GC0048 RfG

Generator Banding Consultation

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RfG overview

- Joint Grid Code/D-Code workgroup **GC0048** has been meeting to progress implementation since early 2014
- Code text was adopted by EU Member States on 26th June 2015. It is expected to 'Enter Into Force' (EIF) in Q2 2016
- The code determines users as 'New' (needing to be RfG-compliant) or 'Existing' (following existing arrangements) depending on:
  - If they're connected before the code enters into force (existing)
  - When they have binding contracts for main plant items procurement, two years from EIF date; either before ('existing'), or after ('new')
- GC0048 are looking to conclude GB implementation in 12 months to maximise lead-time for manufacturers and developers to understand any new requirements
- **Immediate priority is agreeing RfG banding levels**

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What is RfG 'banding' and how is set?

- Technical requirements in RfG are arranged into x**4 Types** based on a user's connection voltage and MW capacity
- Type A and B requirements are close to a **product standard**
- Type C and D requirements need **active generator management**
- MW levels are set on a national basis by nominated TSO providing their levels + justification, and are ratified via industry consultation and regulatory approval. A cost benefit analysis is **not mandated**

Maximum RfG banding levels permitted for GB:		
Type	Connection Voltage	Power Generating Module Capacity
A	< 110kV	800 W – 1 MW
B	< 110kV	1 MW – 50 MW
C	< 110kV	50 MW – 75 MW
D	≥ 110kV	75 MW +

Current GB Definitions:			
Power Station Size	SHET	SPT	NGET
Small	<10MW	<30MW	<50MW
Medium			50-100MW
Large	>10MW	>30MW	>100MW

How did GC0048 consider the banding level

- Three options formed and consulted on within the workgroup for GB:

Type	Option 1 - High Max GB levels	Option 2 - Medium	Option 3 – Low (Similar to Irish levels)
A	800W – 1MW	800W -1MW	800W – 1MW
B	1-50MW	1-30MW	1 – 5 MW
C	50-75MW	30-50MW	5 – 10MW
D	75MW	50MW+	10MW+

- High option is the maximum level written into the RfG text, and is consistent with Continental EU
- Mid option was proposed by NGET, focused primarily on reducing the wide band of Type B (1-50MW) and achieving some semblance of consistency with existing Scottish 'Large' level (SPT)
- Low option is close to Irish values, and continues theme of consistency to a neighbouring synchronous area
- GC0048 tried to use these options to drive incremental costs/benefits between the options to form a justification

GC0048's recommendation

- **Workgroup agreed to focus assessment on the 'high' option as it presented least risk to implementation, because…**
  - It better harmonises GB with Continental EU, as well as existing Grid Code Frequency Response requirements for Large generators in England & Wales, and PPMs across GB
  - Some existing GB requirements can continue with RfG as 'local', as long as they do not impact cross border trade or contradict RfG
  - Relevant TSO can propose changes to banding levels every three years after 'Entry into Force', allowing the evolving system/political change to be taken into account
  - There is an interaction with the EU Transmission System Operator Guideline on banding, which would apply to existing users and present additional compliance/cost issues. High banding minimises this risk
  - RfG bandings are not a panacea; lots of issues for SO managing existing sub-1MW generation which RfG bandings do not affect! NGET will consider solutions to managing this outside RfG

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Industry Consultation focus

- Help us verify and bolster the GC0048 recommendation for high banding; or
- Gain additional justification for GC0048 to re-consider the Medium or Low options
- Depending on respondent's preference, **quantify** the cost/benefit between the three options
  - This needs to be the *incremental* cost between the preferred option and the others, rather than a consideration of the preferred option in isolation
- Assess preferred option against Grid Code/D-Code objectives and impact on Transmission/Distribution system users

Key dates for consultation

- Approved for consultation by Grid Code and Distribution Code panels in March
- It was issued to our distribution lists on **Monday 4th April**, and will run until **Monday 16th May**
  - It will be circulated via the JESG weekly update in due course
- Responses are welcomed from any interested party - though robust justification (including cost/benefit data if applicable) must be included
- National Grid (Richard Woodward) are happy to present the consultation and answer any questions face-to-face, if this will assist stakeholders submitting their response

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Back-up

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EU Connection Code workgroups

- **GC0048-C - Coordination Group (spanning RfG, DCC and HVDC):**
  - Project management of implementation programme for Connection Codes
  - Progress non-technical/procedural requirements common in all three codes (see next slide)
  - Accountable for implementation progress to industry
- **GC0048-T – RfG Technical Group**
- **GC0090 - HVDC Technical Group**
- **GC0091 - DCC Technical Group**
- **GC0087 – RfG Frequency Response**

Email Grid.Code@nationalgrid.com for more info

Banding Requirements – Type A

- A basic level necessary to ensure capability of generation over operational ranges with limited automated response and minimal system operator control.
- Type A ensure that there is no large-scale loss of generation over system operational ranges, minimising critical events, and include requirements necessary for widespread intervention during system-critical events.

Overview of technical requirements:

- Operation across a range of frequencies
- Limits on active power output over frequency range
- Rate of change of frequency withstand settings
- Logic interface (input port) to cease active power output within 5 secs

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Banding Requirements – Type B

- Type B provides for a wider range of automated dynamic response, with greater resilience to more specific operational events.
- They ensure an automated response to alleviate and maximise dynamic generation response to system events.

Overview of technical requirements

- Type A, plus…
- Ability to automatically reduce power on instruction
- Control schemes, protection and metering
- **Fault Ride Through requirements**
- Ability to reconnect
- Reactive capability (synchronous PGMs only)
- Reactive current injection

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Banding Requirements – Type C

- Provide for a refined, stable and highly controllable (real-time) dynamic response, aiming to provide principle ancillary services to ensure security of supply
- These requirements cover all operational network states with consequential detailed specification of interactions of requirements, cfunctions, control and information to utilise these capabilities

Overview of technical requirements:

- Type A-B, plus…
- Active power ontrollability
- **Frequency response**
- **Monitoring**
- Automatic disconnection
- Optional Black start
- Reactive capability (non-synchronous PGMs only)
- Stable operation anywhere in operating range
- Pole slipping protection
- Quick resynchronisation capability
- Instrumentation and monitoring requirements
- Ramp rate limits
- Simulation models

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Banding Requirements – Type D

- Requirements specific to higher voltage connected generation with an impact on entire system control and operation.
- They ensure stable operation of the interconnected network, allowing the use of ancillary services from generation Europe-wide.

Overview of technical requirements

- Type A-C (latter band parameters take precedence when requirements overlap), plus…
- Wider Voltage ranges / longer minimum operating times
- Synchronisation on instruction
- Fault Ride through