G99 Information Document
A Q&A update following WPD's webinar on the requirements for generators

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A Q&A update on the requirements for generators

WPD's Webinar on the requirements for generators

In November 2018 we hosted a webinar to run through the changes required as a consequence of the issue on new Engineering Recommendations G98 and G99 covering the requirements for the connection of generation in parallel with our distribution system. The webinar proved to be very popular with over 180 people registering to take part in the event.

Our aim was to take a high level look at what effect G98 and G99 will have on the process for connecting distributed generation and what it might mean for you particularly if you are seeking to connect and commission generation that will run in parallel with our network in the future. G98 and G99 set out all of the technical requirements that you will need to comply with from 27th April 2019.

During the webinar we covered a number of topics including:

- ✓ Background to implementation of G98/G99 and what it means for connecting customers
- ✓ Technical considerations
- ✓ The application process (specifically under G99)
- ✓ Compliance requirements

Attendees submitted nearly fifty questions to the WPD team during the course of the webinar, some of which we answered at the end of the presentation. For those that we didn't have time for, we committed to respond to at a later date. This Q&A document has been published as a means of meeting that objective.

We have divided the document in to five sections to ease navigation: Modifications, Operational, Process, Technical and Type Testing.

If you would like more information surrounding any of the answers given or you have any further questions relating to the changes set out under G98/G99 you can contact us at wpdrfginfo@westernpower.co.uk We will endeavour to respond to you as soon as possible.

A recording of the webinar and associated slide presentation is now available and can be found on our website

MODIFICATIONS

Surely significant modification doesn't include a turbine change at hydro site where a turbine only is changed and coupled to the existing generator. The existing generator may not be G99 complaint or able to become compliant. Same for a turbine change at a wind farm?	Where the change is to the primemover, rather than the electrical generating unit, and that change was on a like for like performance basis, we would not expect a change in compliance to meet G99 requirements. However we expect there would be case by case assessment, taking in to account economics of compliance, which we believe ultimately may require the Regulator (Ofgem) to arbitrate.
Will the addition of battery storage to an existing G59-3 connected generator be considered as significant modification requiring upgrade to G99 ?	Yes, the new BESS would be a separate Power Park Module and must comply with G99. However the existing unit may remain compliant with G59. See example 4.6 on page 31 of G99.
In G99 for a PV site additional inverter power is required to achieve p.u at the full MEC. If a project designed for G59 is delayed into G99 would you insist the additional inverter power is installed, or MEC decreased?	We do not fully understand the technical aspect of the question but, regardless of this fact the answer will be the same, so if the generating plant is commissioned after the 26th April 2019 then it must be comply with G99.
If a single inverter in a facility (say a 25kW inverter) had broken and it is to be re-installed, does an application have to go in and a G99 compliant inverter installed?	Yes the owner should notify the DNO regarding the change of equipment. A new/replacement inverter is a significant change and as such if it is being installed after 27th April 2019, it will need to comply with G99.
If we have permission to connect a G59 generator, before 27th April 2019, will that automatically mean we can connect a G99 compliant generator after the date, if the install runs over the deadline? or would we need to revise the application?	A formal revision to the application will not be required. However, you should liaise with the WPD Planner assigned to your scheme to discuss any changes that you will be making. The enduring Connection Agreement will need to reflect the correct compliance requirements, i.e. G59 or G99 according to commissioning date.

OPERATIONAL

Generator operating modes - how often is it expected that the different modes will be employed?	We believe your question here relates to technical requirements such as Limited Frequency Sensitive Mode - Over Frequency. The technical capability requirements are laid out in G99 for each Type of generator/facility. It is for the DNO to specify any optional mode requirements through appropriate agreements - e.g. Connection Agreement. The flexibility to require a different mode of operation will remain although we would expect such changes to be infrequent and changes implemented in reasonable operational timescales.
Why is DNO constraint facility etc required if it isn't in the Connection Offer?	G99 is the implementation of generator capability/performance under the European Network Codes. The facility for constraint is therefore a legal requirement, and is there to provide the flexibility that will be required under smarter energy systems in the future.
Why is capability for voltage control required if the Connection Offer only requires power factor (pf) control mode of operation?	G99 is the implementation of generator capability/performance under the European Network Codes. The facility for constraint is therefore a legal requirement, and is there to provide the flexibility that will be required under smarter energy systems in the future.

PROCESS

Do you have any sample G99 forms completed?	No but the information required is not very different to the G59 form, although in a slightly different layout. There is guidance within the form, and we are sure all DNOs would assist where appropriate.
How quickly do you expect WPD to be able to issue a FON? And what is the process?	The Final Operational Notification is issued by the DNO to a generator who compiles with G99, allowing them to operate by using the DNO connection. The issuing of a FON would therefore depend on the time required to demonstrate compliance/commissioning/testing to meet the G99 requirements(which will vary with Generator Type and method of compliance chosen e.g. Type Tested or on-site test results), and the timely submission by the generator. Our initial view is that Types A/B may well be possible on the day or within days of energisation, however some large Type D compliance/report assessments could understandably be a number of weeks.
How do we get answers to project specific questions?	We will acknowledge receipt of an enquiry for connection and inform you of the Planner designated to assess the application and prepare the Connection Offer. The Planner will contact you to discuss your scheme and inform you about next steps. Once this relationship is established all project specific questions should be routed to the Planner.
Can you go over the types of installations that must be connected by the 17th November 2018? Can you give an example?	17th November 2018 relates to the deadline for notification under exemption. All generation that is to operate in parallel with the distribution system that is connected and commissioned on or after 27th April 2019 must comply with G98 (<16A/phase) or G99, as appropriate unless it qualifies under an exemption obtained by the customer having entered a binding contract for the generating units before 17th May 2018 and notifying WPD no later than 17th November 2018. This notification date has now passed and so no further exemptions will be allowed at this point.
Does WPD accept application forms in a house format (assuming the required information is provided of course!)?	No. To encourage clarity and consistency we expect applicants to complete the ENA application form entitled, *'Connection of Power Generating Modules to DNO Distribution Networks in accordance with EREC G99'*, a copy of which may be found at: https:/www.westernpower.co.uk/downloads/2780.
How long would you expect to be on site to complete the commissioning of 2 x 2MW non type tested inverters on a power plant?	WPD does not undertake testing and commissioning of the generating plant. This remains the responsibility of the installer. We will need to witness larger generator connections, typically where the total generating capacity at the site exceeds 50kW. In some cases we may also decide to witness tests at smaller installations so you need to inform us at least 15 working days before you intend to carry out the commissioning works. The duration of our presence will vary according to the size and complexity of the generating plant being commissioned and whether it has been 'type approved' but typically can take between one half and two days.

PROCESS - continued

Who would pay for the volt free contact installation?	The volt free contact forms part of the DNO's connection equipment and would be charged for under the Connection Offer.
Regarding volt free contacts - Who is responsible for the upkeep of the connection and the cost for the connections communication to WPD?	From the volt free contact back into the DNO network would be WPD's responsibility. Similarly, from the volt free contact in to the generator unit/control would be the customer's responsibility. WPD will maintain and install comms within our usual Connection and UoS charges.
If commissioning is delayed beyond 27/04/19 due to late non-contestable work, can generator commission under G59 instead of G99?	No. Unfortunately there is no exemption allowed for this scenario. The generator will need to commission in accordance with G99.

TECHNICAL

Does a battery storage system need a Type A Logic Interface?	Yes. Energy storage systems are not exempt from providing a logic facility to constrain output, this is regardless of Type.
With the SCADA requirements which may limit/constrain output, what is the timescale allowed for response? A large generator 25MW for example running on steam may not be able to respond rapidly without taking the alternator off line?	G99 sections 11,12, & 13 define the Technical Requirements for each Type. 11.1.3 (Type A) states that "Power Generating Modules connected to the DNO's Distribution Network shall be equipped with a logic interface (input port) in order to cease Active Power output within 5 s following an instruction being received at the input port". However sections 12 & 13 (Type B and C/D) state that "The Active Power reduction will be either between 1.0 pu of Registered Capacity Active Power and zero, or between 1.0 pu of Registered Capacity Active Power and Minimum Generation. In the latter case the Generator will agree with the DNO how zero output can be achieved, including the option of using the logic interface as described in paragraph 11.1.3.1." (emphasis added).
Does the Power Generating Module type depend on voltage at Point Of Connection (PoC) e.g. a number of 2MW gensets connected via 11/132kV transformer is this classed as Type B or Type D?	The Type is determined by size of the PGM (Power Generating Module) for synchronous machines, or Power Park Module(non-synchronous). If there is more than one Synchronous PGM within the facility then they are all considered separately in terms of Type. However any site metered at a voltage greater than 110kV is always Type D. Therefore assuming each 2MW gen set is a synchronous machine, each would be treated as a Type B, assuming that the site is metered at a voltage less than 110kV. However if the site was metered at 132kV, they would each be considered Type D.
Low Frequency Response mode - will the generator be expected to respond without any further commands from the DNO?	Yes. Where implemented, LFSM-O & LFSM-U and FSM will be self monitoring and are required to respond without any signal from the DNO.
Are you saying an export limit system needs to be included on all systems? Or just on some when DNO requires it (as in G59)? **Also could you elaborate on what a "logic" interface (for Type A) might be - to allow DNO to constrain output?**	Export Limiting is not a requirement of G99 (see G100). The interface requirement provides a facility for the DNO to constrain output of PGMs to zero. This is different to G100 export limiting system. G99 11.1.3 states (within Type A PGM Technical Requirements) "Power Generating Modules connected to the DNO's Distribution Network shall be equipped with a logic interface (input port) in order to cease Active Power output within 5 seconds following an instruction being received at the input port."
Can you go over the function of the logic interface please - when would it be activated and how?	G99 only requires the logic interface to be provided to constrain output. The use of it by the DNO, or System Operator, would be driven by operational system requirements.

For non type tested equipment will it be essential to carry out the tests in Form A2-2 on every installation these are going to be quite difficult on CHP units that are not designed to run in island mode	G99 allows for Power generating Modules to be fully type tested, partially type tested or non-type tested. Type test verification reports should be added to the ENA Type Test Register. Requirements that are not type tested must be demonstrated by the generator by providing alternative information (e.g. manufacturer's data, one off test reports, simulation studies or by on-site commissioning). Where it is not clear what evidence is required it may be worth considering the equivalent requirements for Type B Power generating Modules (e.g. specified in Form B2-1).
You mentioned you require a protection standard comms for gen constraint functionality. Do you not provide signals at the metering point which would normally be "through the wall" from the customers SCADA etc? Can you expand this and you reference to wireless please.	Where WPD requires the constraint features to be employed these will generally require copper (hardwired) or fibre optic connections between WPD's interface panel and the generating units. Where the Generator proposes to use radio communications systems for these features they shall rely on licensed radio and must meet the relevant ENA Technical Specifications, e.g. ENA TS 48-6-7 and ENA TES 48-6-9.
Does that mean a system of multiple string inverters, where one inverter needs replacing needs to be G99?	As things stand we believe that the new (replacement) inverter will need to comply with the latest version of G99 whereas the existing inverters do not need to be modified. This issue will be raised at the ENA Distributed Energy Resource Technical Forum though.

TYPE TESTING

If a G59 protection relay is type tested, are the stability tests etc required for the relay used for different size synchronous generators?	The requirements for protection type tests are defined in G99 Section 10. Test Form C2-2, B2-2, A2-4.
Can the type test verification certificate be issued from the manufacturer?	Yes, assuming the manufacturer has utilised an appropriately authorised test house/facility. It should then be registered with ENA on the new database.
How can we get our generators type tested?	We believe the current ENA understanding is that the RfG does not mention "Type Testing" but instead describes a regime of Equipment Certificates (EC). ECs are clearly a type testing regime where the EC is granted by an Authorised Certifier – i.e. an organization whose accreditation is given by the national affiliate of the European cooperation for Accreditation ('EA'), established in accordance with Regulation (EC) No 765/2008 of the European Parliament and of the Council. However no formal EC regime currently exists in Great Britain.