

**GB Grid Code
Connection Conditions, Operating Code 5
and General Conditions**

**An Ofgem/DTI mini-drafting consultation
document**

28 November 2003

Table of contents

1. Introduction.....	1
2. Timetable and Responses	6
3. Views invited	7
4. Connection Conditions (CCs)	8
Overview of GBGC CCs.....	8
Summary of analysis of changes from EWGC CCs to GBGC CCs	8
Summary of analysis of changes from SGC CCs to GBGC CCs.....	9
Proposed regional differences and drafting changes to GBGC D1	12
Specific views sought on CCs	22
5. OC5 – Testing and Monitoring	23
Overview of GBGC OC5.....	23
Summary of analysis of changes from EWGC OC5 to GBGC OC5	23
Summary of analysis of changes from SGC to GBGC OC5.....	23
Proposed regional differences and changes to D1	23
Specific views sought on OC5	24
6. General Conditions (GCs)	25
Overview of GBGC GCs	25
Summary of analysis of changes from EWGC GCs to GBGC GCs	25
Summary of analysis of changes from SGC GCs to GBGC GCs	25
Proposed regional differences and changes to D1	26
Specific views sought on GCs.....	26
Appendix 1 – Connection Conditions Comparison Table	27
Appendix 2 –GBGC OC5.5.3 table changes.....	65
Appendix 3 - General Conditions Comparison Table	67

1. Introduction

- 1.1. The rationale for the introduction of a GB Grid Code¹ (GBGC) was published in December 2002 (the December 2002 GBGC consultation). In September 2003, Ofgem/DTI published 'The Grid Code under BETTA, Ofgem/DTI conclusions and consultation on the text of a GB Grid Code and consultation on change co-ordination between the STC² and user-facing industry codes' (the 'September 2003 GBGC consultation'). This document included draft one of the GBGC (GBGC D1) as Volume 2. GBGC D1 was based on the England and Wales Grid Code (EWGC) adapted to apply across GB and included some significant regional differences that had been identified from a comparison of the Scottish Grid Code (SGC) and the EWGC that were identified in the September 2003 GBGC consultation as needing to continue under the GBGC. However, it was also recognised in the consultation that there were more detailed regional differences that needed to be considered for inclusion in the GBGC and that Ofgem/DTI were progressing work to identify the differences between the two existing Grid Codes.
- 1.2. The September 2003 GBGC consultation proposed that, in progressing the drafting of the GBGC, and in preparation for the next consultation on a full draft of the GBGC planned for February 2004, it would be helpful to conduct a number of "mini-drafting consultations" on the various sub-codes of the GBGC. The mini-drafting consultations are intended to supplement the proposals presented in the September 2003 GBGC consultation and to draw out in more detail the technical differences between the SGC and the EWGC and to consult on further regional differences that should be incorporated in the GBGC, to be designated under BETTA. It is not intended for the mini-drafting consultations to consider further the issues raised in the September 2003 GBGC consultation where views have already been invited. It is hoped that the mini-drafting consultations may provide further detailed responses to those received to the September 2003 GBGC consultation on more of the detail of the GBGC drafting. All responses will be taken into account by Ofgem/DTI in their

¹ 'The Grid Code under BETTA, Ofgem/DTI consultation on a Grid Code to apply throughout GB' Ofgem/DTI, December 2002. Ofgem #78/02.

² The 'System Operator (SO) – Transmission Owner (TO) Code'.

development of the second draft of the GBGC to be published in February 2004.

1.3. The Grid Code Expert Group (GCEG) was established prior to the December 2002 GBGC consultation to provide technical expertise to Ofgem/DTI in writing their consultations. The group is supported by the transmission licensees and several users. The sub-codes of the GBGC that are considered in each mini-drafting consultation will have been discussed at the GCEG prior to Ofgem/DTI publishing the mini-drafting consultations. The mini-drafting consultations will comprise:

- a detailed comparison of each sub-code of the SGC and the EWGC to provide a cross reference to the SGC and to identify regional differences between the existing codes
- identification of differences between the EWGC and the GBGC
- identification of differences between the SGC and the GBGC
- identification of regional differences that it is proposed should apply to that sub-code that will not be harmonised for BETTA go-live, and
- GBGC drafting or changes to GBGC D1 (depending on the volume of identified changes) for the sub-code.

1.4. Any draft text included in this series of GB Grid Code mini-drafting consultations will be based on GBGC D1 and will be identified as draft 1.5 of the GBGC. Where changes are proposed from the text published in GBGC D1 these will be identified. Responses have been received on the September 2003 GBGC consultation and GBGC D1 on 25 November 2003. However, it will not be possible to consider those responses in the preparation of the mini-drafting consultations except for possibly the last mini-drafting consultation (on the Planning Code, Data Registration Code and the Glossary and Definitions). It is hoped that the publication of mini-drafting consultations will facilitate wider promulgation of the work being progressed at GCEG and enable

feedback from a wider industry audience on the more detailed issues to be considered before a further draft of the GBGC is published in February 2004.

- 1.5. This mini-drafting consultation is on the Connection Conditions (CCs), Operating Code 5 (OC5 – Testing and Monitoring) and the General Conditions (GCs). To assist Users in Scotland who might be unfamiliar with the EWGC, the SGC CCs, and GCs have been compared with the equivalent EWGC sub-code and differences between the two codes have been identified. This analysis is presented in the Appendices in a comparison table. A comparison table has not been provided for GBGC OC5 as it has no equivalent sub-code in the SGC. The changes in moving to a GBGC³ for parties in Scotland and parties in England and Wales have been identified and are presented in sections 4 and 5, together with any further matters on which views are requested which have been identified since the September 2003 GBGC consultation. As relatively few changes have been identified to draft one of the GBGC, the text of the changes has been included in the main body of the mini-drafting consultation, rather than appending the full text. The changes are change marked against the current version of the EWGC in the same manner as was used in GBGC D1.
- 1.6. As stated in the September 2003 GBGC consultation⁴, the approach of Ofgem/DTI in considering regional differences has been, that where these are material, and are as a result of such matters as difference in technical standards or technical requirements of the transmission system, to retain such differences as currently exist. In support of minimising such differences in the longer term, an objective to promote the minimisation of differences between Scotland and England and Wales where the physical characteristics of the transmission system allow has been added to the panel objectives in the General Conditions. Key regional differences were highlighted in the September 2003 GBGC consultation (such as the proposed regional differences in the definition of Small, Medium and Large Power Stations). Further differences are proposed in this consultation and views are invited on such matters. The majority of these proposals relate to detailed differences in technical requirements, however, one further key difference has been identified in the scope of the

³ At this stage, the numbering of the draft GBGC is the same as the EWGC.

⁴ For example, see 4.99 and 4.100 of the September 2003 GBGC consultation.

requirements⁵. This relates to the exclusion in the EWGC CC.6.3.1 of 'Small Power Stations, hydro units and renewable energy plant not designed for Frequency and voltage control' from the obligation to comply with the 'General Generating Unit Requirements' in CC.6.3. Including these words in the GBGC to apply to Scottish plant would be a relaxation of the existing requirements in Scotland and Ofgem/DTI invite views on whether such a relaxation is technically prudent.

1.7. It was further considered in the September 2003 GBGC consultation that although some of the activities of the GB system operator referred to in the GBGC may physically be undertaken by transmission owners, they would be conducting those activities under contract with the GB system operator (via the STC) and would not be providing a contractual service to users and that the users contract would be with the GB system operator. To the extent that the GB system operator would be reliant upon the actions of transmission owners to discharge some of its obligations under the GBGC, and vice versa, it was proposed that the obligations on transmission owners to provide specified necessary services to the GB system operator would be set out in the STC. Where the subject matter of the GBGC related to responsibilities in relation to health and safety matters, it was proposed in the September 2003 GBGC consultation to make reference to the Relevant Transmission Licensee undertaking the activity⁶. No additional instances of this are proposed in this mini-drafting consultation, however, this may be considered further in light of STC development.

1.8. Other mini-drafting consultations on the GB Grid Code have been published or are planned as follows:

- Operating Codes 1, 2, 6, 7, 9, 10, 12 was published on 31 October, responses are due 4 December 2003
- Balancing Codes, OC8 (Safety Co-ordination) and OC11 (Numbering and Nomenclature of HV Apparatus at Certain Sites), publication 12 December 2003, and

⁵ See paragraph 4.29.

- Planning Code, Data Registration Code and Glossary and Definitions, publication 9 January 2004.

⁶ See paragraph 6.8 of the September 2003 GBGC consultation.

2. Timetable and Responses

2.1. The proposed timetable and process for further development of the GBGC is as follows:

- responses to this mini-drafting consultation should be sent by Friday 9 January 2003 to Bridget Morgan (details below)
- an interim conclusions document may be issued in December 2003 on issues raised in the September 2003 GBGC consultation concerning change management between user facing codes and is not expected to consider the detail of the GBGC text
- Ofgem/DTI are not currently minded to issue a separate conclusions document specifically dealing with respondents views on each mini-drafting consultation. Instead, Ofgem/DTI plan to publish a conclusions document in February 2004 that will summarise responses to the September 2003 GBGC consultation in full and responses to mini-drafting consultations.

3. Views invited

- 3.1. Parties are free to raise comments on any of the matters covered in this paper and in particular on those matters where views have been requested. Although transitional issues will be dealt with at a later date separately from the consideration here of the enduring arrangements, respondents should feel free to raise any such matters that arise in consideration of these issues. All responses, except those marked confidential will be published on the Ofgem website and held electronically in the Ofgem Research and Information Centre. Respondents should try to confine any confidential material in their responses to appendices. Ofgem prefers to receive responses in an electronic form so they can easily be placed on the Ofgem website.
- 3.2. Written responses marked 'Response to GBGC CCs mini-consultation' should be sent by Friday 9 January 2003 to:
- Bridget Morgan
Technical Directorate
Office of Gas and Electricity Markets (Ofgem)
9 Millbank
London
SW1P 3GE
Tel: 020 7901 7080
Fax: 020 7901 7075
Email: bridget.morgan@ofgem.gov.uk
- 3.3. Please e-mail responses to BETTA.Consultationresponse@ofgem.gov.uk marked 'Response to GBGC CCs mini-consultation'. All responses will be forwarded to the DTI.
- 3.4. If you wish to discuss any aspect of this document, please contact Bridget Morgan at Ofgem or Renata Williams at the DTI (e-mail: renata.williams@dti.gsi.gov.uk, telephone: 020 7215 0442).

4. Connection Conditions (CCs)

Overview of GBGC CCs

- 4.1. The Connection Conditions set out the technical requirements on the System Operator (SO) and Users in connecting equipment to the Transmission System or to User Systems.

Summary of analysis of changes from EWGC CCs to GBGC CCs

- 4.2. This section lists matters that have been identified in reviewing the GBGC as a change from the EWGC requirements or in the effect of the EWGC.
- 4.3. The following definitions are changed:
- 'NGC Transmission System' to 'Transmission System'
 - 'NGC' to 'System Operator'
 - where 'NGC' has been used to represent ownership, it has generally been replaced with 'Transmission'
- 4.4. In CC6.1.7 (Voltage Fluctuations) the provisions in both (a) and (b) have been amended. The amendment to CC.6.1.7(a) does not change the requirement in England and Wales. CC.6.1.7(b) asserts that it reflects the standard set out in Engineering Recommendation P28 (P28), but on inspection of P28, the values set out in the EWGC relate to 400kV and 275kV and the applicable levels in P28 for 132kV and below are different. The Flicker Severity factors for 132kV and below have been added to (b) (see paragraph 4.21 below for amended text and further discussion of changes in CC.6.1.7 relating to Scotland). This change is needed to ensure that the requirement for a Transmission System at 132kV and below is covered. Provisions for 132kV and below are normally provided for in the EWGC, however in this instance they are not and therefore need to be added to enable the EWGC provisions to be applied to 132kV and below transmission in Scotland. In effect, this would appear to change the existing England and Wales requirement for 132kV and below from that currently

stated in CC.6.1.7(b), however this provision also says 'as set out in P28' and as the amendment merely reflects the content of P28, it could be seen as clarifying the requirement. Views are invited on this matter.

- 4.5. In GBGC D1, CC.7.1 (relating to commissioning, operation and maintenance etc) was deleted. As this provision was not considered to create any specific obligations or rights, it was suggested in the September 2003 GBGC consultation that it should not be included in the GBGC.
- 4.6. A change is proposed to CC.6.5.10 (see paragraph 4.32) to remove the qualifier 'Large' from 'Large Power Stations' to require the system operator to provide voltage signals for synchronisation purposes to all directly connected power stations. As there are no directly connected Power Stations which are not Large currently then this has no impact on the existing EWGC requirement.
- 4.7. In GBGC D1 CC.7.2, the application by a User or NGC to use their own Safety Rules when working on their Plant and Apparatus but on a site owned by the other was changed to apply to a single site only. Previously it was worded to apply to all sites owned by that User or NGC.
- 4.8. In various places, the provisions are different for Scotland and for England and Wales and so they are set out as such. The intention has been not to change any of the requirements in England and Wales except as set out in this section above.

Summary of analysis of changes from SGC CCs to GBGC CCs

- 4.9. This section lists matters that are identified in the comparison table in Appendix 1 as being a significant difference between the Connection Conditions of the SGC and the EWGC, but where Ofgem/DTI do not propose to retain the existing regional difference.
- 4.10. The structure of the CCs in the GBGC is different from that of the SGC. In the GBGC, the list of conditions to be satisfied prior to connection is at the beginning of the sub-code rather than at the end and the requirements for Generators are separated from those for Network Operators and Non-

Embedded Customers. The section on Site Related Conditions is more detailed than in the SGC. The GBGC also outlines the categories of ancillary services.

- 4.11. The SGC CC 1.3 has an explicit statement that the Company will not (generally) seek to impose retrospective changes on Users. There is no equivalent provision in the GBGC, however, it can be seen from the drafting of the EWGC which has specific dates for compliance with certain sections that such matters as retrospective application are considered in the England and Wales change process (eg CC6.2.1.2(a)). Ofgem/DTI note that all Grid Code change proposals are the subject of consultation⁷ and comments are invited on any proposed changes. Therefore Users are able to identify those changes that would have a material impact on them at the proposal stage.
- 4.12. The SGC CC 1.6 has a provision which enables the Company to agree other than to the standard CCs in a bilateral with that User. Under BETTA, it is proposed that such matters will be dealt with by licensed parties applying to the Authority for derogation from obligations in the GBGC if such a relaxation is required.
- 4.13. SGC 4.1.2(b) describes the range of frequency that may occur on the Transmission System.
- The SGC states that Generator's Plant and Apparatus will be designed to operate continually in this range and that User's Plant and Apparatus should be designed or protected for these circumstances. The equivalent provision in the EWGC (CC.6.1.3) states that all User's Plant and Apparatus should be designed for this operating range. It is considered that the EWGC provision is appropriate going forward but it is noted that the existing provisions differ and as such this new provision may be an issue for existing Scottish Users. Views are invited on whether there are issues with this new provision.
 - The scope of whom the provisions currently apply to is also different. The SGC provision applies to Generators and all Generators are

⁷ The Electricity Transmission Licence requires consultation with Authorised Electricity Operators who may

obliged to comply with the Grid Code in Scotland whether they are embedded or directly connected and whether licensed or licence exempt. The EWGC provision applies to all Generators, other than those who only have Embedded Small Power Stations, ie it would apply to those who only have Embedded Medium and Embedded Large Power Stations. Under the proposed GB arrangements, this would be a relaxation to the existing technical requirements on Embedded Small Power Stations in Scotland. It is also recognised that under the proposed GB arrangements, Embedded Medium and Embedded Large Power Stations in Scotland which were licence exempt would not necessarily have a Grid Code compliance obligation. As stated in the September 2003 GBGC consultation, Ofgem/DTI are considering further whether licence exempt, embedded generators in Scotland need to comply with the GB Grid Code⁸ and if so how this would be achieved. Views are invited on the scope of these provisions and on whether such plant as would not necessarily be covered currently provides these services.

- 4.14. SGC 4.1.3(a) has a different specification for voltage variations than the first paragraph of CC.6.1.4 in the EWGC. The Development Group 4 (DG4) sub-group to STEG⁹ is considering harmonisation of operational standards; this provision will be considered further by Ofgem/DTI in light of the work being progressed by this sub-group.
- 4.15. SGC 4.2.1(b) and CC.6.2.1.2(d) have different quality assurance standards for the premises in which Plant and Apparatus is tested. The SGC has a narrower specification 'in accordance with ISO 9001 or equivalent' whereas the EWGC is in accordance with 'ISO 9000 (or equivalent) or BS EN 45001'. It is proposed that the EWGC requirement is appropriate for the GBGC.
- 4.16. The requirement for protection clearance times in SGC 4.2.2(a) is different to the requirements in CC.6.2.2.2(a) for Generators and CC.6.2.3.1.1(a) for Network Operators and Non-Embedded Customers. These differences have

be materially affected which is generally discharged by public consultation on a website.

⁸ See 4.97 in the September 2003 GBGC consultation.

⁹ DG4 - Investment Planning is a sub-group of the SO-TO Expert Group (STEG).

been discussed at GCEG and are not considered to be significant. Also, as alternative arrangements can be agreed in the bilateral agreement a regional difference in the GBGC is not proposed for these provisions.

Proposed regional differences and drafting changes to GBGC D1

- 4.17. This section lists matters that have been identified by the comparison table in Appendix 1 as having a significant difference between the SGC and the EWGC and where Ofgem/DTI consider it is necessary or appropriate to retain the existing regional difference. For completeness, regional differences proposed in GBGC D1 are also identified. The changes proposed follow the sequence of the SGC which has the effect that the GBGC changes do not appear in sequence. The table in Appendix 1 has further detail of the regional differences.
- 4.18. Regional differences were proposed in GBGC D1 to the definitions of Small Power Station, Medium Power Station and Large Power Station.
- 4.19. A regional difference is proposed to the General Requirements in CC.6.2.1.1(b) relating to Earth Fault Factors and voltage rise under fault conditions to reflect SGC CC 4.1.3(b). The drafting is proposed as follows:

'CC.6.2.1.1(b) The **NGC Transmission System** at nominal **System** voltages of 132kV and above is designed to be earthed with an **Earth Fault Factor** of in England and Wales, below 1.4 and in Scotland, below 1.5. Under fault conditions the rated **Frequency** component of voltage could fall transiently to zero on one or more phases or in England and Wales, rise to 140% phase-to-earth voltage, or in Scotland, rise to 150% phase-to-earth voltage. The voltage rise would last only for the time that the fault conditions exist. The fault conditions referred to here are those existing when the type of fault is single or two phase-to-earth.'

- 4.20. A regional difference is proposed to the Phase (Voltage) Unbalance provisions in CC.6.1.5(b). On the basis that GCEG consider 'maximum negative phase sequence component of the phase voltage' in SGC CC 4.1.3(c) is equivalent to 'Phase (Voltage) Unbalance' in the EWGC CC.6.1.5(b) and that 'exceptional circumstances' are equivalent to 'abnormal conditions', a regional difference is

only proposed to the limits set out in CC.6.1.5(b). It is noted that there is not an equivalent for CC.6.1.6 in the SGC and it is not proposed to extend this provision, concerning infrequent short duration peaks, to Scotland. The drafting is proposed as follows:

‘CC.6.1.5(b) Phase Unbalance

Under **Planned Outage** conditions, the maximum **Phase (Voltage) Unbalance** on the **NGC Transmission System** should remain, in England and Wales, below 1%, and in Scotland, below 2%, unless abnormal conditions prevail.

CC.6.1.6 In England and Wales, uUnder the **Planned Outage** conditions stated in CC.6.1.5(b) infrequent short duration peaks with a maximum value of 2% are permitted for **Phase (Voltage) Unbalance**, subject to the prior agreement of **NGC the System Operator** under the **Bilateral Agreement**. **NGC The System Operator** will only agree following a specific assessment of the impact of these levels on **NGC Transmission Apparatus** and ~~other~~ **Users Apparatus** with which it is satisfied.’

4.21. Both codes, the SGC in CC 4.1.4 (b) and the EWGC in CC.6.1.5(a) have a requirement that Plant and Apparatus connected to the Transmission System shall not impose harmonics on the Transmission System which exceed those specified in the bilateral agreement, however the SGC also defines a default requirement if there is no such specification in the bilateral agreement. It is proposed to continue this default requirement in Scotland. The amended text is as follows:

‘CC.6.1.5 All **Plant** and **Apparatus** connected to the **NGC Transmission System**, and that part of the **NGC Transmission System** at each **Connection Site**, should be capable of withstanding the following distortions of the voltage waveform in respect of harmonic content and phase unbalance:

(a) Harmonic Content

The **Electromagnetic Compatibility Levels** for harmonic distortion on the **NGC Transmission System** from all sources under both **Planned Outage** and fault outage conditions, (unless abnormal conditions prevail) shall comply with the levels shown in the tables of Appendix A of **Engineering Recommendation G5/4**.

Engineering Recommendation G5/4 contains planning criteria which ~~NGC~~ the System Operator will apply to the connection of non-linear load to ~~the NGC~~ **Transmission System**, which may result in harmonic emission limits being specified for these loads in the relevant **Bilateral Agreement**. The application of the planning criteria will take into account the position of existing and prospective **Users' Plant** and **Apparatus** in relation to harmonic emissions. **Users** must ensure that connection of distorting loads to their **User Systems** do not cause any harmonic emission limits specified in the **Bilateral Agreement** to be exceeded, or in Scotland, where no such limits are specified, the relevant planning levels specified in G5/4.'

- 4.22. EWGC CC.6.1.7 sets out the requirements for voltage fluctuations. GCEG consider that P28 applies in Scotland as this engineering recommendation is referenced in Appendix A of the Planning Code of the SGC. CC.6.1.7(a) is not a P28 limit but (b) is therefore (a) will apply in England and Wales only and (b) also in Scotland. The proposed drafting is as follows:

'Voltage Fluctuations

CC.6.1.7 Voltage fluctuations at a **Point of Common Coupling** with a fluctuating **Load** directly connected to the ~~NGC~~ **Transmission System** shall not exceed:

(a) In England and Wales, 1% of the **voltage** level for step changes which may occur repetitively. Any large voltage excursions other than step changes may be allowed up to a level of 3% provided that this does not constitute a risk to the ~~NGC~~ **Transmission System** or, in ~~NGC~~ the System Operator's view, to the **System** of any **User**. In Scotland, the limits for voltage level step changes are as set out in **Engineering Recommendation P28**.

(b) For voltages above 132kV, Flicker Severity (Short Term) of 0.8 Unit and a Flicker Severity (Long Term) of 0.6 Unit, for voltages 132kV and below, Flicker Severity (Short Term) of 1.0 Unit and a Flicker Severity (Long Term) of 0.8 Unit, as set out in **Engineering Recommendation P28** as current at the **Transfer Date**.'

- 4.23. There is a difference between the requirements in EWGC CC.6.2.2.1 and the SGC CC 4.2.1(c) with respect to control of a connection to the Transmission System by a circuit breaker. In the EWGC, the requirement relates only to Generating Units and specifies a single circuit breaker and in Scotland the requirement relates to all Users and specifies one or more circuit breakers. It is

considered that it would be inappropriate to remove the requirement from Users other than Generating Units in Scotland and noted that in Scotland there are instances where more than one circuit breaker is used to control a connection. Therefore, to preserve the existing technical requirements in Scotland a regional difference is proposed. The wording of the SGC has otherwise been conformed to that used in the EWGC. As GBGC CC.6.2.2.1 relates to Generating Units only and not all Users then the regional difference features in two sections of the GBGC as follows:

Add a new provision to the GBGC to cover Users in Scotland which generally reflects the wording of CC.6.2.2.1 but is placed in the 'General Requirements' section which applies to all Users:

'CC.6.2.1.2(e) In Scotland, each connection between a **User** and the **Transmission System** must be controlled by a circuit-breaker (or circuit breakers) capable of interrupting the maximum short circuit current at the point of connection. The **Seven Year Statement** gives values of short circuit current and the rating of **Transmission circuit breakers** at existing and committed **Connection Points** for future years.'

and amend CC.6.2.2.1 as follows:

'CC.6.2.2.1 In England and Wales, e~~E~~Each connection between a **Generating Unit** (other than a **CCGT Unit**) or a **CCGT Module** and the ~~NGC~~ **Transmission System** must be controlled by a circuit breaker capable of interrupting the maximum short circuit current at the point of connection. The **Seven Year Statement** gives values of short circuit current and the rating of ~~NGC-Transmission~~ circuit breakers at existing and committed **Connection Points** for future years.'

- 4.24. The requirement in SGC CC 4.2.1(d) on Users to maintain their Plant and Apparatus is broader than the EWGC requirements in CC.7.7. It is therefore proposed to amend the obligation in CC.7.7 for Users in Scotland to reflect the existing requirement in 4.2.1(d). In other respects, EWGC CC.7.7 is considered equivalent to 4.2.1(d) and so no change is proposed to CC.7.7.1 and CC.7.7.2. The following addition is proposed:

'CC.7.7.3 In Scotland, it is the **User's** responsibility to ensure that all the **User's Plant and Apparatus**, including protection systems, are tested and maintained and remain

rated for the duty required. An annual update of system fault levels is available as part of the **Seven Year Statement**.

4.25. The part of the CCs dealing with protection arrangements is not straightforward to compare. In general terms, SGC CC 4.2.2 relates to EWGC CC.6.2.2.2.2 for generators and CC.6.2.3.1.1 for Network Operators and Non-Embedded Customers. The further provisions in SGC CC 4.2.6 appear to overlap with the requirements in SGC CC 4.2.2. There are some remaining questions in the table in Appendix 1 in this area on which views are invited.

4.26. The equivalent to SGC CC 4.2.2(b) is EWGC CC.6.2.2.2.2(b) for generators and CC.6.2.3.1.1(b) for Network Operators and Non-Embedded Customers. The requirement on Generating Units connected at 132kV is different in Scotland and so the following regional difference is proposed:

‘CC.6.2.2.2(b) For the event that the above fault clearance times are not met as a result of failure to operate on the **Main Protection System(s)** provided, the **Generators** shall provide **Back-Up Protection**. [NGC The System Operator](#) will also provide **Back-Up Protection** and these **Back-Up Protections** will be co-ordinated so as to provide **Discrimination**.

On a **Generating Unit** connected to the [NGC Transmission System](#) where only one **Main Protection** is provided to clear faults on the **HV Generator Connections** within the required fault clearance time, the **Back-Up Protection** provided by the **Generators** shall operate to give a fault clearance time of no slower than 300 ms at the minimum infeed for normal operation for faults on the **HV Generator Connections**. On **Generating Units** connected to the [NGC Transmission System](#) at 400 kV and 275 kV where two **Main Protections** are provided and on **Generating Units** connected to the [NGC Transmission System](#) at 132 kV and below, the **Back-Up Protection** shall operate to give a fault clearance time of no slower than 800 ms [in England and Wales and 300ms in Scotland](#) at the minimum infeed for normal operation for faults on the **HV Generator Connections**.

Generators’ Back-Up Protection will also be required to withstand, without tripping, the loading incurred during the clearance of a fault on the [NGC Transmission System](#) by breaker fail **Protection** at 400kV or 275kV or of a fault cleared by **Back-Up Protection** where the **Generator** is connected at 132kV and below. This will permit

Discrimination between Generator Back-Up Protection and Back-Up Protection
provided on the **NGC Transmission System** and other **Users' Systems**.'

4.27. The equivalent to SGC CC 4.2.2(c) is EWGC CC.6.2.2.2(c) for generators and CC.6.2.3.1.1(c) for Network Operators and Non-Embedded Customers. The two codes have different fault clearance times of 300ms (SGC) and 200ms (EWGC) but the wording of the provisions is also different such that the specified times are measured from different points. GCEG considered that the differences between the provisions were not significant. However, the EWGC does not specify a requirement for 132kV and so this is proposed as a regional difference as follows:

'6.2.2.2(c) When the **Generating Unit** is connected to the **NGC Transmission System** at 400kV or 275kV, and in Scotland also at 132kV, and a circuit breaker is provided by the **Generator**, or **NGC the System Operator**, as the case may be, to interrupt fault current interchange with the **NGC Transmission System**, or **Generator's System**, as the case may be, circuit breaker fail **Protection** shall be provided by the **Generator**, or **NGC the System Operator**, as the case may be, on this circuit breaker. In the event, following operation of a **Protection** system, of a failure to interrupt fault current by these circuit-breakers within the **Fault Current Interruption Time**, the circuit breaker fail **Protection** is required to initiate tripping of all the necessary electrically adjacent circuit-breakers so as to interrupt the fault current within the next 200 ms.'

and:

'6.2.3.1.1(c) (i) Where the **Network Operator** or **Non-Embedded Customer** is connected to the **NGC Transmission System** at 400kV or 275kV, and in Scotland also at 132kV, and a circuit breaker is provided by the **Network Operator** or **Non-Embedded Customer**, or **NGC the System Operator**, as the case may be, to interrupt the interchange of fault current with the **NGC Transmission System** or the **System** of the **Network Operator** or **Non-Embedded Customer**, as the case may be, circuit breaker fail **Protection** will be provided by the **Network Operator** or **Non-Embedded Customer**, or **NGC the System Operator**, as the case may be, on this circuit breaker.

(ii) In the event, following operation of a **Protection** system, of a failure to interrupt fault current by these circuit-breakers within the **Fault Current Interruption Time**, the circuit breaker fail **Protection** is required to initiate tripping of all the

necessary electrically adjacent circuit-breakers so as to interrupt the fault current within the next 200 ms.'

- 4.28. In both codes SGC CC 4.2.3 and EWGC CC.6.2.2.4 and CC.6.2.3.5 the User is prevented from working on equipment except in the presence of a representative of NGC or the Company. The SGC also provides for the ability to provide written authority for Users to work on equipment. It is proposed to retain this flexibility in Scotland and so a regional difference is proposed as follows:

'CC.6.2.2.4 Work on **Protection** Equipment

No busbar **Protection**, mesh corner **Protection**, circuit-breaker fail **Protection** relays, AC or DC wiring (other than power supplies or DC tripping associated with the **Generating Unit** itself) may be worked upon or altered by the **Generator** personnel in the absence of a representative of ~~NGC~~ the **System Operator** or in Scotland, a representative of, or written authority from, the **Relevant Transmission Licensee**.'

and:

'CC.6.2.3.5 Work on **Protection** equipment

Where ~~NGC~~a **Transmission Licensee** owns the busbar at the **Connection Point**, no busbar **Protection**, mesh corner **Protection** relays, AC or DC wiring (other than power supplies or DC tripping associated with the **Network Operator** or **Non-Embedded Customer's Apparatus** itself) may be worked upon or altered by the **Network Operator** or **Non-Embedded Customer** personnel in the absence of a representative of ~~NGC~~the **System Operator** or in Scotland, a representative of, or written authority from, the **Relevant Transmission Licensee**.'

- 4.29. The requirements in SGC CC 4.3 (plant performance requirements) are placed on all Generating Units ('Any Apparatus which produces electricity') whereas the requirements in the EWGC CC.6.3 are qualified in CC.6.3.1 to exclude 'Small Power Stations, hydro units and renewable energy plant not designed for Frequency and voltage control'¹⁰. The application of these words to plant in

¹⁰ It is noted that the scope of this qualification has been the subject of discussion in England and Wales and that there have been a number of interpretations put forward.

Scotland would be a relaxation of the existing requirements in Scotland and Ofgem/DTI understand that there is plant in Scotland that may be excluded by such a qualification which currently provides such services and that therefore it would be technically prudent to continue with the existing Scottish requirement. Generators and/or the System Operator could apply for derogation against these requirements where existing generating plant was unable to meet any of the obligations set out in this section of the GBGC. Views are invited on whether the exclusion of certain plant should be limited to England and Wales to reflect the existing requirements. The proposed drafting would be as follows:

‘CC.6.3.1 This section sets out the technical and design criteria and performance requirements for **Generating Units** (whether directly connected to the **NGC Transmission System** or **Embedded**) which each **Generator** must ensure are complied with in relation to its **Generating Units**, but, in England and Wales, does not apply to **Small Power Stations**, hydro units and renewable energy plant not designed for **Frequency** and voltage control. References to **Generating Units** in this CC.6.3 should be read accordingly.’

4.30. SGC CC 4.3.2(b) and Schedule and Despatch Code 3 (SDC3) section 6 set out the frequency control requirements for generators in Scotland. The EWGC in CC.6.3.2 to CC.6.3.8 has more detailed requirements; some of which apply to all Generating Units and some that are specific to plant with a Completion Date after 1 January 2001. It is anticipated that for plant in Scotland that does not comply with the general requirements, licensee(s) will apply for derogation. It is proposed that in applying the EWGC requirement which applies to plant which have a Completion Date after 1 January 2001 to plant in Scotland it would be appropriate to adopt the BETTA go-live date of 1 April 2005. By identifying this requirement at this stage, this would be consistent with the introduction of this requirement in England and Wales which was only applied to plant connecting after a future date¹¹. The proposed drafting is as follows:

¹¹ In England and Wales the date was one year after the requirement was introduced to the Grid Code.

‘CC.6.3.7(e) Each **Generating Unit** and/or **CCGT Module** which has a **Completion Date** after 1 January 2001 [in England and Wales, and after 1 April 2005 in Scotland](#), must be capable of meeting the minimum frequency response requirement profile subject to and in accordance with the provisions of Appendix 3.’

and:

‘CC.6.3.7(f) For the avoidance of doubt, the requirements of Appendix 3 do not apply to **Generating Units** and/or **CCGT Modules** which have a **Completion Date** before 1 January 2001 [in England and Wales, and after 1 April 2005 in Scotland](#), for whom the remaining requirements of this clause CC.6.3.7 shall continue to apply unchanged.’

4.31. SGC CC 4.5.3 sets down the requirements for Users to provide measurements and status points and contains provisions for Renewable Generating Units to provide anemometer readings. It is proposed to retain this requirement in Scotland. The definitions in the SGC to support this requirement will also be incorporated in the GBGC. The proposed drafting of the equivalent EWGC provision, CC.6.5.6(a), and the new terms to be added to the Glossary and Definitions (all of which is taken directly from the SGC), are as follows:

‘CC.6.5.6(a) ~~NGC~~[The System Operator](#) shall provide system control and data acquisition (SCADA) outstation interface equipment. The **User** shall provide such voltage, current, **Frequency**, **Active Power** and **Reactive Power** measurement outputs and plant status indications and alarms to the [NGC Transmission](#) SCADA outstation interface equipment as required by ~~NGC~~[the System Operator](#) in accordance with the terms of the **Bilateral Agreement**. [In addition, in Scotland, in the case of **Renewable Generating Units** utilising wind energy, anemometer readings would be required for any turbine or **Cluster** of wind turbines with a total **Registered Capacity** of 5MW and greater, a single anemometer would suffice.](#)’

[and:](#)

[‘Cluster](#)

[1. Before Telemetry](#)

[A cluster of wind turbines will be formed when the total wind capacity within any circle of five kilometre radius has a **Registered Capacity** of not less than 5MW](#)

2. After Telemetry

Any wind turbine installed within a five kilometer radius of the anemometer position (whether installed before or after the installation of that anemometer) will be deemed to be within the cluster for that anemometer and will not count towards the creation of any new cluster. All other wind turbines may count towards the creation of further clusters.

Renewable Generating Unit

A **Generating Unit** which is (or may be) fuelled or driven otherwise than by **Fossil Fuel** or nuclear power.'

- 4.32. In SGC CC 4.5.6 and EWGC CC.6.5.10, the Company/NGC provide voltage signals to enable generators to synchronise. The SGC provides for these signals to be available to Generating Units whereas the EWGC is limited to Large Power Stations at Grid Entry Points because in practice there have been no directly connected generators other than large. The drafting change to delete the word 'Large' from GBGC D1 is as follows:

'CC.6.5.10 ~~NGC~~The System Operator shall, subject as provided below, provide each **Generator** at each **Grid Entry Point** where one of its ~~Large~~ **Power Stations** is connected with appropriate voltage signals to enable the **Generator** to obtain the necessary information to synchronise its **Gensets** to the ~~NGC~~ **Transmission System**. The term "**voltage signal**" shall mean in this context, a point of connection on (or wire or wires from) a relevant part of ~~NGC's~~Transmission **Plant** and/or **Apparatus** at the **Grid Entry Point**, to which the **Generator**, with ~~NGC~~the System Operator's agreement (not to be unreasonably withheld) in relation to the **Plant** and/or **Apparatus** to be attached, will be able to attach its **Plant** and/or **Apparatus** (normally a wire or wires) in order to obtain measurement outputs in relation to the busbar.'

- 4.33. As SGC CC 6.1.2(g), (h) and (i) are concerned with safety and site liaison it is proposed to incorporate the existing regional difference in the GBGC. The equivalent to SGC 6.1.2(g) appears in EWGC 5.2(g) but the others do not have a direct equivalent. In incorporating the SGC provision, it is not considered necessary to include the definition for 'Directly Connected' (which exists by inference from the definition of 'Direct Connection') in the GBGC and so the term is not capitalised. The words are incorporated directly from the SGC (except as noted above) and the proposed drafting is as follows:

'CC.5.2 (g) written confirmation that **Safety Coordinators** acting on behalf of the **User** are authorised and competent pursuant to the requirements of **OC8**, and, in addition, in Scotland: a list of persons appointed by the **User** to undertake, and to be responsible for, the application and removal of **Safety Precautions** on those parts of the **User's System** which are directly connected to the Transmission System; a list of persons appointed by the **User** to undertake operational duties on the **User's System** and to issue and receive operational messages and instructions in relation to the **User's System**; and an appointed person or persons(s) responsible for the maintenance and testing of **User's Plant and Apparatus.**'

Specific views sought on CCs

- 4.34. Views are sought on all of the drafting in the CCs (set out in GBGC D1) and in particular on the conformance of requirements or regional differences proposed in this section 4. Views are particularly sought on the matters raised in paragraphs 4.4, 4.13, 4.25 and 4.29.

5. OC5 – Testing and Monitoring

Overview of GBGC OC5

- 5.1. There is no equivalent to OC5 (Testing and Monitoring) in the SGC and so no comparison table has been provided. OC5 provides the detail of the testing requirements associated with the CCs. Regional differences have been proposed to reflect the regional differences proposed in the CCs

Summary of analysis of changes from EWGC OC5 to GBGC OC5

- 5.2. The following definitions are changed:
- ‘NGC’ to ‘System Operator’.
- 5.3. In various places, the provisions are different for Scotland and for England and Wales and so they are set out as such. The intention has been not change any of the requirements in England and Wales.

Summary of analysis of changes from SGC to GBGC OC5

- 5.4. The SGC does not have specific provision for testing and monitoring. The GBGC OC5 provisions will be new to Scotland. However, Ofgem/DTI understand that many of these provisions are covered by other bilateral (and therefore private) agreements in Scotland.

Proposed regional differences and changes to D1

- 5.5. Regional differences are proposed to the table in EWGC OC5.5.3, these reflect the proposals for regional difference in the CCs. No other changes are proposed to the EWGC OC5. The table is presented in Appendix 2.

Specific views sought on OC5

- 5.6. Views are sought on all of the drafting in OC5 and in particular on the requirements for regional differences presented in Appendix 2.

6. General Conditions (GCs)

Overview of GBGC GCs

- 6.1. GBGC General Conditions (GCs) set out the general conditions that apply to the Grid Code such as the composition of the Grid Code Review Panel (GCRP) and communication between the GB system operator and the User.

Summary of analysis of changes from EWGC GCs to GBGC GCs

- 6.2. The following definitions are changed:
- 'NGC' to 'System Operator'.
- 6.3. The September 2003 GBGC consultation added another objective for the Panel, '4.2(f) consider and identify changes to the GC to remove any unnecessary differences in the treatment of issues in Scotland from their treatment in England and Wales.'
- 6.4. The September 2003 GBGC consultation included a proposal to amend the GCRP representation.
- 6.5. There will be one GCRP for GB under BETTA.
- 6.6. GC.11 has been added to draw attention to the confidentiality provisions in the CUSC.

Summary of analysis of changes from SGC GCs to GBGC GCs

- 6.7. The changes in 6.2 to 6.6 also apply as changes from the SGC to the GBGC. The GBGC GCs are based on the EWGC GCs and so there will be other minor differences in moving from the SGC to the GBGC (please refer to the comparison table in Appendix 3 for details).

Proposed regional differences and changes to D1

- 6.8. No regional differences are proposed for the GCs and no changes are proposed above those issued in draft 1 of the GBGC.

Specific views sought on GCs

- 6.9. Views are sought on all of the drafting in the GCs.

Appendix 1 – Connection Conditions Comparison Table

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
1.1	CC1.1	In both codes, the introduction states that the CCs set out the minimum technical, design and operational criteria which must be complied with by a User (or potential User). In the SGC: Generators connected to a User System who require use of the Transmission System (or are Interconnector Users) must also comply; and the CCs also set down procedures by which the Company will ensure User compliance as a prerequisite for establishing the User's connection. In the EWGC, also sets out the minimum technical, design and operational criteria which must be complied with by NGC.	Similar. Explanatory text only.	No.
1.2	CC.4.1 (CUSC 2.13 & 3.7)	In the SGC, procedures whereby the Company and Users can enter into agreements are in the Planning Code. Every Connection or Use of System Agreement shall require the User to comply with the CCs. The Company won't agree to connect the User until the CCs have been met (subject to 1.6). In the EWGC, describes that the CUSC contains procedure for connection (or in the case of Embedded Power Stations - becoming operational) including provisions which the User needs to satisfy before		No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		it has the right to become operational.		
1.3	n/a	In the SGC, the Company will not impose changes to the CCs on existing Users unless they can demonstrate a significant, detrimental impact on the Transmission System.	General Conditions (GC.4.5) requires all Authorised Electricity Operators to be consulted on proposed changes.	No.
1.4	n/a	In the SGC, if 1.3 test is met then the User will be responsible for any required modification (subject to determination by the Authority).		No.
1.5	CUSC 6.29 and licence obligations	In the SGC, there is a requirement on Users to comply with relevant obligations in the Settlement Agreement for Scotland.		No.
1.6	n/a	In the SGC, some Generating Units have inherent characteristics that mean they can't comply with the CCs. The Company will discuss requirements with the User.	Handled by derogation in England and Wales.	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
2.1	CC.2.1	In the SGC, the objective of the CCs is to ensure that (i) all Users are treated in a non-discriminatory fashion and in accordance with the Company's statutory and licence obligations and (ii) the Transmission System will operate in accordance with the standards defined in the PC and section 4 of the CCs (unless otherwise agreed between the Company and the User) and the User won't cause operation outside standards of the Transmission System or other Users. In the EWGC, the objective of the CCs is to ensure that the basic rules for connection to the Transmission System (or for some Users a User System) are similar for all Users of an equivalent category and will enable the SO to comply with its statutory and transmission licence obligations.	Similar. Explanatory text.	No.
3.1	CC.3.1	In both codes, this applies to existing and potential Users. In the SGC, scope is Generators (including Renewable Generators requiring use of the Transmission System), Network Operators, Suppliers, Directly Connected Customers and Interconnector Users. In the EWGC, scope is NGC, Generators (other than those which only have Embedded Small Power stations), Network Operators, Non-Embedded Customers and BM Participants and Externally Interconnected System Operators (in respect of CC.6.5 only).	In EWGC, does not apply directly to Interconnector Users but they are BM Participants. In the SGC does not apply to the EISO.	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
4.1.1	CC.6.1.1 & CC.6.1.4 - 2 nd para & CC.6.1.5 - 1 st para & CC.6.2 & CC.6.2.2.2.1 & CC.6.2.3.1.1	In the SGC, frequency and voltage are subject to variation within the ranges set out in 4.1.2(a) to 4.1.3(c). The Company will ensure that the Transmission System will operate satisfactorily with the specified ranges. The Company and the User may agree to a greater or lesser voltage variation (which will be set out in the Connection/UoS agreement). Users shall ensure that their Plant and Apparatus (P&A) can operate satisfactorily with the variations set out in 4.1.2(a) to 4.1.4(b). Users should consider these variations when designing their systems. In the EWGC, NGC will ensure Transmission System complies with the criteria, except where there are insufficient Power Stations or User Systems or Users do not comply with the GC. Users shall ensure its P&A complies with the 6.1.5 voltage waveform quality criteria. NGC and the User can agree to a greater or lesser voltage variation. The introductions to various sections state that Users must meet the requirements. Note in the EWGC, NGC checks compliance in relation to Transmission P&A (CC.6.2).	Similar.	No.
4.1.2(a)	CC.6.1.2	In both codes, the system frequency is nominally 50Hz and shall normally be controlled within the range 49.5 - 50.5 Hz. In the SGC, as set out in the Electricity Supply Regulations. In the EWGC, except in exceptional circumstances.	Equivalent.	No.

SGC ref	EWGC/GBGC equiv	Provisions		Comment	Regional difference proposed
4.1.2(b)	CC 6.1.3	In both codes, the system frequency could rise to 52Hz or fall to 47Hz in exceptional circumstances. In the SGC, Generator's P&A and in the EWGC, User's P&A shall be designed to: operate continually between 47.5 - 52 Hz and operate for a period of at least 20 seconds each time the frequency falls below 47.5Hz between 47 - 47.5Hz. In the SGC, other Users should ensure their equipment is designed or protected for these circumstances.		In EWGC, all User P&A should operate in this range. 'User' is Generators, Network Operators and Non-Embedded Customers. In SGC, Generators 'operate', other Users 'protect'. SGC applies to all Generators. EWGC applies to all Generators other than those who only have Embedded Small Power Stations.	No regional difference is proposed as a material difference has not been identified. Does not seem appropriate to have a difference going forward.
4.1.3(a)	CC.6.1.4 1 st para	In the SGC, the voltage will normally be within: for 400kV +/- 5% with 10% 15 minutes overvoltage;	In the EWGC, the voltage will normally be within: for 400kV +/- 5% with 10% 15 minutes overvoltage, a minimum voltage of -10% and a maximum	At 400kV: EWGC specifies a minimum and a maximum voltage. SGC specifies	DG4 sub group is considering harmonisation of operational standards; GC will be reviewed

SGC ref	EWGC/GBGC equiv	Provisions		Comment	Regional difference proposed
		for 275kV +/- 10% with 15% overvoltage; for 132kV +/- 10% with 20% overvoltage	voltage of + 10%; for 275kV and 132kV +/- 10%; for below 132kV +/-6% of nominal value.	overvoltage at 275kV and 132kV. EWGC has a voltage range for voltages of less than 132kV.	for impact when this work has progressed further.
4.1.3(b)	CC.6.1.4 last sentence of 1 st para & CC.6.2.1.1(b) CC.6.2.1.1(c)	In the SGC, under fault and circuit switching conditions the rated frequency component of voltage could fall transiently (possibly extending to the back-up Protection times in 4.2.2(b)) to zero on one or more phases or rise to 150% of nominal phase-to-earth voltage.	CC.6.1.4 in the EWGC, under fault conditions, voltage may collapse transiently to zero at the point of fault until the fault is cleared. CC.6.2.1.1(b) System is designed to be earthed with an Earth Fault Factor of 1.4. Under faults conditions rated frequency component of voltage could fall transiently to zero or rise to 140% phase to earth voltage. The voltage rise would last for the time the fault conditions exist. The fault conditions are when the fault is single or two phase to earth. CC.6.2.1.1(c) for connections to the	CC.6.1.4 is equivalent. The SGC qualifies 'transiently'. The SGC has 'fault <u>and circuit switching</u> conditions'. The SGC has 150% rise, the EWGC has 140%. The EWGC has length of time and type of fault. For connections below 132kV in the EWGC NGC will advise conditions prior to	Reflects design standards, propose regional difference in CC.6.2.1.1(b).

SGC ref	EWGC/GBGC equiv	Provisions		Comment	Regional difference proposed
			Transmission System below 132kV the earthing requirements and voltage rise conditions will be advised by NGC prior to connection.	connection.	
4.1.3(c)	CC.6.1.5(b) & CC.6.1.6	In the SGC, under Planned Outage conditions the maximum negative phase sequence component of the phase voltage on the Transmission System should remain below 2% unless exceptional circumstances prevail.	In the EWGC, under Planned Outage conditions, the maximum Phase (Voltage) Unbalance on the Transmission System should remain below 1% unless abnormal conditions prevail. Under the Planned Outage conditions stated in CC.6.1.5(b) infrequent short duration peaks with a maximum value of 2% are permitted for Phase (Voltage) Unbalance, subject to the prior agreement of NGC under the Bilateral Agreement. NGC will only agree following a specific assessment of the impact of these levels on Transmission Apparatus and Users Apparatus with which it is satisfied.	Confirm 'maximum Phase (Voltage) Unbalance' is the same as 'maximum negative phase sequence component of the phase voltage'. In SGC, exceptional circumstances. In EWGC, abnormal conditions. Different % requirements. EWGC has same % as SGC (but for short duration peaks) where this is agreed under the Bilateral Agreement. Phase (Voltage) Unbalance is the ratio (in%) between the rms	GCEG consider that 'maximum negative phase sequence component of the phase voltage' is equivalent to 'Phase (Voltage) Unbalance and that 'exceptional circumstances' are equivalent to 'abnormal conditions'. Propose a regional difference to % in 6.1.5(b) and that CC6.1.6 should only

SGC ref	EWGC/GBGC equiv	Provisions		Comment	Regional difference proposed
				values of the negative sequence component and the positive sequence component of the voltage.	apply to England and Wales.
4.1.4	CC.6.1.5(a)	In the SGC, all Plant and Apparatus connected to the system must be capable of withstanding likely levels of harmonic distortion ('Electromagnetic Compatibility Levels' set out in ER G5/4 App A). The Company will apply the planning criteria in G5/4 to the connection of nonlinear loads, this may result in harmonic emission limits being specified in the relevant Connection Agreement. Connected Plant and Apparatus shall not impose harmonics on the Transmission System which exceed the limits specified in the relevant Connection Agreement, or where no limits are specified, the relevant	In the EWGC, all Plant and Apparatus(P&A) connected to the system should be capable of withstanding distortions in the voltage waveform. The Electromagnetic Compatibility Levels for harmonic distortion on the Transmission System from all sources under both Planned Outage and fault outage conditions, (unless abnormal conditions prevail) shall comply with the levels shown in the tables of Appendix A of Engineering Recommendation G5/4. Engineering Recommendation G5/4 contains planning criteria which the System Operator will apply to	Not equivalent in that the SGC provides a requirement on Users where no limits are specified in the bilateral agreement.	Propose to retain the default requirement from the SGC.

SGC ref	EWGC/GBGC equiv	Provisions		Comment	Regional difference proposed
		Planning Levels specified in G5/4.	the connection of non-linear load to the Transmission System, which may result in harmonic emission limits being specified for these loads in the relevant Bilateral Agreement. The application of the planning criteria will take into account the position of existing and prospective Users' Plant and Apparatus in relation to harmonic emissions. Users must ensure that connection of distorting loads to their User Systems do not cause any harmonic emission limits specified in the Bilateral Agreement to be exceeded.		
n/a	CC.6.1.7	In the EWGC, voltage fluctuations on the Transmission System near a point where a fluctuating load attaches to the Transmission System shall not exceed: (a) 1% for repetitive step changes, others up to 3% as long as they are not a risk to the Transmission System (b) Flicker Severity of 0.8 Unit (0.6 long term) as set out in P28 as		SGC CC 4.4.1 puts obligations on Users with respect to fluctuating loads to ensure that P28 will not be exceeded. [Assume there is a typo in SGC 4.4.1, and that App B	GCEG consider that P28 applies in Scotland. (a) is not a P28 limit but (b) is. Apply (a) as exists in E&W only and P28 in Scotland

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		current at the Transfer Date	should refer to App A]	and (b) also in Scotland. Amend (b) as limits (on inspection of P28) apply to above 132kV.
PC 4.1	CC.6.2.1.1(a)	In the EWGC, the design of connections between the Transmission System and Users will be consistent with Licence Standards.	Equivalent (in GC terms). There may be differences in the applicable standards which may need to be reflected in the definition of Licence Standards.	No.
4.2.1(a)	CC.6.2.1.2 (a) & (b)	In the SGC: All P&A shall comply with the current IEC, BS, Euronorm and CENELEC requirements, subject to Clause 1.3, for the items listed, as modified by any ESI standard (list of P&A). In the EWGC: (a) list of P&A as SGC except also has 'reactors'; (i)P&A installed, owned or ordered, prior to 1/1/99 shall comply with the standards applicable at the time of design or as set out in Bilateral	The SGC applies to all User Plant and Apparatus at the Connection Point whereas the EWGC only covers Plant and Apparatus within the	Would expect any regional difference to appear in the list of relevant technical specifications.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		Agreement: (ii) P&A post 1/1/99 for a new Connection Point shall comply with relevant technical standards and any further requirements identified by NGC; (iii) P&A post 1/1/99 for an existing Connection Point shall comply with the standards applicable when the change was designed (iv) Used P&A use (i), (ii) or (iii) as appropriate. (b) NGC will maintain a list of relevant technical specifications and will provide the list to Users on request.	busbar protection zone. The scope of applicable technical standards may be considered further in light of arrangements that may be implemented relating to the Governance of Electrical Standards¹² and DG4 of STEG (re 'interface equipment specification').	Not at this time.
n/a	CC.6.2.1.2(c)	In the EWGC, where the User provides the SO with test reports which demonstrate compliance with Technical Specs NGC shall give due consideration to the info.	Information requirement in bilateral. No need for difference.	No.

¹² Ofgem/DTI note that NGC has recently consulted on changes to its Grid Code based on the recommendation from a joint working group with the SGCRP and DCRP and expects proposals to be developed for the SGC in the near future.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
4.2.1(b)	CC.6.2.1.2(d)	In the SGC, P&A shall be designed, manufactured and tested in premises certified in accordance with the quality assurance requirements of ISO 9001 or equivalent. In the EWGC, premises are certified to ISO 9000 (or equivalent) or BS EN 45001.	SGC requirement is narrower.	No.
4.2.1(c)	CC.6.2.2.1	In both codes, each connection between a User(SGC)/Generating Unit (EWGC) and the Transmission System shall be controlled by a circuit-breaker (in SGC - or circuit breakers) capable of interrupting at the Connection Point, the short circuit current as advised in the Statements of System capacity (section 5.1 of the Planning Code) (SGC) and in SYS (EWGC).	In SGC applies to Users and can be more than one breaker. In EWGC applies to Generating Units, no equivalent for Network Operators.	Yes.
4.2.1(d)	CC.7.7 & CC.6.2.2.1 (for Generators)	In the SGC, it is the User's responsibility to ensure that his P&A, including protection systems, are tested and maintained and remain rated for the duty required. An annual update of system fault levels is available from the Company as part of the Seven Year Statement. In the EWGC, all User's P&A on Transmission Sites shall be maintained adequately so as not to provide a threat to Transmission P&A or personnel. NGC will have the right to inspect the maintenance records. All Transmission P&A on User's Sites shall be maintained adequately. Users will have the right to inspect maintenance records.	In the SGC, it is the User's responsibility to remain rated for the duty required. Note that all transmission licensees publish fault level data in SYS.	Propose additional requirement on Scottish Users in CC.7.7 reflecting existing requirement in SGC 4.2.1(d).

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
4.2.2(a)	CC.6.2.2.2.2(a) (gen) & CC.6.2.3.1.1(a) (NO and NEC)	In the SGC, fault clearance times (from fault inception to circuit breaker arc extinction) by main Protection should not exceed: (i) 400 kV network - 80 milliseconds (ii) 275 kV network - 100 milliseconds (iii) 132 kV network - 140 milliseconds The probability that these times will be exceeded for any given fault must be less than 2%. In the EWGC, for faults on the generator/Network Operator(NO)/Non-Embedded Customers (NEC's) equipment, or faults on the Transmission System directly connected to the Generator/NO/NEC's equipment, fault clearance times (from fault inception to circuit breaker arc extinction) shall be set out in the bilateral. Those times shall not be faster than: (i) 80ms at 400kV (ii) 100ms at 275kV (iii) 120ms at 132kV and below but this shall not prevent the User or NGC having faster fault clearance	SGC has 140ms at 132kV and no specification for lower voltages. EWGC has 120ms at 132kV and below. Can conform to EWGC in light of the flexibility to relax by agreement.	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		times. (ie you can't force the User to have faster times in the bilateral but you can agree faster times with a User) Slower fault clearance times can be specified in the bilateral (but only if it's acceptable to NGC). Same probability for fault times exceeded as SGC.		
4.2.2(b)	CC.6.2.2.2.2(b) 1st para (gen) (see CC.6.2.3.1.1(b) for NO and NEC)	In the SGC, Back-Up Protection shall be provided with a target maximum fault clearance time of 300ms to cover for the failure of the main Protection. In the EWGC, Generators shall provide back-up protection for when main protection fails to operate. NGC will also provide back-up protection and both these protections will be co-ordinated to provide discrimination. For Generating Units [connected at 400kV and 275kV] where only one main protection is provided: the back-up protection shall result in a fault clearance time of no slower than 300ms. For Generating Units connected at 400kV and 275kV where two main protections are provided and Generating Units connected at 132kV and below: the back-up protection shall result in a fault clearance time of no slower than 800ms. Generators back-up protection will also be required to withstand the loading incurred during a fault on the Transmission	Requirement in SGC matches reqt for EWGC for gens connected at 400/275kV where only one main protection is provided. Generators connected at 400/275 where two main protections are provided and generators connected at 132kV and below fault clearance is by 800ms (compares with 300ms in Scotland).	Propose a regional difference of 300ms in Scotland cf 800ms in E&W.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		System (by breaker fail protection at 400/275kV) or of a fault cleared by Back-Up Protection where the Generator is connected at 132kV and below). This will permit discrimination between Back-Up Protection provided on the Transmission System and other User's Systems.		
n/a	CC.6.2.2.2.2(b) para 3	In the EWGC, Generator Back-Up Protection will be required to withstand the loading incurred during fault clearance.		No.
4.2.2(c)	CC.6.2.2.2.2(c) (gen) & CC.6.2.3.1.1(c) (NO and NEC)	In the SGC, circuit-breaker fail Protection (CBFP) shall be provided by Users to trip all required circuit breakers within 300ms. In the EWGC, when the Generator is connected at 400/275kV, NGC or the Generator shall provide circuit breaker fail protection, If the circuit breaker fails to operate within the Fault Current Interruption Time the circuit breaker fail protection shall trip all required circuit breakers within 200ms. Same requirement for NO and NEC.	EWGC has no requirement for 132kV. Scotland has 300ms, EWGC has 200ms but this is from different starting points. GCEG consider no significant difference in requirements.	Propose a 132kV spec but no timing difference.
4.2.2(d)	CC.6.2.2.2.2(d) (gen) & CC.6.2.3.1.1(d) (NO and NEC)	In both codes, the design reliability for Protection shall be equal to or greater than 99%.		No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
n/a	CC.6.2.2.3.1 (gen) & CC.6.2.3.6.1 (NO and NEC)	In the EWGC, Protection equipment for 'interconnecting connections' will be specified in the Bilateral Agreement.	It is not clear that there are there any 'interconnecting connections' in Scotland. However this clause does not set out a requirement.	No.
n/a	CC.6.2.2.3.2 (gen)	In the EWGC, the Generator will install circuit breaker fail protection in accordance with the Bilateral Agreement. Where these circuit breakers are installed, in the event of loss of air from its pressurised head circuit breakers, during the Generating Unit run-up sequence, the Generator will provide a 'back-trip signal'.	It is not clear that there are any of these in Scotland.	No. Views invited.
4.2.3	CC.6.2.2.4 (gen) & CC.6.2.3.5 (NO and NEC)	In both codes, no busbar Protection, mesh corner Protection, circuit-breaker fail Protection relays, AC or DC wiring (other than power supplies or DC Tripping associated with the User's Plant and Apparatus) shall be worked upon or altered, by or on behalf of, a User in the absence of a representative of the Company/NGC. In the SGC the Company can provide written authority for such work, in place of having a representative.	Maybe necessary to provide written authority option for example in remote areas.	Yes.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
n/a	CC.6.2.2.5 (gen) & CC.6.2.3.4 (NO and NEC)	In the EWGC, protection and relay settings will be co-ordinated across the Connection Point in accordance with the bilateral agreement.	Equivalent practice in Scotland by letter between parties but currently not formalised in a bilateral agreement.	No.
4.2.4	CC.6.2.2.3.3	In both codes, the Generator must provide Protection to detect loss of generator excitation and initiate a trip of the associated Generating Unit.	Equivalent.	No.
4.2.5	CC.6.2.2.3.4	In both codes, where, in the Company/NGC's reasonable opinion, system requirements dictate, the Company/NGC will specify in the bilateral a requirement for Generators to fit pole-slipping Protection on Generating Units.	Equivalent.	No.
4.2.6(a)	CC.6.2.3.1.1(b) (ii)	In the SGC, the Transmission System will be equipped with back-up Protection which will be expected to operate only in the event of a failure to operate of the Network Operators' and Directly Connected Customers' main Protection, or failure to trip of the associated circuit-breaker. In the EWGC, Back-Up Protection (BUP) shall be provided by the	Equivalent.	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		Network Operator (NO) or Non-Embedded Customer(NEC). For connections at 132kV and below it is normally required that the BUP on the Transmission System (TS) will discriminate with the NO or NEC BUP.		
4.2.2(b)	CC.6.2.3.1.1(b) (i), (iv), (v)	In the EWGC, the SO will also provide Back-Up Protection (BUP) with a slower fault clearance time than the NO or NEC BUP to provide Discrimination. For connections at 400 or 275 kV the BUP will be provided by the NO or NEC with a fault clearance time not slower than 300ms for faults on the NO or NEC Apparatus. Such protection will also need to withstand the loading incurred during fault clearance. Discrimination will be set in the Bilateral.	Part of (i) covered in SGC4.2.2(b) (iv) in SGC4.2.2(c) (v) cf 6.2.2.2.2(b) Equivalent.	No.
4.2.6(b) (i)	CC.6.2.3.1.1(a) & CC.6.2.3.1.1(b) (iii) (same as Generator reqts in CC6.2.2.2.2	In both codes, Protection of any lower voltage System supplied from the Transmission System by direct transformation must meet the minimum requirements given below: (i) Fault Clearance Times In the SGC, the maximum fault clearance time of faults on the User's System shall not exceed 250ms. The probability that this time will be	GCEG consider application of obligation is equivalent.	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
	above)	exceeded, for any given fault, shall be less than 2%. In the EWGC, for faults on NO or NEC directly connected to the TS, or faults on the Transmission System directly connected to the NO or NEC equipment, fault clearance times (from fault inception to circuit breaker arc extinction) shall be set out in the bilateral. Those times shall not be faster than: (i) 80ms at 400kV (ii) 100ms at 275kV (iii) 120ms at 132kV and below but this shall not prevent the User or NGC having faster fault clearance times. (ie you can't force the User to have faster times in the bilateral but you can agree faster times with a User) Slower fault clearance times can be specified in the bilateral (but for NO or NEC only if it's acceptable to the SO). Same probability for fault times exceeding as SGC.		
4.2.6(b) (ii)	CC.6.2.3.2	Fault Disconnection Facilities In both codes, where the interface circuit-breaker is provided by the User, the User must provide the Company/NGC with the means of	Equivalent. In the SGC suitable facilities will be	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		Tripping all the User's circuit-breakers necessary to isolate faults or System abnormalities on the Transmission System. In these circumstances, for faults on the User's System, the User's Protection should also trip higher voltage Company/NGC circuit-breakers (in the SGC 'suitable facilities will be provided by the Company'). Tripping facilities shall be in accordance with the requirements of the bilateral agreement.	provided by the Company.	
4.2.6(b) (iii)	CC.6.2.3.3	Automatic Switching Equipment In both codes, where automatic reclosure of Company/NGC circuit-breakers is required following faults on the User's System, automatic switching equipment shall be provided in accordance with the bilateral agreement.		No.
4.3.1(a), (b) and (c)	CC.6.3.1	In the SGC Generating Unit requirements apply to all Generating Units (unless in some instances otherwise qualified) ie all generating units (no size limit). Scope is set out in each clause. In the EWGC, these conditions (in CC.6.3) apply to all Generating Units except Small Power Stations, hydro units and renewable energy plant not designed for frequency and voltage control.	Difference in scope. In SGC applies to all Generating Units. In EWGC limited by qualification. Current SGC requirement is on all Generating Units. Technical prudence	Not at this time. Views invited.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
			would suggest existing requirement in Scotland should be retained.	
4.3.1(a)	CC.6.3.2	In both codes, all generating units must be capable of supplying Active Power output between .85 power factor lagging and .95 power factor leading. The short circuit ratio of the Generating Units shall not be less than .5. In the SGC these conditions are 'unless otherwise agreed by the Company'.	Ofgem is aware of circumstances where other requirements have been agreed in England and Wales (and derogations were granted). Licensee(s) can apply for derogation for non compliant plant.	No.
4.3.1(b)	CC.6.3.3(a) & CC.6.3.3(b)	In both codes, a Generating Unit must be capable of continuously supplying constant Active Power Output between 49.5 and 50.5 Hz. In the frequency range 49.5 to 47 Hz decrease of power must, in the SGC be no more than pro-rata with frequency. In the EWGC, according to a graph.	Equivalent. The graph in the EWGC clarifies the obligation.	No.
4.3.1(c)	CC.6.3.4	In both codes, active power output of generators should not be affected by the voltage ranges specified in 4.1.3(a)/CC.6.1.4. Reactive power output should be fully available within +/- 5% of voltage range.		No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
4.3.1(d)	CC.6.3.5	In both codes, the Transmission System needs some generators to have black start capability, these will be specified in bilateral agreement. In the SGC, in the event that agreement cannot be reached between the Company and the Generator, the matter can be referred by either party to the Authority.	Equivalent.	No.
4.3.2(a)	CC6.3.6	In both codes, each Generating Unit must be capable of contributing to frequency and voltage control by the modulation of the active and reactive power supplied to the Transmission System or User System. In the SGC, in a manner satisfactory to the Company.	Equivalent.	No.
4.3.2(b) & SDC3 6.1 & 6.2	CC6.3.7(a), (b), (c), (d), (e) & (f)	In the SGC, each Unit must be fitted with a governor to provide power and frequency control in accordance with SDC3. Where a Unit becomes isolated but is supplying customers it must be able to control frequency between 47.5 and 52Hz. In the EWGC: (a) each Unit must be fitted with a speed governor and load controller to provide frequency response in accordance with BC3. The governor must be designed and operated to the appropriate European Specification etc. (b) control devices must operate with stability over entire operating range.	EWGC has European spec; stability over range; isolation spec differs; governor settings; target frequency range 49.9 – 50.1Hz; differing requirements for post 1/1/1 plant. (c) (iii) may be difficult for some Scottish generators.	(e) /(f) yes. Apply BETTA go-live date to plant in Scotland in (e) and (f).

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		(c) (i) where a Unit becomes isolated but is supplying customers the governor must be able to control frequency below 52Hz unless this causes the Unit to operate below its Minimum Operating Level when, as detailed in BC3.7.3 it may trip after a time. (ii) the governor must be capable of being set between 3% and 5% droop. (iii) the governor deadband should be no greater than .03Hz. (d) it should be possible to set a Target Frequency in 0.05Hz steps over the range 50 +/- .1Hz in the unit load controller. (SGC SDC3 6.2) (e) & (f) each Unit which has a Completion Date after 1 January 2001 must be capable of meeting the minimum frequency response requirement profile of Appendix 3.	Plant in Scotland does not currently need to comply with the '10/10/10' capability specified in (e).	
4.3.2(c)	CC6.3.8	In both codes, excitation control system is required. Power system stabilisers will be specified in the bilateral. In the EWGC, constant Reactive Power output control is not required and if present, will be disabled unless recorded in the bilateral.	Equivalent.	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
4.3.2(d)	n/a	In the SGC, Generating Unit transformers must have on-load tap changing facilities.		No.
4.3.2(e)	[CC.6.5.6]	In the SGC, the Company is entitled to acquire operational metering, plant data etc as it requires. In the EWGC, (a) NGC shall provide SCADA equipment. The User shall provide appropriate outputs to it. (b) This data must be provided for each CCGT Unit.		No.
n/a	CC.6.3.9	In the EWGC, standard deviation of load error over a 30 minute period must not exceed 2.5% of registered capacity.		No.
4.3.3	CC6.3.10	In both codes, the Generating Unit will be required to withstand the negative phase sequence loading incurred by clearance of a close-up phase to phase fault. In the SGC, in accordance with IEC Standard 34/1.		No.
4.3.4	CC6.3.11	In both codes, the higher voltage windings of the Generating Unit transformer must be star connected.	Note CC6.2.1.1.(b) has regional difference	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		In the SGC, with the star point earthed in accordance with IEC standards and if adjacent to a Company substation, attached to the Earthing System of the substation. In the EWGC, with the star point suitable for earthing and such as to ensure that the Earth Fault Factor requirement of CC.6.2.1.1(b) will be met on the Transmission System at voltages of 132kV and above.	proposed.	
4.3.5(a)	CC.6.3.12	In both codes, Generating Units should be capable of operating in the system frequency range unless the Company/NGC has agreed otherwise.	Equivalent.	No.
4.3.5(b)	CC.6.3.13	In both codes, Generators are responsible for protecting their Generating Units against frequency excursions.	Equivalent.	No.
4.3.5(c)	CC.6.3.14	In the SGC, the application of frequency level relays to pumped storage plant will be in accordance with the bilateral. In the EWGC, it may be agreed in the bilateral that a Genset has a fast start capability (by frequency level relay).	Equivalent.	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
4.4.1	CC.6.4.1	In the SGC, the User must provide the Company with load characteristic data to enable the Company to verify that the standards detailed in the Planning Code will not be exceeded. In the EWGC, explains that this part deals with requirements for Network Operators and Non-Embedded Customers.		No.
4.4.2	CC.6.4.2	Same as generator provisions in 4.3.4/CC.6.3.11.		No.
4.4.3	CC.6.4.3	In both codes, Users should note arrangements will exist for the automatic disconnection of demand for low frequency. Any requirements for this will be included in the bilateral. In the EWGC, the technical requirements for Low Frequency Relays are listed in Appendix 5.	No technical requirements for relays are defined in the SGC. Views are invited as to whether these requirements would be an issue in Scotland.	No.
4.5.1	CC.6.5.1	In the SGC, communication requirements will be set out in the bilateral agreement. 4.5.2 to 4.5.5 specifies the minimum requirement. In the EWGC, communication requirements will be as set out in 6.5.		No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
4.5.2	CC.6.5.2 to CC.6.5.5	In the SGC, Users will provide control telephony. Connection to the Company control telephone network; facilities to be provided by the User at the Connection point; requirements for the interface will be specified in the bilateral. In the EWGC, Control Telephony is the method by which the User and NGC communicate for control purposes; supervisory tones are used; Users are required to use Control Telephony in respect of all Connection points and Embedded Large Power Stations, the SO will install Control Telephony where the applicable, details will be in the bilateral; detailed information on Control Telephony is available on request.	It is recognised that with its role in safety switching there is a need for communication links between Users and the Transmission Owner. Ofgem/DTI note that the detailed arrangements for the transmission sector are being developed as part of the work on the STC. Ofgem/DTI will review these provisions in light of this work.	Not at this time.
4.5.3	CC.6.5.6 (see also SGC 4.3.2(e))	In the SGC, the User may need to provide various outputs, requirements will be specified in the bilateral. The Company will provide the telemetry outstation and associated battery supplies. In the case of wind units, anemometer readings are required for turbines with a registered capacity of 5MW or over. In the EWGC, NGC will provide the outstation equipment. The User will	Battery supplies, Anemometer readings.	Yes for anemometer readings.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		provide outputs as specified in the bilateral.		
4.5.4 & 4.5.5	CC.6.5.7 & CC6.5.8	In the SGC, the User may be required to provide special instructor facilities; SPT/NGC and Moyle Interconnector Users must ensure communication facilities are in place; detailed specification of required facilities will be provided by the Company. In the EWGC, the User shall accommodate Instructor Facilities provided by NGC for the receipt of operational messages relating to System conditions. All BM Participants must ensure they have the appropriate communication facilities; automatic logging devices must be available at Control Points; Users can comment on proposed change to communication specifications; detailed specifications are available on request. Fax machine requirements.		No.
4.5.6	CC.6.5.10	In both codes, the Company/NGC will provide the Generator with access to signals to enable the generator to synchronise.	In the EWGC, applies with respect to Large Power Stations – need to remove the 'Large' to include all Gensets.	No regional difference but change to draft 1 proposed.
n/a	CC.6.5.9	In the EWGC, each User will provide a fax machine, for gens at the Control Point and Trading Point, for NO at the Control Centre and NEC		No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		at the Control Point.		
4.6	CC.6.6	In both codes, monitoring equipment may require signals from the User, these will be provided in accordance with the bilateral.	Equivalent.	No.
4.7	CC.6.2.2.3.5	In the SGC, tariff metering will be provided in accordance with the bilateral. Users will be required to provide current and voltage transformers to supply the metering equipment. It shall comply with the SAS requirements. Communications must be provided which conform with the interface standards. In the EWGC, Generators will install current and voltage transformers to supply tariff meters in accordance with the bilateral.	Equivalent.	No.
5.1.1	CC.7.3 & CC.7.4	In the SGC, every bilateral will incorporate a Site Responsibility Schedule detailing access rights and the division of responsibilities at Connection Points for ownership, control, operation , maintenance, hazardous areas, access routes, and testing of all buildings, P & A. For relevant sites the User shall provide the Company with a copy of the Hazardous Classification Document for Potentially Explosive Areas. In the EWGC, a Site Responsibility Schedule will be produced for each	There may be a need for specific appendices for Scotland. STEG DG2 are considering data exchange (and the associated formats) for	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		Connection Site, the format is described in Appendix 1. Operation and Gas Zone Diagrams are detailed in CC.7.4, these are detailed in Appendix 2.	the transmission sector in detail. The GBGC will be reviewed in light of this work.	
5.2	CC.7.2	In the SGC, the Site Responsibility Schedule will detail the demarcation of responsibility for safety of persons carrying out work at Connection Points and Company Control Boundary Points. Further information on safety is given in SGC OC6. In the EWGC, any User entering a Transmission Site to work on its plant will work to NGC's rules in E&W and the Relevant Transmission Licensee's in Scotland. NGC or the RTL entering a User Site to work on its plant will work to the User's Safety Rules. A User can apply to NGC to work according to its rules on a Transmission Site. (7.2.3) NGC can apply to a User to work according to its rules on a User Site (7.2.4). Rules for access to a Transmission Site shall be the SO or RTLs; rules for access to a User Site shall be the User's (7.2.5).		No further changes above draft 1.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		For User Sites, the User will notify the SO of Safety Rules that apply to it/the RTL's staff. For Transmission Sites, the SO/RTL shall notify the User of any Safety Rules that apply to its staff (7.2.6). Each Site Responsibility Schedule must record which Safety Rules are to be used on each item of P&A.		
n/a	CC.7.5	In the EWGC, Site Common Drawings will be prepared for each Connection Site.	In Scotland, Site Common Drawings are specified in the bilateral.	No.
n/a	CC.7.6	In the EWGC, the provisions relating to access to Sites are set out in the Interface Agreement. Where a Transmission Site contains exposed HV conductors, unaccompanied access will only be granted to individuals holding an Authority for Access.	It may be that in Scotland, the Authority for Access should be issued by the transmission owner. This will be considered further following further STC development.	Not at this time.
n/a	CC.7.8	In the EWGC, NGC and Users with an interface with NGC shall make staff available for Safety Precautions etc.		No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
6.1	CC.5.1	In the SGC, User provides a 'Statement of Readiness' at least 6 weeks before connection is expected. In the EWGC, provisions for connecting are contained in the CUSC and the bilateral agreement. In both codes the following lists of provisions must have been met prior to the Completion Date:		No.
6.1.1	CC.5.2(a)	In both codes, updated Planning Code data must have been submitted.	Equivalent.	No.
6.1.2(a)	n/a	In the SGC, Test reports showing P&A meets the criteria specified in section 4.	In EWGC this would be dealt with in the bilateral.	No.
6.1.2(b)	n/a	In the SGC, copies of the manufacturer's test certificates relating to P&A , including measurements of positive and zero sequence impedances	No equivalent in the EWGC although this may be dealt with in the bilateral.	No.
6.1.2(c)	CC.5.2(b)	In both codes, details of the Protection arrangements.		No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		In the SGC, a Protection Co-ordination study which will require provision of network protection data by the Company. The Company shall provide any such information within 3 weeks of a request.		
6.1.2(d)	n/a	In the SGC, a certificate declaring maximum short circuit current which the User's System would contribute to a three-phase short circuit at the Connection Point. The minimum zero sequence impedance of the User's System at the Connection Point.	No equivalent in the EWGC although this may be dealt with in the bilateral.	No.
6.1.2(e)	n/a	In the SGC, a proposed pre-commissioning testing programme.	Dealt with in CUSC?	No.
6.1.2(f)	CC.5.2(c)	In the SGC, a copy of the Safety Rules applicable at User's Sites. In the EWGC, a copy of Safety Rules and Local Safety Instructions which will be used at Users Sites.	EWGC asks for LSI as well as SR.	No.
6.1.2(g)	CC.5.2(g)	In the SGC, a list of people appointed by the User to be responsible for Safety Precautions on those parts of the User's System directly connected to the Transmission System.	Differences in process between SGC and EWGC.	Yes.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		In the EWGC, written confirmation that Safety Coordinators acting on behalf of the User are authorised and competent pursuant to the requirements of OC8.		
6.1.2(h)	n/a	In the SGC, a list of people appointed by the User to undertake operational duties on the User's System.		as 6.1.2(g)
6.1.2(i)	n/a	In the SGC, a person responsible for the maintenance and testing of User's P&A.		as 6.1.2(g)
6.1.2(j)	CC.5.2(i)	In both codes, a list of telephone numbers and names of senior management for use in Joint System Incidents. In the EWGC, confirmation that they are fully authorised to make decisions on behalf of the User.		No.
6.1.2(k)	CC.5.2(e)	In both codes, an Operation Diagram.		No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
6.1.2(l)	CC.5.2(k)	In the SGC, Site Common Drawings. In the EWGC, information to enable NGC to prepare Site common drawings.		No.
6.1.2(m)	CC.5.2(d)	In both codes, information to allow the Company/NGC to prepare Site Responsibility Schedules.		No.
n/a	CC.5.2(f)	In the EWGC, the proposed name of the User Site.		No.
n/a	CC.5.2(h)	In the EWGC, RISSP prefixes pursuant to the requirements of OC8.		No (consider further with review of OC8).
n/a	CC.5.2(j)	In the EWGC, a list of managers that have been authorised to sign Site Responsibility Schedules on behalf of the User.		No.
n/a	CC.5.2(l)	In the EWGC, a list of numbers for User's fax machines.		No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
n/a	CC.5.3	In the EWGC, items CC.5.2 (c), (e), (g), (h) and (k) are not needed for Embedded Power Stations, (i) is not needed for Embedded Small and Medium Power Stations and (d) and (j) are only needed where the Embedded Power Station is within a Connection Site with another User.		No.
n/a	CC.5.4	In the EWGC, at the time the information is given under 5.2(g) NGC will provide written confirmation to the User that the Safety Co-ordinators acting on behalf of NGC are authorised and competent pursuant to the requirements of OC8.		No.
6.2	n/a	In the SGC, within 30 days of receipt of the Statement of Readiness, the Company will inform the User whether the making of the connection is approved.	Under CUSC.	No.
6.3	n/a	In the SGC, the Company will specify the sequence of the energisation programme.	Under CUSC.	No.
6.4	n/a	In the SGC, the Company shall be entitled to witness tests. The Company may withhold agreement to energise where test results do not comply	Under CUSC?	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
		with the CCs.		
n/a	CC.8	In the EWGC, lists System Ancillary Services which Generators are obliged to provide and those which Generators will provide only if agreement is reached, and notes the existence of other Commercial Ancillary Services.		No.
n/a	App 1	Details of Site Responsibility Schedules		For further review following STEG DG work.
n/a	App 2	Details of Operation Diagrams and Gas Zone Diagrams		For further review following STEG DG work.
n/a	App 3	Minimum frequency response requirement profile and operating range for new Generating Units with a completion date after 1/1/1		See SGC 4.3.2(b).
n/a	App 5	Technical requirements for low frequency relays for demand disconnection		See SGC 4.4.3.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed

Appendix 2 –GBGC OC5.5.3 table changes

Harmonic Content	CC.6.1.5(a)	Measured harmonic emissions do not exceed the limits specified in the Bilateral Agreement or in Scotland, where no such limits are specified, the relevant planning level specified in G5/4.
Phase Unbalance	CC.6.1.5(b)	The measured maximum Phase (Voltage) Unbalance on the Transmission System should remain below 1%.
Phase Unbalance	CC.6.1.6	Measured infrequent short duration peaks in phase unbalance should not exceed the maximum value stated in the Bilateral Agreement .
Voltage Fluctuations	CC.6.1.7(a)	In England and Wales, measured voltage fluctuations at the Point of Common Coupling shall not exceed 1% of the voltage level for step changes. Measured voltage excursions other than step changes may be allowed up to a level of 3%. In Scotland, measured voltage fluctuations at a Point of Common Coupling shall not exceed the limits set out in Engineering Recommendation P28.
Flicker	CC.6.1.7(b)	Measured voltage fluctuations at the Point of Common Coupling shall not exceed the Flicker Severity (Short Term) of 0.8 Unit and a Flicker Severity (Long Term) of 0.6 Unit, for voltages above 132kV, and voltages 132kV and below shall not exceed the Flicker Severity (Short Term) of 1.0 Unit and a Flicker Severity (long Term) of 0.8 Unit, as set out in Engineering Recommendation P28 as current at the Transfer Date .

and:

Response Capability	CC.6.3.7(e) CC.A.3	The measured frequency response of each Generating Unit and/or CCGT Module which has a Completion Date after 1 January 2001 in England and Wales and after 1 April 2005 in Scotland shall meet requirement profile contained in Connection Conditions Appendix 3.
------------------------	-----------------------	---

Appendix 3 - General Conditions Comparison Table

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
1.1	GC.1.1	In both codes, describes the purpose of the General Conditions.	Equivalent.	No.
2.1	GC.2.1	In both codes, scope is NGC/the Company and all Users.	Equivalent.	No.
3.1	GC.3.1	In both codes, what to do in unforeseen circumstances.	Equivalent except in the SGC, if agreement cannot be reached between the Company and the User and the Company decides a course of action it shall notify the Authority to that effect. Covered by CUSC dispute procedure.	No.
4.1	GC.4.1	In both codes, SPT and S + S/NGC shall establish the Panel.	Equivalent.	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
4.2(a)	GC.4.2(a)	In both codes, keep the GC and its working under review.	Equivalent.	No.
4.2(b)	GC.4.2(b)	In both codes, review any suggestions for amendments which any User (and in the EWGC) the Authority) may wish to submit for consideration by the Panel.	Equivalent, except in the EWGC the Authority can suggest matters for consideration, but this is a replication of the grid code licence condition so this applies anyway to both codes.	No.
4.2(c)	GC.4.2(c)	In both codes, publish recommendations as to amendments of the GC with reasons.	Equivalent.	No.
4.2(d)	GC.4.2(d)	In both codes, issues guidance in relation to the GC when asked to by any User.	Equivalent.	No.
4.2(e)	GC.4.2(e)	In both codes, consider what changes are necessary to the GC.	Equivalent.	No.
n/a	GBGC GC.4.2(f)	4.2(f) is an additional provision in GBGC 'consider and identify changes to the GC to remove any unnecessary differences in the treatment of issues in	Proposed in draft1.	No.

SGC ref	EWGC/GBGC equiv	Provisions		Comment	Regional difference proposed
		Scotland from their treatment in England and Wales’.			
4.3(a) & (b)	GC.4.3(a)	In the SGC, 2 persons to act as Chair and vice on an annual alternating basis by SPT and S+S, two other persons appointed by each of SPT and S+S. In the EWGC, a chair and up to 4 members appointed by NGC.		Single Grid Code Review Panel based on the EWGC was proposed in draft1.	No.
4.3(c)	GC.4.3(b)	In the SGC: 3 for Generators with reg cap > 1GW 2 for Generators with reg cap < 1GW 1 for renewable generators 1 for Directly Connected Customers 1 for Suppliers 1 for Network Operators 1 for SESL	In the GBGC: 3 for Generators with Large Power Stations with a total reg cap of 3GW+ 1 for Generators with Large Power Stations with a total reg cap of < 3GW 2 for Network Operators in England and Wales 1 for Network Operators in Scotland	In draft 1 GBGC amended EWGC provisions to split the NO representation; change the reg cap from 5 to 3 GW; add a rep for renewable generators.	No.

SGC ref	EWGC/GBGC equiv	Provisions		Comment	Regional difference proposed
		1 for EISO (other than SPT/S + S) gen reps for (ii) have to be from a different company to (i) and renewables (i) and (ii)	1 for Suppliers 1 for Non-Embedded Customers 1 for Generators with Small or Medium Power Stations 1 for BSC Panel 1 for EISOs 1 for renewable generators		
4.3(d)	GC.4.3(b)	In both codes, a person appointed by the Authority.		Equivalent.	No.
4.4	GC4.4	In both codes, the Panel shall establish and comply at all times with its own rules and procedures relating to the conduct of business which shall be approved by the Authority.		Equivalent.	No.
4.5	GC4.5	In both codes, the Company/NGC shall consult all Users/AEOs which are liable to be materially affected by proposed amendments and will submit all amendments to the Panel for discussion.		Equivalent.	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
5.1 & 5.2	GC.5.1 & GC.5.2	In both codes, all instructions and other communications (except the submission of data and notices) shall take place between the Company Grid Control Centre/ the NGC Control Engineer based at the NGC Control Centre and the User Responsible Engineer/Operator.	The SGC splits communications between Company and Generator, Supplier and Network Operator (5.1) from other Users (5.2). The EWGC splits communication between Generators and Suppliers (5.2) from other Users (5.1) and has further clarification for the location of the User's communications.	Not at this time. May need to consider further following STC development.
5.3	GC.5.3	In the SGC, instructions and communication will be by telephone and/or such other electronic means as have been agreed. In the EWGC, by control telephony (see CC.6.5.2).	Equivalent.	Not at this time. May need to consider further following STC development.
5.4	GC.5.4 & GC.5.5	In both codes, if either the Company/NGC Control Centre or the User Control Centre is moved then each party shall inform the other. In the EWGC, Generators and Suppliers must also notify Trading Point location moves.	Equivalent.	Not at this time. May need to consider further following STC development.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
5.5	GC.5.6	In both codes, the recording of instructions and communications given by telephone/Control Telephony will be accepted as evidence of communications.	Equivalent.	No.
6.1.1	GC.6.1.1	In both codes, data and notices shall be delivered in writing either by hand, first class post or fax. In the SGC or by other agreed means. In the EWGC, to a specified address previously submitted by NGC/the User.	Equivalent.	No.
various eg OC2 1.6	GC.6.1.2	In the EWGC, references to 'in writing' include typewriting etc.	SGC does not preclude typewriting being classed as 'in writing'.	No.
6.1.2	GC.6.1.3	In both codes, addresses for correspondence.	Equivalent.	No.
6.1.3	GC.6.1.4	In both codes, all data items will be referenced to nominal volts and frequency.	Equivalent.	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
7.1	GC.7	In both codes, references under the code to Plant/Apparatus of a User include Plant/Apparatus used by a User under any agreement with a third party.	Equivalent.	No.
8.1	GC.8	In both codes, where a User's System is, by agreement, under the control of the Company/NGC then the Company/NGC can treat that User's System as part of the Transmission System.	Equivalent.	No.
9.1	GC.9	In both codes, the Grid Code may be suspended pursuant to directions given by the Secretary of State.	EWGC mentions Fuels Security Code. SGC mentions Utilities Act. Equivalent.	No.
n/a	GC.10	In the EWGC, where NGC and Users fail to agree on a matter, where they agree to do so, the matter will be referred to arbitration pursuant to the rules of the Electricity Supply Industry Arbitration Association.	SGC GC 3.1 refers to matters not agreed being notified to the Authority.	No. review in light of STC work on disputes.
Introduction	GBGC.11	There is currently no general clause in the EWGC	This change was proposed in draft 1.	No.

SGC ref	EWGC/GBGC equiv	Provisions	Comment	Regional difference proposed
6.		GC about confidentiality. A clause has been inserted at GC.11 to draw attention to the confidentiality provisions in the CUSC.		