

Summary of Meeting and Actions

Meeting Name	Grid Code Power Park Modules and Synchronous Generating Units Working Group
Meeting No.	4
Date of Meeting	Thursday, 7 th September 2006
Time	10:00am – 3:00pm
Venue	National Grid Offices, Coventry Road, Hinckley

This note outlines the key action points from the forth meeting of the Grid Code Power Park Modules and Synchronous Generating Units Working Group

1) Apologies for Absence

Apologies for absence were received from Simon Cowdroy and Claire Maxim.

2) Minutes from the Previous Meeting

The minutes of the third Working Group meeting held on 11th July 2006, were agreed and approved by members subject to the inclusion of a post meeting note on the issue of 'Point of Voltage Control'.

In response to the assertions made by HD on page 2 and page 3 of the minutes of the previous meeting, NT presented evidence that confirmed that the three TOs did discuss with WTG manufacturers the requirement for a 1 sec speed of response at the GEP/USEP. The evidence presented was the minutes of meetings held between the three TOs and WTG manufacturers (and Ofgem) in January/February 2004. These meetings were attended by HD and SHETL and the minutes were approved by the three TOs, Ofgem and the manufacturers. The Scottish TOs were thus fully aware of the requirement. The fact that this was not discussed by the three TOs at the Forum organised by Ofgem was because these were not part of the Grid Code Proposals as the thinking at the time was to include the voltage control performance specifications in Bilateral Agreements in line with the custom and practice for synchronous plant.

3) Review of Draft Legal Text

The Working Group discussed and reviewed the associated legal text, as prepared by National Grid, for the proposed changes to the Grid Code as outlined in the Working Group's terms of reference.

Additional Power Park Unit Parameters

Working Group members were informed that a number of additional parameters are required to model wind turbines. The submission of a number of these data items would be on a one off basis (the enduring arrangement being that they would be submitted at the time of application for a CUSC Contract).

The specific issue of air density value was discussed by the Working Group and specifically whether the Grid Code should specify the year for which the data should be submitted e.g. forecast or historic, or whether this should be open to the developer to choose. Comments are sought from the developers.

Additionally National Grid agreed to amend the relevant legal text. that currently refers to squirrel-cage or doubly-fed induction generators to reflect the fact the data is required for all induction generators

Action: National Grid

User System Layout

The Working Group was informed that the requirements of the single line diagram containing equivalentents that the user may choose to submit have been made specific, previously they showed an example. The Working Group noted that the equivalent network should not extend beyond the busbar to which the generator transformers

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connect (a new term – Common Collection Busbar – has been defined). This change is proposed to align the information supplied with the information required for short circuit calculations.

National Grid agreed that that 'Note 3' as specified in the single line diagram should be extended to 'Substation A'. National Grid will amend the diagram accordingly.

MK questioned the applicability of the provisions under the Licence Exemptable Embedded Medium Power Stations (LEEMPS) provisions. The Working Group agreed that it was important that the new provisions are adequately incorporated within the LEEMPS existing arrangements.

National Grid and MK to double check the proposals and their impact on existing LEEMPS clauses.

Action: National Grid and MK

[Post meeting Note: MK has provided his view of the obligations the DNO should discharge on behalf of LEEMPS. National Grid to review.]

Short Circuit Infeed Data

The Working Group was informed that the proposals will require developers to submit new data relating to short circuit infeeds. The Working Group questioned the need for this data, which is in excess of similar provisions for synchronous generators units/auxiliaries.

The Working Group was informed that the Transmission owners and operators are required to undertake assessments of short circuit levels across the transmission system. The accuracy of such assessments is essential to ensure the safety of staff and the public and to meet the requirements of the Health and Safety Act. This means that sources of fault infeed must be accurately modelled. The infeed from synchronous generating units, including its variation with time, can be predicted, according to internationally agreed standards and procedures, from a number of data items submitted as part of week 24 data e.g. machine and transformer reactances. Using this data and the standards, models for use in studies can be constructed.

The infeed from Power Park Modules is not solely dependent on physical parameters such as impedances. It may be significantly affected by the action of electronically controlled protection devices. The action of these devices, and the time in which they act, depends on a number of factors, some of which may be site specific. This means that their action is difficult to predict. No standards on how to model wind turbines under fault conditions exist. For this reason data is required that demonstrates the infeed, including any action by protective devices, under the range of conditions and across the whole time range that need to be assessed. Data is also requested that describes the limiting conditions under which the protection will act.

The standards used for assessing short circuit levels allow for different levels of detail to be modelled according to the proximity to a short circuit. This will mean that the level of detail of the wind farm that needs to be studied will vary. For this reason infeed data is requested at both the connection point and within the wind farm network.

National Grid did acknowledge that submission of this data constitutes a greater requirement than for synchronous plant. However, National Grid reiterated that in order to ensure that short circuit assessments are carried out accurately under all circumstances a complete model of the behaviour of plant is required

JG highlighted that the provisions would result in several traces being required to be submitted due to the variable factors involved and questioned the need for such a high quantity of data. The Working Group also highlighted that a significant amount of the information being required by National Grid would not be available at the time when the connection offer was being made.

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National Grid agreed that a distinction would be made between the detailed and standard planning data which would be reflected in the associated legal text with the intention that only the information that would be expected to be known at the time of application for a CUSC Contract would be required to be submitted.

JN expressed concerns regarding the proposed wording in the associated DRC Schedule and enquired whether the text could be simplified. NT indicated that a balance had to be reached regarding the wording e.g. sufficient text in order to ensure clarity to the Users regarding the provisions and presenting it in a manageable format. NT invited comments from the Working Group on how the associated wording could be improved.

Action: Working Group Members

Extension of a Power Park Module

National Grid informed the Working Group that following previous discussions on the matter and subsequent comments received, including the treatment of synchronous generating plant, it is National Grid's belief that this matter should be considered separately. National Grid proposed to leave the Grid Code unchanged and raise a separate issue at the GCRP.

The Working Group agreed with National Grid's proposal.

Voltage Control Below 20% Rated MW output

Based on comments received and previous discussions, the Working Group were informed that the associated legal text does not specify the reactive capability required if voltage control is offered below 20% Rated MW due to the fact that any voltage control capability is considered beneficial to the transmission system.

The Working Group noted that the requirements of CC.6.3.2(b), that it should be possible to maintain zero MVar transfer within a tolerance at all MW levels, will continue to apply.

Harmonisation of Point of Voltage Control

The Working Group was informed that the associated legal text had been amended to reflect comments received on this issue.

Excitation Systems for Synchronous Generators

The Working Group was informed of the proposal to introduce a new appendix (CC.A.6) which would specify the performance requirements of the excitation systems of synchronous generators. In order to make the requirements generic to all types of excitation systems it will be necessary to specify some values in Bilateral Agreements. In such cases typical ranges for the values are given in CC.A.6. Members of the group requested that the ranges be extended to reflect the full possibility of values that National Grid can foresee rather than those used to date.

In addition to the wordings used in Bilateral Agreements is the requirement that over-excitation limiters do not limit the plant performance more than is necessary to keep it within design limits. This requirement is based on international experience of recent blackouts and NGET studies that show the action of over-excitation limiters is a major factor in determining whether voltage collapse occurs on highly stressed networks.

The Working Group were informed that it is proposed to amend the current definition of AVR such that it is aligned with BS EN 60034-16-1: 1996 and IEC 34-16-1: 1991.

JN and DW noted that the new definition of AVR does not make reference to control of terminal voltage. It was agreed that the new proposed wording should be amended such that it retains reference to this.

JN queried the proposed wording for CC.A.6.1.1 and indicated that it may be beneficial to amend the second sentence such that it should read "...where in NGET's **reasonable opinion** these facilities are **demonstrably** necessary **at a specific site** for system

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reasons". This would provide comfort to Users that National Grid will not specify additional requirements beyond those essential for system security.

JN requested that in Clause CC.A.6.1.4, "Modification" (lines 1 and 4) be substituted with "change" as a change or alteration notified under the PC may not constitute a Modification as defined in the CUSC.

JN also indicated it would be preferable that the new provisions apply to all Users, not just Users who have a completion date on or after 1st January 2007 providing appropriate grandfathering provisions are included within CC.A.6, such as for the proposed new requirement to install a PSS. Working Group members discussed the applicability of such provisions on existing equipment.

National Grid agreed to widen the proposed ranges but still retain provisions to specify an alternative figure if there was a significant system issue. CC.A.6.1.1 will be amended to reflect Working Group discussions. National Grid to review CC.A.6.1.4 taking into account Working Group members concerns regarding the use of 'modification'.

Action: National Grid

Voltage Control for Power Park Modules

The Working Group was informed of National Grid's view that the requirements on voltage control for a windfarm should be specified at the connection point. This would eliminate the need for producing different specifications at different sites according to the number of circuits and transformers between a different, user chosen control point, and the transmission system.

The proposed wording divides the requirement into two areas: steady state and transient voltage control. The steady state requirement is based on NGET's licence standards that require steady state studies to be undertaken immediately prior to an event and then 5 seconds after an event. In steady state conditions adjustments to controls, such as the adjustment of a slope characteristic, should not occur. Studies of the slope characteristic and setpoint (a newly defined term meaning the voltage at which 0 MVARs are generated) of a windfarm using terminal voltage control show that they can vary significantly with MW generation – depending on the deadband settings of the controller a change from a 7% slope to a 16% slope could occur for a 400kV connected windfarm in which the MW generation drops from 1000MW to 250MW. Slopes at this level are too high to ensure that all of the MVA capability can be utilised at acceptable transmission voltages and therefore implies that correction is necessary. Due to the 5 second requirement of the security standards, correction within 5 seconds is required.

The proposed wording therefore requires correction of a slope to a specified level (typically 4%) in a 5 second period. This does not rule out the use of a SCADA system that introduces a delay of up to 5 seconds, which National Grid understands from discussions is one of the major concerns for developers when the requirement is 1 second. There was some discussion on whether a maximum allowable slope should be specified with any variation up to this level permitted. The proposals are based on the Power Park Module operating to a fixed slope rather than a variable one, subject to a maximum, because National Grid believe this is preferable for system operation and security without introducing significant extra requirements for developers.

The transient period covers the time from an event on the system up to 5 seconds after the event when the transient oscillations will have died out. In this period the requirement is to produce a response at a rate such that 90% of the capability can be utilised within 1 second if the event is such that this size of response is needed. This is on the basis of studies discussed at previous meetings. During this transient period there is no specification of either the setpoint or slope. Previous discussions have indicated that the slope characteristic introduced by the windfarm network is significantly reduced under transient conditions, meaning that it is likely that the connection point transient requirement can be met by monitoring and switching compensation at a point within the

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windfarm network. As the system settles following a disturbance a slope will be introduced. The requirements of the slope are covered by the steady state requirement.

The proposal attempts to clarify the performance of the Power Park Module outside of its normal voltage/reactive power operating envelope. It is required that the maximum amount of lagging current is produced for very low voltages, and the maximum leading current is produced for high voltages. JN suggested that the proposed wording could be reduced by referring to the diagram to aid clarity.

National Grid will amend associated legal text for Figure CC.A.7.2.2(b) to aid clarity for Users.

Action: National Grid

The Working Group queried why some of the provisions were required for Power Park Modules only (no corresponding provisions for Synchronous Generating Units).

National Grid stated that the requirements for Power Park Modules would result in performance similar to that obtained from synchronous generating units controlling the voltage behind a generator transformer. NT highlighted that the provisions are a relaxation of the current requirements in Bilateral Agreements.

MK and NS highlighted that the DNO would have to be informed of any dispatch affecting their area. NS indicated that the provision should be more stringent and specify that no dispatch should occur without the prior agreement of the DNOs. National Grid will amend the legal text accordingly.

Action: National Grid

There was a discussion on the requirements for settling following a step change, particularly regarding the two second criteria and the tolerance value. HD noted that the proposed wording could result in zero tolerance if the step caused a change from a condition in which the Power Park Module was initially producing leading MVARs to a condition in which 0 MVARs were generated. It was noted that a stepped response such as that produced by capacitor banks would be acceptable and therefore reference the "linear increasing" would need to be clarified to reflect this.

National Grid will amend CC.A.7.2.3.1 to aid clarity and to ensure that associated text represents true intentions of proposals.

Action: National Grid

Power Available Signal

The Working Group discussed the proposed wording which specifies the use that will be made of the signal and the sampling rate required.

The Working Group discussed the removal of 'unless otherwise specified in the Bilateral Agreement' from provision CC.6.5.6(e). National Grid will amend CC.6.5.6(e) in line with Working Group comments.

Action: National Grid

The Working Group discussed the difference between 'Power Available' and Potential MW Output' which NS informed the group is already provided by Users. NS indicated that it would be beneficial if the provisions for Power Available did not interact with Potential MW Output.

NS to circulate a description of 'Potential MW Output' and specify the associated obligations for the provision of the data.

Action: NS

CC.7.9 – Manned Control Rooms

Associated legal text is to be reviewed in light of recent Regional Difference provisions. JN requested clarification whether the proposed obligation would also apply to BELLA

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sites subject to BC2 or otherwise and suggested substituting “through” with “under” (line 7).

Action: National Grid

3) Other Possible Changes

The Working Group discussed other proposals which were not initially specified in the Working Group’s Terms of Reference but have been highlighted as potential areas of possible review in previous Working Meetings.

Definition of Power Park Modules

The Working Group discussed the proposed amendments to the definition of Power Park Modules to take into account emerging technologies.

Frequency Response/Control

In response to the request from some of the members, the frequency response requirements in the Grid Code were reviewed by National Grid to address the issues raised (i.e. mainly associated with the initial response performance of Power Park Modules following large frequency disturbances). Suggested text changes were tabled and discussed.

The nature of the proposed text changes were mainly clarifications rather than changes to the requirements. It was agreed that some of the existing wordings in the Glossary and Definitions for Primary and High Frequency Responses in the Grid Code could be adopted in CC.A.3.4 to help the plant developers/suppliers to focus on the issue.

It was accepted that there will always been an inherent initial delay for any types of generating plant but appropriate control measures helped to minimise such a delay. This has been adopted successfully by the industry in the past and National Grid believes similar technical performance should be achievable on wind farm units and modules.

It was noted that some Power Park Modules may not give as fast a response compared to Synchronous Generating Units; however they were able to change load more quickly.

NT acknowledged that the Grid Code should, wherever possible, accommodate alternative technologies. NT indicated that once there was a greater understanding of this new technology it may possible to review the provisions.

Schedule 5 data

National Grid propose to add the settings for rotor underspeed and rotor overspeed protection to the list of protection settings required for Power Park Units in Schedule 5.

4) Next Steps

The Working Group agreed that there was no requirement for further meetings and that it remains the intention of the group to present it findings and recommendation to November’s GCRP meeting.

To this end National Grid will circulate amended draft legal text and the associated Working Group Report to members by 13th October 2006.

Working Group members will have until the 27th October to provide any comments on the Report.

Final version of Working Group report will be circulated to the GCRP on the associated papers day for the November meeting i.e. 9th November 2006.

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Appendix 1 – Working Group Attendance

Members Present:

Mark Duffield	MD	Chairman
Lilian Macleod	LMcL	Secretary
William Hung	WH	National Grid
Mark Perry	MP	National Grid
Brian Taylor	BT	National Grid
Nasser Tleis	NT	National Grid
Neil Sandison (via teleconference)	NS	SSE
Lindsay McGrow (via teleconference)	LMcG	SSE
Hamish Dallachy	HD	Scottish Power
Damien McCool	DMcC	Scottish Power
Mike Kay	MK	United Utilities
Philip Belben	PB	E.ON
Tim Moore	TM	EDF Energy
John Gaffney	JG	RWE
John Norbury	JN	RWE
David Ward	DW	Magnox
Bridget Morgan	BM	Ofgem