different fuel types and to adopt a consistent definition across the Workgroup, GS suggested that the conventional list of fuel types created by the Energy Networks Association (ENA) be used. IF requested that the definition of fuel types be aligned with the information contained in the Long Term Development Statement (LTDS). GS queried whether the same definition for fuel types is used across the by DNOs and this was confirmed by IF and AA. CM advised the Workgroup to cross-check the fuel types with the definitions contained in the Transparency Regulations.

18. VH specified the requirement for the installed capacity both in terms of active power (MW) and reactive power (Mvar). CM stated that there was a difference between the rated capacity and the maximum output of the SEPS and it was decided to change the term to “Registered Capacity”, which is a defined term in both the Distribution Code and the Grid Code.

    The requirement for Mvar capacity was removed from the requirements list after AA and IF stated that most of the SEPS are assumed to be operating in unity power factor although they can range from 0.95 lead and lag. BR requested that DNOs should inform National Grid whenever SEPS are instructed to operate significantly away from unity power factor in voltage control mode and provide guidance on the mode of Mvar control; otherwise National Grid will assume that they operate at unity power factor.

19. The DNO representatives were content with item 4 on the list which was to provide the node on the SLD where the SEPS connects to. VH and BR confirmed that these are existing nodes on the SLD in response to a question from a Workgroup member.

20. GS asked the DNO members whether they were happy with the list relating to SEPS above 1 MW prior to discussing the smaller embedded power stations (i.e. below 1MW). IF and KS were reasonably happy with the list but expressed their concerns about the RoCoF settings, emphasising that the information is not currently available.

21. CM enquired about the time scale of the submission of the information and GS replied that it would be along with the Week 24 Data submission. IF expressed his concern over the fact that more data would have to be provided for the Planning Code Week 24 submission under the same time scale and the same amount of resources. It is recognised that more information will need to be provided in the yearly Planning Code submission. Hopefully, the static data on each Small Embedded Power Stations rarely changes from one year’s submission to the next thereby reducing the on-going effort to maintain the data for subsequent years.

22. The Workgroup then discussed the requirements for SEPS below 1MW.

    BR requested DNOs to provide National Grid with information about SEPS with registered capacity below 1MW as an aggregation by fuel type (Wind, PV and Other) per node on the SLD. He proposed that an accuracy level of 1MW on either side would be acceptable for each node.

AA mentioned that DNOs can provide the information for SEPS connected under the Engineering Recommendation (ER) G59/2 which covers generating units with a rating of above 16A per phase. (Post meeting note: This threshold is about 3.7 kW for single phase connections and 11.1 kW for 3 phase connections). AA confirmed that most PV-based SEPS will be connected outside the ER G59/2 and DNOs would therefore not have the required information for these units.

KS explained that most of the owners of SEPS which are not covered by ER G59/2 do not inform the DNOs when they connect to the network but register their units in order to obtain Feed-in-Tariffs (FIT). KS stated that OFGEM have a FITS register containing information about these generators and added that the list was not in the public domain. KS also mentioned that OFGEM refused to share the register with SSE. BR thought that National Grid should speak to OFGEM to convince them to provide the data to the DNOs. IF suggested that National Grid could process the information directly rather than to go through the DNOs but BR explained that National Grid would not be able to correctly determine the node where the SEPS connects to on the SLD based on the information from the register. GS thought that the FIT register was available to the public and stated that he would confirm this with the Workgroup.

IF stated that it would be difficult to obtain information for the units below 1MW and questioned whether National Grid would really benefit from the additional information. KS described the current situation on the SSE network where several 50kW generating units amounted to 5MW. This highlighted the importance of having information about SEPS below 1MW where they have a cumulative significance.

AA suggested that the Workgroup should tackle the problem in steps i.e. to consider SEPS above 1MW as a starting point and when DNOs become comfortable with the process, SEPS below 1MW can be addressed. AA felt that National Grid could face a lot of opposition among the DNOs if SEPS above and below 1MW were tackled at the same time.

KS suggested that DNOs could provide any information they have for SEPS below 1MW as far as reasonably practicable.

GS suggested that DNOs should think about the best approach to be adopted with regards to supplying information about SEPS below 1MW. The alternatives suggested were for DNOs:

- To provide data about SEPS which they already have records of
- To collect data about generators which DNOs do not have records of but can be obtained from FITs registers
- To provide reasonable assumptions about SEPS which DNOs do not have records of

Without the knowledge of connected Small Embedded Power Stations, deriving the true GB electricity demand would be difficult. As the volume of intermittent Small Embedded Power Stations increase, the ability to ensure the adequacy of the Total Electricity will be subdued.

23. The Workgroup did not have sufficient time to discuss the format of the Workgroup report. GS stated that the report would be submitted to the Grid Code Review Panel (GCRP) in July 2013.

24. No other business was discussed and the meeting ended at 14:00

3 List of Actions

25. **National Grid** to work on a draft version of the Workgroup report and send it to all the participants before the next meeting.

26. **National Grid (JB)** to quantify the National Demand forecasting errors

27. **National Grid** to forward the presentation slides used in the meeting to the Workgroup members

28. **National Grid** to send a link, if available, to the information on SEPS not covered under the ER G59/2 to the Workgroup members.

29. **National Grid** to update the table of requirements and forward it to the Workgroup members within 1 week of the meeting.

30. **National Grid** to ensure that the definitions of terms used in the list of requirements align with the definitions contained in the transparency regulation.

31. **Ian Fletcher (IF)** to send the list of fuel types used in the Long Term Development Statement (LTDS) to National Grid.

32. **DNO's** to consider the information that could be provided for SEPS with registered capacity of less than 1MW.

4 Suggested ways forward

33. Actions will be dealt with by relevant parties prior to the next Workgroup meeting.

34. Proposals will be agreed at the next meeting by all parties so that they can be discussed at the Grid Code Review Panel (GCRP) consultation in July 2013.

5 Date of Next Meeting

35. The next meeting will take place on Tuesday 4 June at National Grid House Warwick.

6 List of items required by National Grid

Please note that all the items listed below are still open for discussion

For SEPS **above and equal to 1 MW**

	Requirements	Justifications	Comments
1	Unique Name for each SEPS	To enable National Grid to distinguish between each SEPS above 1 MW	The Site Name of the SEPS is required. With the additional information requested, each SEPS can be uniquely identified
2	Fuel type for each SEPS For the avoidance of doubt, certain categories will be discussed in GCWG.	To enable National Grid to evaluate load factors 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.	ENA definition of fuel types will be adopted
3	The registered capacity for each SEPS (MW)	To enable National Grid to evaluate the contribution of SEPS at different times by applying the respective scaling factors. This would also help in demand forecasting.	The term 'Registered Capacity' will be used instead of installed capacity to represent the maximum output that the SEPS can deliver
4	The existing node on the single line diagram where each SEPS connects to. For meshed networks, the node on the single line diagram to which each SEPS exports most of its power to would be required.	To enable National Grid to model the location of power in-feed from the SEPS from the BSP where it is connected to.	DNOs to provide National Grid with new nodes if the single line diagram is updated in the future.
5	The geographical location of each SEPS	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	This location corresponds to the location of the Primary Substation which the SEPS connects to and is required only for Wind and PV based SEPS, whose outputs are location dependent.

6	The mode of operation that each SEPS are operating in, if possible. (i.e.. in Voltage control mode, operating Power Factor)	To enable National Grid to evaluate the reactive power contribution from the SEPS at specific times.	National Grid will assume unity power factory unless informed otherwise by DNOs
7	Loss of Main Protection Settings (i.e. RoCoF protection setting)	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.	DNOs to provide RoCoF settings for existing SEPS if information is available. National Grid also requires the RoCoF settings for new connections

For SEPS **below 1 MW,** the following are required

8	An equivalent power station capacity per node on the single line diagram to represent an aggregation of all wind generation	To enable National Grid to have visibility of the aggregated contribution of all Wind Powered Power Stations below 1MW individual capacity. This data will be used by National Grid to forecast the output of this generation based upon locational weather forecast.	The accuracy guidance for this data is plus or minus 1MW per node
9	An equivalent power station per node on the single line diagram to represent an aggregation of all Photo Voltaic generation	To enable National Grid to have visibility of the aggregated contribution of all Wind Powered Power Stations below 1MW individual capacity. This data will be used by National Grid to forecast the output of this generation based upon locational weather forecast.	The accuracy guidance for this data is plus or minus 1MW per node

10	An equivalent power station per node on the single line diagram to represent an aggregation of all other SEPS	To enable National Grid to have visibility of the aggregated contribution of all PVs below 1MW individual capacity. (This data will be used by National Grid to forecast the output of this generation based upon locational weather forecast.	The accuracy guidance for this data is plus or minus 1MW per node.
11	Loss of Main Protection Settings (i.e. RoCoF protection setting)	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.	DNOs to provide RoCoF settings for existing SEPS if information is available. National Grid also requires the RoCoF settings for new connections