Stage 03: Industry Consultation

DC0079 Frequency Changes during Large Disturbances and their Impact on the Total System - Phase 2

What stage is this document at?

01	Proposal Form
02	Workgroup Report
03	**Industry Consultation**
04	**Report to the Authority**

This document presents proposals to modify Distribution Code Annex 1 qualifying standards Engineering Recommendations (EREC) G59 and G83 for Industry Consultation. Any interested party is able to make a response in line with the guidance set out in Section 7 of this document

This document contains the findings of the workgroup up to 30/01/2018.

The workgroup recommends that the Distribution and Planning Code be changed to ensure that all type tested generation commissioned on or after 1 July 2018 should demonstrate stability for defined RoCoF and vector shift disturbances

High Impact:
Manufactures of Type Tested Generators may need to re-test their plant to ensure compliance with the requirement.

Medium Impact:
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Low Impact:

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Any Questions?

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About this document

This is an industry Consultation document which contains a summary of the discussions and the recommendations of the DC0079 Workgroup.

Document Control

Version	Date	Author	Change Reference
0.1	12/01/2018		Draft Industry consultation Report
0.2	25/01/2018		Includes WG Comments

1 Executive Summary

1.1 Connection requirements applicable for embedded generation can be split into two categories. The first category concerns plant whose Loss of Mains (LoM) protection is implemented using discrete relays and the second is where the protection functionality is implemented in the control scheme of Type Tested Embedded Generators, as allowed for in both EREC G59 and G83.

1.2 The purpose of the type tests is to demonstrate compliance with the LoM functional requirements of these engineering recommendations (although the exact LoM technique to be used is not specified). By satisfying the test conditions in the relevant annex of EREC G59 and EREC G83 the generating plant can be considered to be an approved generating plant for connection to a public Distribution System.

1.3 During the September 2017 GC0079[1] industry consultation, two options were put forward in section 4.36 of that consultation document. Option 1 was only aimed at plant whose LoM is through relays. This required plant commissioning on or after 1 February 2018 to stop using vector shift protection and to use RoCoF relay settings of $1Hzs^{-1}$ with a 500ms time delay. This was approved by the Authority on the 15 December 2017.

1.4 The second option required type tested embedded generators to demonstrate immunity to vector shift disturbances. The Workgroup proposed that plant should be able to ride through faults whose vector shift could be up 50°.

1.5 The reasons behind these requirements, the current and future challenges faced by the System Operator in managing the total system were articulated in the September 2017 GC0079 consultation document stated in section 1.3 of this report.

1.6 No consultation response was received from manufacturers of type tested embedded generators on vector shift immunity requirements. The workgroup concluded that there was need to further engage with these manufacturers. As part of this engagement process, the DCRP wrote an open letter to manufacturers[2] of type tested plant in an effort to inform and engage them.

1.7 Another open letter[3] was written by the Workgroup (WG) redefining the requirement taking into account post consultation feedback from manufacturers. The immunity as initially proposed in the September consultation document was open to interpretation and would have encroached on to fault ride through requirements which the WG felt would be better handled through another workgroup. As a result the WG revised the requirement to a single simple $\pm$50° vector shift immunity from the current 9° and 6° specified in G59 and G83 respectively.

1.8 Tests carried out by Strathclyde University and summarised in section 3.2 of the "Testing LV PV Inverters Stability during Voltage Magnitude and Vector Shift Disturbances[4]" report concluded that all commercially

[1] https://www.nationalgrid.com/sites/default/files/documents/GC0079%20%20%20Industry%20Consultation%20Document.pdf

[2] http://www.dcode.org.uk/assets/uploads/171014_open_letter_VS_301017.pdf

[3] http://www.dcode.org.uk/assets/uploads/171128_DCode_open_letter_VS_part_2b_issued_131217.pdf

[4] Strathclyde Report

available inverters, within their sample, passed the ±50º vector shift type test which the workgroup is proposing in this consultation even though the current immunity requirement is lower. No other inverters have been tested and no manufacturers have stated that their inverters would comply with the requirement. Therefore compliance of inverters from outside of the sample can only be inferred by reference to the inverters actually tested.

1.9 This WG consultation (under the guidance of the Distribution Code Review Panel DCRP) is proposing to change EREC G59, EREC G83 and the Distribution Code (Dcode) to ensure that all type tested generation commissioned on or after 1 July 2018 should include a single simple 50º vector shift immunity stability test as specified in Annexes 2, 3 and 4 of this report. This will ensure that the risk of inadvertent tripping, which has an adverse impact on the system frequency, does not continue to increase with new plant being connected to the total system.

1.10 The WG believes that its terms of reference have not yet been completely discharged and will continue to pursue other issues within its terms of reference, including retrospective application of these requirements.

2 Purpose & Scope of the Workgroup

2.1 The Frequency Changes during Large Disturbances and their impact on the Total System Workgroup was established by the Grid Code Review Panel (GCRP) and Distribution Code Review Panel (DCRP) in 2012.

2.2 The reasons and background for the formation of the workgroup are covered in Chapter 3 (Workgroup discussion) of the Phase 1, GC0035 document to the authority available on National Grid's website. Further to this, the same workgroup was reconstituted under GC0079 with the aim of extending the recommendations of GC0035 to embedded generation with a registered capacity less than 5MW.

2.3 The following are the workgroup objectives relevant to this workgroup consultation:

2.3.1 To deliver proposals concerning RoCoF based protection on embedded generators with a registered capacity of less than 5MW.

2.3.2 To investigate and recommend on the suitability of VS protection as an alternative to RoCoF, taking into account its possible unsuitability for transmission fault ride through requirements.

Terms of Reference

2.4 A copy of the Terms of Reference can be found in Annex 1

Timescales

2.5 The GC0079 workgroup held a sequence of over 40 meetings, the first on 14 June 2013 with the most recent meeting being on 19 December 2017.

3 Why Change?

Background

System Inertia

3.1 The volatility of system inertia, the causes, impacts and mitigation measures have been extensively articulated in the GC0035[5] and GC0079[6] reports to the Authority. This has resulted in:

a) The relaxation of RoCoF setting from 0.125 Hzs^{-1} to 1 Hzs^{-1} with a 500ms time delay for all embedded generation whose registration capacity is 5MW and above.

b) The requirement to set RoCoF to 1 Hzs^{-1} with a 500ms time delay for installations whose registered capacity is below 5MW and whose commissioning date is on or after 1 February 2018

c) The banning of the use of vector shift relay protection as loss of mains protection for all embedded generation whose commissioning date is on or after 1 February 2018

3.2 Analysis of the generation mix in the Future Energy Scenario[7] (FES) 2017 report suggests that the system inertia will continue to decrease over the next 20 years. Fig 1 shows the inertia probability density for selected years up to 2027. This decrease, along with the anticipated increase in the largest infeed loss, will increase the balancing and services cost.

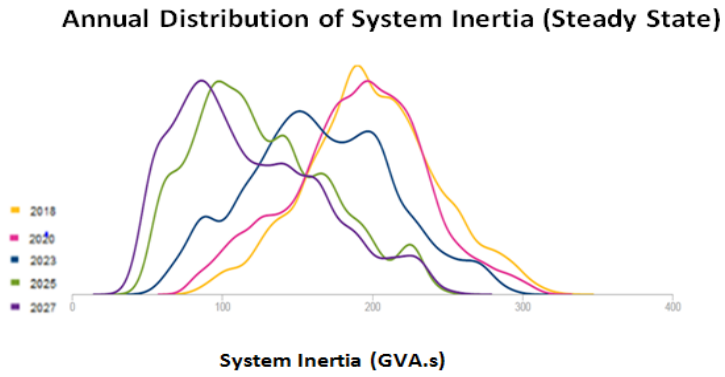

Fig 1 System inertia distribution

Vector shift Issues

3.1 Inadvertent tripping of vector shift protection as a result of secured events on the transmission system continues to impose a major challenge to the GB System Operator. The September 2017 industry consultation report, referenced in section 1.3 of this report, articulated the problems associated with VS protection. One incident mentioned in the same report is the 22 May 2016 single phase transmission circuit fault that resulted in

[5] http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/Grid-code/Modifications/GC0035-GC0079/

[6] http://www.dcode.org.uk/assets/uploads/Report_To_the_Authorityv3_1.pdf

[7] http://fes.nationalgrid.com/media/1253/final-fes-2017-updated-interactive-pdf-44-amended.pdf

a significant number of embedded generation plants tripping as a result of the operation of VS protection. This event resulted in a loss of infeed and a bigger frequency excursion than otherwise anticipated. Data from simulations and phase measurement units showed that the vector shift at the point of fault was greater than 50°.

3.2 Further similar incidents have occurred and Table 1 below shows a summary of some of these events.

Date	Fault Location	Estimated Capacity tripped[MW]	Vector shift (location: 400kV)
10/07/2017	Bramford – Sizewell No. 4 400kV circuit	330	36° (Bramford)
17/07/2017	Kensal Green Reserve Busbar 1	550	21° (Beddington)
21/05/2017	Littlebrook Circuit Breaker X140	280	9° (Canterbury)

Table 1 Vector Shift during transmission incidents

3.3 Information from the DNOs, on faults in Table 1, indicated that the loss of embedded generation was as a result of vector shift protection operation.

3.4 These events, among others, support the need to stop using vector shift protection for future embedded generators to prevent them from inadvertent tripping.

Increase in connections

3.5 The majority of type tested generators are of the Photovoltaic (PV) type. Using historic data for the September Feed In tariff report[8] it can be seen that there has been approximately 4% (35510 sites) increase in the number of sites from September 2016 to September 2017.

Category	**Installations**		**Capacity(MW)**	
	Number	% increase	Number	%increase
0 to ≤ 4 kW	31296	4	70	3
4 to ≤ 10 kW	2386	11	15	9
10 to ≤ 50 kW	1655	7	41	6
50 kW to ≤ 5 MW	173	5	529	19
Total	35510	4	656	11

Table 2 Number of PV installations between 2016 and 2017

[8] https://www.gov.uk/government/statistics/solar-photovoltaics-deployment

3.5.1 The majority of type tested PV covered by EREC G59 and EREC G83 is in the category 0 to ≤ 50 kW and constitute approximately 99% (35337) of the total number of additional installations below 5MW.

3.5.2 Data from the past two years shows the number of PV installations has been increasing. This trend is likely to continue in future based on the forecast in the FES. The risk of inadvertent tripping could increase if more and more generators with low vector shift immunity level are being installed. To reduce this risk the WG is proposing a higher level of immunity of 50° based on studies on transmission faults summarised in the 2017 September Consultation report referred to in section 1.3 of this consultation.

4 Workgroup Discussions

4.1 This stage of the DC0079 consultation is forward looking and covers only type tested embedded generators with a (proposed) commissioning date on or after 1 July 2018. The WG recommends that these type tested plant should stay connected for a transmission fault which may result in a 50º vector shift at the generator's plant terminals. It is the WG's intention to change EREC G59 and EREC 83 to this effect.

4.2 This requirement is in pursuit of option 2 defined in the September 2017 consultation document as stated in section 1.3 of this report. The WG concluded, after that consultation, that further engagement with type tested manufacturers was necessary as they did not respond to the consultation.

4.3 Option 1 of that consultation was approved by the Authority on 15 December 2018.

4.4 The DCRP wrote two open letters to type tested manufacturers as part of the engagement process notifying them of the proposed changes to the immunity requirement. So far some manufacturers have indicated that they have seen the letters, and other manufacturers have had discussions with the WG, from which the WG believes there is generally a low level of concern amongst manufacturers in terms of the difficulty of meeting the proposed tests.

Strathclyde inverter study

4.5 In parallel to engaging manufacturers, National Grid, on behalf of the WG, commissioned the Power Network Demonstration Centre (PNDC) from Strathclyde University) to assess the behaviour of low voltage inverters to a wider range of vector shift type conditions. Included in this objective was to:

a) To find out if inverters remained connected when subjected to a ±50° vector shift step change. The intention was to replicate a type test condition.

b) Assessing whether the inverters will remain connected and generating when exposed to waveforms with varying levels of voltage and vector shift of up to 60°. The intention was to understand the behaviour of the inverters across a spectrum of a combination of voltage and vector shift conditions.

4.6 The results of the study showed the following :

a) That all inverters passed the vector shift type test of ±50° at nominal voltage and loading. This means that they are capable of riding through a fault of this nature under these conditions.

b) Results of vector shift stability at lower voltages were inconsistent. Some inverters were not affected by reduced voltages while others show significant reduction in vector shift stability at voltages below 80% of nominal.

c) Inverters reduced their output during simulations described in (b) above. This behaviour is similar to that obtained when inverters were subjected to a RoCoF event of $1Hzs^{-1}$ detailed in the 2015 PNDC

report ''Experimental Evaluation of PV Inverter Performance during Islanding and Frequency Disturbance Conditions''[9] .

4.7 The workgroup recommends that vector shift immunity level be changed from the current 12° to 50° in EREC G83 and EREC G59. From the tests carried out by Strathclyde University , all inverters, within their sample, passed this test. No other inverters have been tested and no manufacturers have stated that their inverters would comply with the requirement. Therefore compliance of inverters from outside of the sample can only be inferred by reference to the inverters actually tested..

4.8 On the other findings relating to inverter behaviour during faults, the WG suggests that this could be further investigated under a separate workgroup as a package with fault ride through requirements.

Summary of the Change

4.9 Section 5.3.3 of EREC G83 Annex 4 **(Frequency Drift and Step Change Stability Test**) requires Small Scale Embedded Generators (SSEG) to carry out stability type tests to ensure plant remains stable under normal network operations which is frequently changing due to continuous unbalance of load and generation or when subjected to a step change due to the loss of a network component, which does not result in islanding. In order to meet this requirement and avoid unnecessary tripping of these generators, the WG proposes that these machines be type tested at:

4.9.1 A rate of change of frequency for the test that is marginally less that $1Hzs^{-1}$ with a 500ms time delay (see section 5.3.1 Table 1 of Annex 4).

4.9.2 A vector shifts of up to 50º. This is to ensure that this plant remains connected during secured events on the transmission system which may result in a local vector shift of up to 50 º.

4.10 Section 9.3.7 of EREC G59 (Annex 3) has been modified to, among other things, change the stability limit of type tested generating units from the current $\pm$9º to $\pm$50º

4.11 The Authority has already approved the banning of vector shift protection relays for plant connecting onto the system on or after 1 February 2018. To ensure similar requirement on non-type tested plant, the workgroup, through this consultation, proposes a change of vector shift immunity requirement from 12º to 50º.

Risk Assessment summary

4.12 Several risks were considered during the September 2017 Consultation on vector shift protection. Based in the Strathclyde University report ''Assessment of Risks Resulting from the Adjustment of Vector Shift (VS) Based Loss of Mains Protection Settings Phase II''[10] the WG agreed with the conclusion that:

4.12.1 VS protection is generally very ineffective, especially for settings of 12° and above. Analyses concluded that when using these higher

[9] https://www.nationalgrid.com/sites/default/files/documents/8589936354-UoS%20Inverter%20Testing%20Final%20Report%20-%20December%202015.pdf

[10] https://www.nationalgrid.com/sites/default/files/documents/Appendix%202%20Strathclyde%20Report%202.pdf

settings, in an attempt to reduce the risk of inadvertent tripping, generators are disconnected by G59 protection (as opposed to VS) in the majority of islanding situations. This coupled with the absence of real life cases where out-of- phase auto-reclosure has been recorded in the network for the past 25 years led the WG to conclude that VS should not be used as LoM protection.

4.12.2 The risk related to accidental electrocution for the LoM option where only G59 voltage and frequency protection are used is estimated at 6.28×10^{-7} and therefore lies within what is termed as the "broadly acceptable" region of personal risk accepted as consistent with the Health and Safety at Work Act 1974.

DC0079 proposal of Type tested plant:

4.13 The proposed requirement from the DC0079 WG is that the type test for small scale generation includes a single simple 50º vector shift type test. It is expected that these plants should remain connected for a vector shift up to this value. This is a typical value of the vector shift that embedded generators, in the vicinity of a transmission fault, are likely to be subjected to.

4.14 From WG discussions with manufacturers, the WG believes that there is generally a low level of concern amongst manufacturers in terms of the difficulty of meeting the proposed requirement.

Interactions between GC0102 and DC0079

4.15 There is some interaction between the administration of GC0102 and DC0079. It is the WG intention to ensure that there is no conflict between the two modifications.

4.16 If the proposals in this consultation are accepted by Ofgem it will be necessary to include these provisions in the GC0102 modification that is running in parallel with this DC0079 consultation. The GC0102 baseline text does not include the stability proposals of this DC0079 consultation. However should the changes to EREC G59 and EREC G83 that are proposed here be accepted, then these will become a simple consequential change to the G98 and G99 drafting (which are the two documents implementing G83 and G59 requirements from May 2019).

5 Impact & Assessment

Impact on the Distribution Code

5.1 The workgroup recommends amendments to Engineering Recommendations G59 and G83

5.1.1 The appropriate text for G59 is contained in Annex 2 of this document.

5.1.2 The appropriate text for G83 is contained in Annex 3 of this document.

Impact on National Electricity Transmission System (NETS)

5.2 This will result in limiting the total capacity of embedded generation that is at risk of being unnecessarily disconnected from the system by their LoM protection following an event on the transmission system.

Impact on Embedded power stations

5.2.1 The modification proposed will require type tested embedded generation connected to the system after the agreed implementation date to be type tested at 50° vector shift immunity level.

Impact on Grid Code Users

5.3 The proposed modification will reduce the risk of embedded generators from tripping as a result of transmission related secure events.

Impact on Greenhouse Gas emissions

5.4 The proposed change will reduce emissions by reducing the number and duration of the occasions where additional fossil-fuelled plant has to run to provide additional inertia to the total system.

Assessment against Distribution Code Objectives

5.5 The workgroup considers that the proposed amendments would better facilitate the Distribution Code objective:

(i) To permit the development, maintenance and operation of an efficient, coordinated and economical system for the distribution of electricity;

LoM will also be more co-ordinated as there are less forms of LoM protection that do not co-ordinate – the protection is more simple and reliable. The proposal will progressively reduce the risk of undetected islanding and inadvertent generation shutdown as new generation sites connect.

(ii) To facilitate competition in the generation and supply of electricity

The proposal has a neutral impact on this objective.

(iii) Efficiently discharge the obligations imposed upon DNOs by the Distribution Licence and comply with the Regulation (where Regulation has the meaning defined in the Distribution Licence) and any relevant legally binding decision of the European Commission and/or Agency for the Co-operation of Energy Regulators.

The proposal has a neutral impact on this objective.

(iv) Promote efficiency in the implementation and administration of the Distribution Code.

The proposal has a neutral impact on this objective.

Impact on core industry documents

5.6 The proposed modification does not affect any other core industry documents.

Impact on other industry documents

5.7 The proposed modification does not affect any other industry documents.

Implementation

5.8 The workgroup proposes that, should the proposals be taken forward, the proposed changes be implemented with the provisional target of 1 July 2018.

6 Workgroup Recommendations

6.1 This consultation recommends changes to EREC G83/2 and EREC G59/3-3 to ensure that all type tested plant connecting onto the system is compliant with the specified immunity requirements. This should be implemented from 1 July 2018 or such other date as the Authority decrees.

7 Consultation Responses

7.1 Views are invited upon the proposals outlined in this consultation, which should be received by 23/02/2018.

7.2 Your formal responses may be emailed to dcode@energynetworks.org

7.3 The proposals set out in this consultation are intended to better meet the Distribution Code Objectives. To achieve this, they are intended to facilitate efficient and economic connection arrangements whilst ensuring there is no impact on the safety and security of the transmission system, and no discernible impact on the visual disturbance to electricity consumers.

7.4 Responses are invited to the following questions:

(i) Do you believe that DC0079 better facilitates the appropriate Distribution Code objectives? If not, why do they fail to do so?

(ii) Do you support the proposal to increase the immunity level on type tested plant as specified in Annex 2 and 3

(iii) In particular do you agree that manufacturers of type tested plant should comply with these changes by 1 July 2018?

(iv) Are there any additional manufacturing costs associated with these requirements? If so what are what are they and what is their proportion to the existing cost? Please provide evidence (in confidence if necessary).

(v) Do the proposed changes facilitate efficient connection and operation of distributed generators? If not, why do they fail to do so?

(vi) Do the proposed changes introduce any material risks for distributed generators? What are these risks? And have they been or will they be appropriately mitigated?

(vii) Do the proposed changes impose any additional material risks on the system operator, eg reduced stability margins, reduced reactive capability margins, or difficulty in managing transmission system voltages? If yes, please highlight these risks.

(viii) Do the proposed changes impose any additional material risks on distribution network operators, eg stability and security issues safety risks, or any additional investment that might be neither economic nor efficient? If yes, please highlight these risks.

(ix) Do the proposed changes adequately protect the interests of all distribution network users? If not, why do they fail to do so?

(x) Are there further technical considerations to be taken into account? If yes, please highlight these technical considerations.

(xi) Is there any evidence that Users will be inappropriately or adversely affected by the changes proposed? If so, please provide details.

(xii) Do the modifications proposed strike an appropriate balance between the needs of generators, DNOs, transmission licensees, and other interested parties? If not, why do they fail to do so?

(xiii) Please provide any other comments you feel are relevant to the proposed change.

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

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

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

Annex 1 – WG Terms of Reference

i) The workgroup will investigate extending the first stage of work (Phase 1 underGC0035) to cover all distributed generation as Phase 2.

ii) The workgroup will undertake Phase 2 of the work. The context for Phase 2 includes the following considerations:

a) There is a convergence of technical considerations when transmission system faults give rise to both voltage and frequency phenomena. DC0079 is concerned primarily with the frequency effects on the Total System, or on DNO power islands.

b) It is recognised that National Grid will have to develop a formal operating standard in line with the European Codes defining the maximum RoCoF that the total system is secured against. This is an expected consequential requirement of implementing the EU Network Code currently titled "Network Code on Operational Security" in the GB frameworks.

c) There are a number of factors that will prevent generating plant riding through frequency changes. These include both the physical capabilities of electrical and mechanical components, the capability of control systems, and the effects of protection.

d) Generating equipment connected to distribution networks will generally have protection that fulfils two discrete functions. The first is to protect the generating equipment and ancillaries. The second is to provide the required network interface protection, ie as currently required by G59 or G83.

e) The focus of Phase 2 is to address the risks of unwanted tripping initiated by the network interface protection, but includes considering mitigation of any additional frequency resilience risks arising from generating equipment protection and control.

f) Phase 2 will investigate the suitability of VS shift protection as an alternative to RoCoF, taking into account its possible unsuitability for transmission fault ride through requirements.

iii) Phase 2 will therefore include the following activities:

a) Monitoring the implementation of the protection changes recommended under phase 1.

b) Researching the characteristics (numbers/types etc.) of existing embedded generation of less than 5MW rated capacity including their likely RoCoF withstand capabilities;

c) Researching the characteristics of existing embedded generation of all sizes where the embedded generation is fitted with VS anti-islanding protection.

d) Investigate the likely effect of transmission faults on VS protection techniques, and determine the risk of wide spread DG tripping from VS protection being inappropriately sensitive to transmission faults.

e) Investigating the characteristics of popular/likely inverter technology deployed, particularly in relation to RoCoF withstand capability and island stability;

f) Investigating the characteristics of popular/likely inverter technology deployed in relation to its behaviour in the presence of the voltage phenomena associated with transmission faults;

g) Assessing or modelling the interaction of multiple generators in a DNO power island;

h) Investigating and quantifying the risks to DNO networks and Users of desensitising RoCoF based protection on embedded generators of rated capacity of less than 5MW;

i) Analysing the merit of retrospective application of RoCoF criteria to existing embedded generation of less than 5MW (including comparison with similar programmes in Europe);

j) Considering any other relevant issues in relation to the resilience of the total system in respect of the operating characteristics of small generation;

k) Consider, if appropriate, revised VS protection settings, including any supporting risk assessment analysis;

l) To the extent that revised settings are proposed, create detailed specifications for the application of those revised settings;

m) Consider any other adverse effect on total system operability that existing G59 and G83 requirements may present, given the changed context since G59 and G83 were originally introduced, and include any such issues and their mitigation in the drafting and consultation (for example the current and future implications of Black Start on the existing over and under frequency settings);

n) Developing proposals for consultation on any proposed changes to RoCoF and VS protection drawing out the costs, benefits and risk of such a change to present to the GCRP and DCRP. Proposals should include a recommendation of where implementation costs should fall and the most appropriate workgroup for this issue to sit with;

o) Initiating consideration by DNOs of the future management of out-of-phase reclose risk; and

p) Engaging with the Health and Safety Executive (HSE) and all affected parties considering the different stakeholders that will be affected by any proposed changes.

iv) Phase 2 will deliver proposals concerning RoCoF based protection on embedded generators of rated capacity of less than 5MW and concerning VS protection for all embedded generation.

Annex 2 –Legal Text – EREC G59

Proposed changes to G59 are documented in a file called **Annex 2 –Legal Text Distribution Code for G59** circulated together with this report

Annex 3 – Legal Text for EREC G83

Proposed changes to G83 are documented in a file called **Annex 3 –Legal Text for G83** circulated together with this report.