Minutes

Meeting name	:	GC0028: Constant Terminal Voltage
Meeting number:		6
Date of meeting :		Friday, 17 April 2015
Time	:	10:00 – 14:00
Location	:	Holiday Inn, Olympus Avenue, Leamington Spa, CV34 6RJ

Item	Topic		Documents
1	Introductions & Apologies	GS	
2	Minutes of last Meeting	GS	Minutes
3	Review of comments received on the Workgroup report	All	Report List of comments
4	Review of the legal text	All	Report
5	Discussion	All	
6	Next Steps	All	
7	AOB	All	

Attendees

Name	Initials	Company
Graham Stein	GS	National Grid (Chair)
Bieshoy Awad	BA	National Grid
Antony Johnson	AJ	National Grid
Franklin Rodrick	FR	Tech Sec
John Norbury	JN	RWE
Philip Belben	PB	Horizon Nuclear Power
Hervé Meljac	HM	EDF Energy
Steijn Cole (by Telephone)	SC	Tractebel Engineering

Apologies

Name	Initials	Company
Mike Wynd	MW	Scottish Power
Fraser Richardson	FR	Scottish Power
Lorna Short	LS	RWE
Touleng Lochungvu	TL	Nugen
Pierre Josz	PJ	Tractebel Engineering
Julian Wayne	JW	Ofgem
Paul Newton	PN	EON
Karim Karoui	KK	Tractebel Engineering

List of Workgroup Comments for discussion

1. Implementation date
2. Operational metering
3. Submission of additional data
4. Reference to large nuclear plants
5. Reference to safety case
6. Reference to Compliance Process
7. Implications on positive and negative ceiling voltages
8. Diagrams
    a. AVR response times
    b. Reactive power diagrams (MVAr vs P/Q)
    c. Examples with 120tap OLTC

Introductions & Apologies

1. GS welcomed everyone to the meeting and the attendants introduced themselves. GS explained that the purpose of the meeting was to comment on the workgroup report before submission to the May GCRP.

2. BA explained that the comments were used to make changes to the report but not all comments were addressed. JN added he has some comments but most of them are addressed.

3. BA highlighted that the majority of comments were addressed but there were a number of more complex issues which required discussion during the meeting and were included on the agenda.

Minutes of last meeting

4. Minutes and actions discussed from the previous meeting were discussed. No comments were received and the minutes from the previous meeting were accepted as true and accurate.

Workgroup Report

Implementation Date

5. BA highlighted that the date of implementation was intended to be 2017 to allow the assessment of impact on NGET's load flow algorithms and the implementation of any new algorithms. However, as it is thought that, as not all Generators will adopt the new methodology, there implementation date can be brought forward.

6. JN commented that he was pleased with the new methodology but was concerned that there was no mechanism for a change to an existing Bilateral Agreement. He expressed concern that where there was a need to change the Bilateral Agreement, a modification may be required which could trigger a an unnecessary fee. He suggested one solution to this could be through a process similar to that adopted for Appendix C of the Bilateral Connection Agreement.

7. HM highlighted that if a generator agrees to satisfy the Grid Code requirements through a combination of the generator transformer tap range and adjustment in the terminal voltage , then they should provide additional signals to NGET. HM added that a discussion would be useful to see what additional signals are required.

8. HM said the advantage of writing the requirements in the Grid Code is that it gives better transparency. If the requirements are written in individual Bilateral Connection Agreements then it would not highlight whether NGET is applying the same approach for all the generators. AJ said once the code modification goes through then the templates would also need to be updated.

9. JN highlighted that once the Grid Code change take place, the basis of derogations would need to be reviewed. AJ added that if the generator is already satisfying the Grid Code requirements by adjustment of the Generating Unit terminal voltage then it will not require a derogation.

10. BA highlighted that a number of Scottish generators currently don't comply with the Grid Code but things would improve once the change has been made to the Grid Code.

11. JN said NGET needs to do some work on how they would receive these additional signals from the generators and how it will be used.

Operational Metering

12. BA highlighted that for this modification to work NGET would require Generator Terminal Voltage as an additional operational metering signal. He added that this would be necessary both to assist Control Engineers at the Electricity National Control Centre (ENCC) but also as an input to the State Estimator.

13. HM highlighted that if the terminal voltage is defined then it there is a cost on the generator although it makes it easier for NGET. He added that NGET should not be worried about what happens on the LV side of the transformer. AJ added that it's operationally easier if NGET have the terminal voltage. He added that for new generators the cost of providing Generating Unit Terminal voltage amongst the other operational metering signals (eg MW, MVAr, HV Voltage and breaker status etc) would be insignificant, however for existing stations then there would be a cost.

Action: AJ/BA to clarify what the operational metering costs would be on different parties as a result of these changes.

14. PB questioned why NGET needs the provision of a Generating Unit Terminal voltage signal s when NGET can calculate the signal for themselves. AJ advised that whilst this is possible it makes the process more complex and less accurate.

15. JN questioned the criticality of NGET requiring a Generating Unit terminal voltage. He also questioned whether NGET use the signal when there's only a small deviation from 1.0p.u BA said that at present it's assumed that generators are working at 1p.u..

Action: NGET to identify whether the signal is required or not.

16. PB said the cost is not for new plants but it's for existing plants. BA said if the plant is compliant at the moment then there is no cost but if it's working under a derogation then there may be a cost if the new methodology has been adopted.

17. GS highlighted that if existing generators decide to follow the new methodology then they will have to provide the additional operational metering signals required.. HM said that there should be an indication of the cost implications of this new signal.

18. AJ noted that for the majority of generators they should have access to the generating unit terminal voltage. However he went on to advise that the cost would be how this signal could be provided to NGET and the consequential database changes that may be required. JN said it is a reasonable expectation from NGET to be asking for this signal if the Grid Code is being amended to permit variation in Generating Unit terminal voltage.

Action: AJ to speak to design assurance to find out the cost of the signal to include in the report.

Submission of additional data

19. BA advised that the additional data requirements were not included in the first draft of the workgroup report but had been included in draft 2 of the workgroup report.

20. BA highlighted that the DRC will include the following additional data items:-

21. Rated Terminal Voltage
    - Maximum Terminal Voltage
    - terminal voltage setting step resolution

22. BA highlighted that it would be necessary to provide a performance chart at rated terminal voltage, maximum terminal voltage and one value between the maximum and rated values. PB questioned why NGET needs a graph between the rated and the maximum terminal voltage. HM said NGET can prepare the graphs themselves since the generators provide all

the information required. A question was also raised why a performance chart was required if it was not used for operational purposes.

23. PB said that all the information is submitted by the Generator as part of the DRC so additional charts may not be needed. JN said if the data is provided by the generator then it should be the generator who provides the graphs as well. JN suggested that the charts are not used by the NGET control room in the operational environment and questioned why they are required. AJ said the data provided by the generators is used in National Grid's off-line analysis software but PB suggested that the software used by National Grid produces its own graphs based on the Generator parameters submitted.

Action: AJ/BA to discuss these issues with the Generator Compliance Team to identify if the figures are required.

Reference to large nuclear plants

24. BA highlighted that comments were made to remove reference to nuclear plants from the workgroup report. HM noted that the issue is not nuclear safety and the issues that arise from this workgroup are prime mover independent.

25. AJ added that nuclear generation was not being singled out, but it is to acknowledge that every source of generation should be covered.. GS added that a general statement on reliability and safety can be made and we should be technology neutral.

26. JN questioned whether there is a safety issue for nuclear generation. AJ noted that in previous meetings it was highlighted that nuclear plants will only be using proven technology and would generally not try a new technology.

Action: NG to re-word workgroup text regarding nuclear plants (sections 4.8, 5.10, 10.2 and 10.4).

Reference to Compliance Process

27. BA highlighted that the report suggests compliance studies which hasn't been discussed before. JN said it seems to imply the generator has to perform simulations for different levels of Generating Unit Terminal voltage regardless of whether or not the Generator adopts the new methodology.

28. BA highlighted that CP.A.6.3.2 gives Generators the flexibility to use a terminal voltage setting other than 1.0pu for the simulation studies detailed in CP.A.3.3.4 if required.

29. HM highlighted that the text doesn't make it clear what compliance provisions are required. If the requirements are not clear then it can have a cost implication on the generator if the connection is delayed. PB said that the generator can end up running too many load flow studies. HM said is it possible that a U/Q diagram can be provided to demonstrate compliance.

30. HM questioned whether the minimum short circuit level can be removed. BA highlighted that the text in BC.2.A.6 under target voltage levels specifies compliance with the requirement to achieve a target voltage level within +/- 1% , hence it cannot be removed.

31. PB said that the wording proposed for CP.A.6.3.2 may be interpreted such that the Generator has to use the same terminal voltage setting for both simulations. Therefore the wording needs to change to clarify the proposal.

32. PB highlighted that Figure 15 doesn't highlight that the Generator was connected to a 400kV busbar. He also noted that the report quoted the short circuit level in kA rather than MVA which would be more useful.

Action: HM/PB to review the text for CP.A.6.3.4 how it could possibly be updated.

Implications on positive and negative ceiling voltages

33. BA said there is reference in the report to increasing the excitation ceiling voltage. GS said that the required excitation ceiling voltages will be specified in the bilateral agreement. but it was noted that the impact on Generator ceiling voltage was negligible, especially if the Generator Terminal Voltage was increased above 1.0p.u.

34. PB questioned whether the studies have ruled out the option of reducing the generating unit terminal voltage below 1.0pu? BA highlighted that National Grid is reluctant to allow a reduction in terminal voltage below 1pu due to stability reasons.

Diagrams

AVR Response times

35. BA explained that the simulations were based on the Generating Unit parameters quoted in the W24 submissions of a specific plant. These numbers included a typo and the correct parameters have been recently notified by the Generator. Simulations will be updated to reflect the corrected values.

Reactive Power diagram

36. HM highlighted the issuee of using the **p.u.** system in the examples . PB said if the p.u. system is used then it is difficult to see the quantitative changes. For example for a 2000MVA Generator or indeed any other size of Generator it becomes very difficult to see if the ±25MVAr tolerance can be achieved as required under BC2.A.2..

37. It was also noted that instead of using a 1770 MW in the example it would be better to use 1800MW as this would then be consistent with the SQSS infrequent infeed loss.

Examples with120 taps

38. BA highlighted that the 120 tap example shown in Figure 7 of the workgroup report was used only for illustrative purposes. GS suggested that Figure 7 in the workgroup report was amended for the industry consultation but this would not be necessary for submission of the workgroup report to the GCRP.

39. The workgroup members discussed that the Derogations will need to be reviewed once the Grid Code changes have been made.

40. JN suggested that the group should compare whether the proposed solution addresses the Grid Code objectives. It was highlighted that the change would create efficiencies as it would enable generators to avoid having a large number of taps and allowing them to optimize the design though a selection of tap range and adjustment in Generating Unit terminal voltage. The change will also clarify the Grid Code by eliminating the current ambiguities.

Additional Comments on the Workgroup Report

41. Following discussion of the key workgroup report issues, a page turning exercise was undertaken on the report. Minor comments (including typographical issues) were noted on the following sections and BA undertook and action to include these issues in the next iteration of the report.

42. Sections:- 5.6, 6.5, 7.22, 9.6, 11.4, 11.14, 11.15 and legal text

Action:- BA to update minor comments on the report received during the discussions.

Next Steps

43. It was agreed that subject to the comments received during the meeting, that the workgroup report should be updated and submitted to the May GCRP meeting with the recommendation that the Workgroup report should be submitted to industry consultation.