

Open Letter to key generator stakeholders – i.e. manufacturers, developers, installers, operators, trade associations and owners of distributed generation

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Dear colleague,

Future G59 and G83 protection requirements

As you are probably aware, the nature, number, sizes and types of generators that are connected to the electrical system in Great Britain is changing, and will soon look quite different to the characteristic mix of recent history. Much of this is coming about because of the retirement of the large fossil fuelled stations built from the 1960s on, and the growth of wind and solar generation needed to meet carbon emission reduction and renewable energy targets.

This change has implications for the stability of the entire GB electrical system. National Grid and the electricity distribution companies have been considering the implications for some time. In particular National Grid has carried out studies which show that by 2020 at times of minimum generation from conventional sources (and minimum demand) that the rate of change of frequency may approach 1Hzs^{-1} following the largest instantaneous loss of generation or load (i.e. 1800MW) which the GB electrical system needs to withstand. This rate of change is significantly in excess of those catered for in Engineering Recommendations G59 and G83, which start at 0.125Hzs^{-1} , beyond which many generators would be expected to stop generating due to the operation of loss of mains protection. National Grid's ongoing assessment work also shows that there is an increasing risk under current operating conditions that the rate of change of frequency following a large disturbance may be higher than the recommended settings, leading to a consequent risk of widespread generation shutdown. National Grid assesses this risk continuously and will have to take preventative and mitigating action more frequently from this time forward.

To provide the required level of ongoing security and stability it is likely that National Grid and the distribution companies will propose that the provisions of Engineering Recommendations G83 and G59, which specify the requirements for connecting to the GB electrical system, should be changed. These proposals are being developed by a joint Distribution Code and Grid Code Workgroup and will be subject to formal consultation and approval by Ofgem. As with all such changes,

the costs, risks and benefits of making changes will be examined in all necessary aspects, including where applicable the implications of retrospective application. Papers and details of the Workgroup meetings can be found on the National Grid Website¹.

The following proposals are currently being considered by the Workgroup:

1. All generating units installed from a future date, but possibly as early as 1 April 2014, will be required to continue to operate without tripping during a rise of frequency from 49.5Hz to 51.5Hz and during a fall of frequency from 50.5Hz to 47.5Hz;
2. The rate of change of frequency required to be withstood without tripping within the above frequency ranges will be specified by National Grid and the distribution companies following further studies, and it is expected that it will be in the range 1Hzs^{-1} to 2Hzs^{-1} ;
3. For Type Tested units of <50kW or 17kW per phase this requirement will take the form of a frequency change stability test as defined by G83/2. A similar test for Type Tested Units under G59 is expected to be introduced before this date in line with the current G83/2 test;
4. The vector shift stability test defined in G83/2 will remain unchanged and will be extended to an updated G59;
5. Generating Units larger than 50kW three phase (and larger than 17kW single phase) will be required to demonstrate compliance, possibly by type testing in the same way as 3. above and with the same frequency range and vector shift;
6. It is possible that RoCoF protection will no longer be acceptable as a loss of mains protection because its reliability and effectiveness may be eroded over time; and
7. The settings of existing loss of mains protection may need to be changed to align with the frequency ranges proposed in 1. and 2. above.

Distribution companies and National Grid recognise the potential far reaching effect on the manufacture, supply and ongoing operation of distributed generation equipment that these proposals might have and are therefore writing out now to make key stakeholders aware of the necessary development of these ideas and how they might get involved in the decision making process if they so wish.

Stakeholders will also probably be aware of the introduction of European Network Codes. The relevant EU Network Code is the Requirements for Grid Connection

¹ Further information on the joint Grid and Distribution Code Review Panels Workgroup is available at the following link. <http://www.nationalgrid.com/uk/Electricity/Codes/gridcode/workinggroups/Frequency+Changes+during+Large+System+Disturbances/>

Applicable to all Generators². It is expected that this will enter into force in EU and UK law in 2014 and its provisions are likely to be introduced progressively over the following three years. The Requirements for Grid Connection Applicable to all Generators also includes new provisions for all generation >0.8kW to remain stable for system disturbances that will necessitate changes to G59 and G83 in any event along the above lines. Any relevant provisions of the EU Network Codes will be taken into account in both the development of proposals by the Workgroup and in the ultimate approval of any changes to G59 and G83.

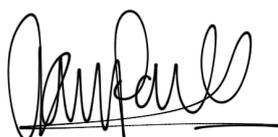
In the meantime, as part of their development of machines, manufacturers of small scale generation of less than 16A per phase may wish to carry out testing to higher rates of change of frequency than 0.19Hzs⁻¹ presently required by G83/2, in line with point 2 above, to avoid the need to retest again prior to the implementation of the EU Network Code.

We realise that this letter raises uncertainty about what the future requirements will be. However, given the importance of these requirements and generator design lead times, the Workgroup has asked that stakeholders be given as much notice and opportunity for consideration as possible of likely future changes.

The Workgroup will be hosting seminars in Spring 2013 to discuss the likely changes and to take questions from affected parties.

If you wish to discuss the content of this letter; the associated workgroup, or to register interest in one of the seminars, please contact Robyn Jenkins at grid.code@nationalgrid.com or call 01926 655602.

Yours faithfully



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² More information is available on the ENTSO-E website at: <https://www.entsoe.eu/major-projects/network-code-development/requirements-for-generators/>