

DER Technical Forum



Energy Networks Association

DER Technical Forum

22 November 2018

10:00 at ENA

Today's Agenda

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| 10:00 | Welcome to ENA and housekeeping |
| 10:05 | Introductions |
| 10:10 | Review of membership |
| 10:15 | Review Terms of Reference for DER Technical Forum |
| 10.25 | Elect Chairperson/Co-chairperson |
| 10.30 | Information updates since last DG Tech Forum Jan 2017; <ul style="list-style-type: none">• ER P28 Revision and G5• Domestic Energy Storage Systems• G98/G99 amendments• Misc. items |
| 12:15 | Lunch |
| 13:00 | Open Forum |
| P.M. | Equipment Certificates |
| 14:45 | AOB |
| 14:55 | Date of next meeting TBC |
| 15:00 | Meeting Close |

Initial Forum Agenda Housekeeping Items

- Please note; the group should be vigilant in their discussions and be mindful of the Competition Act throughout the meeting.
- Review of Companies represented – any omissions? Suggestions for future forums.
- Terms of Reference (Review and update as deemed necessary)
- Elect Chair Person(s)

- First amendment was made in July 2018 to apply the recently agreed revision to RoCoF protection settings (ie to align with the very recently changed G59 and G83) and also to correct the implementation date (ie to 27 April 2019 from 17 May 2019).
- GC0110 – LFSM-O – this modification has been raised to address lack of clarity in LFSM-O requirements for type A and Type B PGMs in G99. It was submitted to Ofgem on 16 August.
- Storage Fast Track – this modification brings G98 and G99 in line with the processes agreed with DNOs re how to progress relatively small storage applications meeting certain criteria. This modification was submitted to Ofgem on 25 October.
- There is a consultation currently running on a number of housekeeping modifications to G98 and G99. The consultation closes on 23 November (tomorrow).

- A number of queries have been received to date – many thanks for supporting the purpose of the forum!
- The following slides repeat the question and give an initial response
- The responses are initial thinking, for discussion etc, and do not represent a settled position of the DNOs

- Q How are non-type tested functions of Type A generators verified? Can simulation studies be used?
- A We would expect that Type A generators can be type tested but it is up to the manufactures to decide what to Type Test and how to demonstrate compliance eg providing manufacturers' information which for some characteristics will be a simulation model.

Q How are the Type A verification forms applied to Power Park Modules? Do the forms apply to Generation Units or whole Power park Modules?

A PPMs that consist of inverters would use form A2-3. PPMs made from asynchronous units would use form A2-2.

There is a note in Form A2-3:

Within this Form A2-3 the term Power Park Module will be used but its meaning can be interpreted within Form A2-3 to mean Power Park Module, Generating Unit or Inverter as appropriate for the context. However, note that compliance must be demonstrated at the Power Park Module level.

- Q Application of LFSM-O, FSM and LFSM-U. When would these functions be used? Who makes the decision to implement these functions?
- A LFSM-O is a requirement for all generators (Types A-D). The generator will respond automatically when the frequency exceeds 50.4 Hz (or 50.5 Hz if operating in FSM)
LFSM-U is a requirement for Type C and Type D generators. The generator will respond automatically when the frequency falls below 49.5 Hz
FSM would be an ancillary service that the Generator signed up with the TSO to provide and as such would be managed by NG.

Q How should Reactive Capability be simulated? Is it practical for Type C / D studies to be based on a 1.0pu voltage on the generator terminals and 1.05 and 0.95 pu voltage at the Connection Point and 0.95 lag and lead power factors? Should the source impedance be modelled etc.?

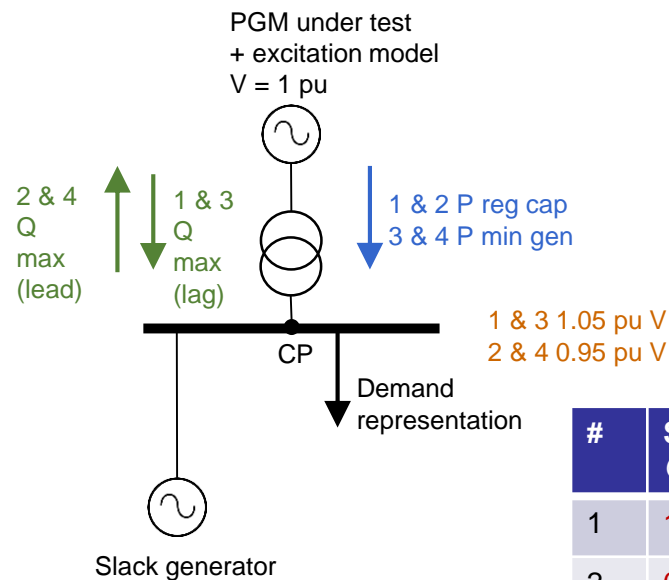
A Please see following slide which illustrated this study. This is a theoretical study to demonstrate that the required VAR performance of the PGM is achievable at the connection point (the DNO can agree to this being demonstrated at the PGM rather than the connection point). For a Type C or D generator the likely presence of some impedance (eg a generator transformer) means the voltage at the PGM can be set at 1pu (generator set in PV mode) and then the VARs will adjust to meet the higher or lower V at the CP. If there is little or no impedance between the connection point and the generator then the generator should still be set in PV mode, but the resulting voltage at the generator may not be 1pu.

Note Annex C.7.3.3 details the need for possible additional demonstration requirements for PPMs

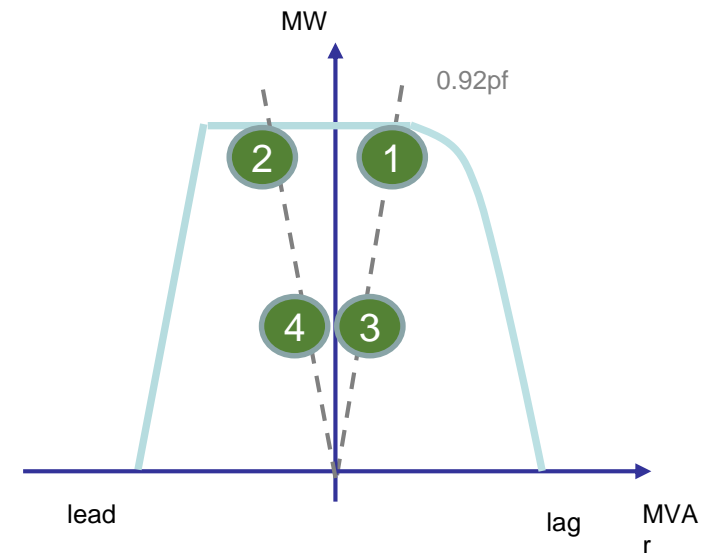
Reactive Capability Simulation studies

Type C & D

Studies to demonstrate compliance with performance chart



| # | Set V @ CP | Set P | Calc Q |
|---|------------|---------|----------|
| 1 | 1.05 | Reg Cap | Max lag |
| 2 | 0.95 | Reg Cap | Max lead |
| 3 | 1.05 | Min Gen | Max lag |
| 4 | 0.95 | Min Gen | Max lead |



- Q Type B / Type C Synchronous Power Modules classification:
- I believe this topic can be deceiving as G99 provides various examples on what constitutes a Module, a Generating Facility, etc. However, in practice we have found that NG and some DNOs are taking opposing views. To give you a more specific example, a 20 MW gas-reciprocating generating plant made of 2 MW Synchronous Power Generating Modules will be considered a Type B installation in WPD, whereas it will be considered a Type C installation in NG. I am aware that G99 is not really applicable to NG connections but the definitions for Type B and Type C modules within G99 and the Grid Code are aligned and therefore one can only expect that there should be a consistent view throughout. NG's argument is that if all the Synchronous Power Generating Modules are operated in the same manner, with the same objective, and/or they have a common control system then it should be treated as a 20 MW unit and therefore it would be Type C. Our view which is shared with WPD is that by definition, a Power Generating Module is an indivisible unit and the plant could operate with one, two or many generators (modules), meaning that it is divisible and therefore each 2MW Power Generating Module should be treated as a Type B Module. I am aware that NG and WPD are engaged in a discussion to clarify this but I thought it would be a good topic to make sure everyone is of the same mind.
- A Currently in discussion with NG.

- Q6 Given the lack of a laboratory based equipment route at present, what paperwork will the individual DNOs expect to see in support of the Manufacturers self declaration
- 7 What site test are the individual DNOs likely to require before "granting" the connection
- 8 How should the simulation results be presented for Type B (the models are not required to be presented as we understand it - only the results)
- 9 How should the simulation models be presented for Types C & D

A It is the Generator's responsibility to resolve these issues, but that does imply manufacturers will need to be providing much of the information – certainly for mass market products. Type B models have to be provided in the same way as for G59 (para 6.3.6 of G99)

So far the DNOs have taken the approach that

- a) DNOs probably do not have sufficient expertise to hand to develop detail that would be acceptable to all of their stakeholders and
- b) some manufacturers (particularly wind turbine manufacturers) will have a reasonable track record of doing these things for grid connections

However, the ENA is open to discussion and suggestions about how to move this forward.

- Q Logical Interface for disabling/enabling inverter remotely, page 24 section 9.4.3 of G98-Issue-1-Amendment-3.
- What are the nominal galvanic characteristics of this interface?
 - It is stated that the DNO "may specify any additional requirements regarding this interface": Is this in relation to enable/disable time? or to signal characteristics?
- A The galvanic isolation has not been specified by the RfG or the ENA at this stage; normal industry approaches would be expected to apply with appropriate isolation between the generating equipment and the communication equipment. As this is a new requirement, and little practical application to date, the specification is open to being developed and adapted to suit experience and needs. As such DNOs might specify more detail individually or collectively in due course – for both the signal and data -and will be open to suggestions from industry as to how this can be made as efficient as possible. For G98 the response time is already defined as <5s

- Q11 - Clarification as to what DNOs would find acceptable as a form of anti-tamper for the relay trip settings i.e. password something physical
- Q12 - 10.1.4 Type Tested Interface Power Generating Module Protections, shall have protection settings set during manufacture. However it states in 10.1.5: Once the Power Generating Modules have been installed and commissioned. the protection settings shall only be altered following written agreement between the DNO and the Generator. Voltage settings should not be locked down, but should be designed so that they are only easily reset by appropriately authorised personnel (such as via an additional electronic device). Paragraphs 10.6.14 and 10.6.15 detail the protection setting calculation for non standard LV connections and the display requirements respectively. This seems contradictory and confuses the setting locking requirements.
- A – this is probably best discussed, although a couple of workshops between DNOs and stakeholders did discuss it in May and came to an agreed position statement on it (attached). We did try to reflect this into the version of G99 that's out for housekeeping mods comments. We can review this and revise/improve the drafting. (continued on next slide)

- A protection relay can only be considered type tested if:
- The frequency and LOM settings are factory set to those in G99 section x.x and cannot be changed outside the factory.
- The voltage settings are factory set to those in G99 section x.x and can be changed but only by authorised personnel.
- The access by authorised personnel will be controlled by either a password, pin or a physical switch that has the facility to be sealed.
- Any relay functionality other than protection settings can only be changed by authorised personnel.

- Q13 Can simplified guidance to the new G98 and G99 guidelines, be produced for generators and developers ?
- A To be discussed with forum members.
 - Are the new guides useful?
 - <http://www.energynetworks.org/electricity/engineering/distributed-generation/dg-connection-guides.html>
 - For example G99 full guide for Types B-C: Section C An overview of getting connected and Section D The Connection Application Process were significantly revised
 - Always open to suggestions for improvement for the annual review

- Q14 The implication of carrying out the operating range test on CHP equipment is going to be very difficult is this test going to be mandatory? A lot of CHP units cannot run in island mode so running them at low or high Hz not an easy test to do, as is any of the test running at different frequency's

- Please note; Work on this aspect is still in the early stages and details of who and how the certification scheme will be implemented are still to be developed.
- DNOs [and NG] wish to see the early establishment of an Equipment Certificate régime. The ENA will work with all potential providers of Equipment Certificates to enable them to offer Equipment Certificates as soon as possible to manufacturers of generation equipment that is to be used in Great Britain.
- The ENA is particularly keen to support the development of Equipment Certificates for equipment that will comply with EREC G98 and for the generation equipment at the smaller end of the size range that will be covered by EREC G99.
- The ENA will periodically publish its view of progress towards establishing the régime in Great Britain.
- Assuming potential providers bring forward Equipment Certificate regimes it is the ENA's intention that G98 will be updated in the future to make Equipment Certificates mandatory for all power generating modules of 16A or less.

Dates of Q1 2019 Meetings

- **Provisional Dates for Q1 2019**
 - **10 January**
 - **14 February**
 - **14 March**
 - **17 April**

Thank you

- **Thank you all for your time and input into today's very important industry forum. We hope you found it useful.**
- **Have a safe journey home and we look forward to welcoming you again to the ENA in the near future.**