GC0087 - Frequency Response Provisions



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Agenda

- Summary of 3 March Workshop
- Why we need to define delays and ramp rates
- RfG update
- GC changes – where?

Summary of 3 March Workshop

Issue	Stop/ proceed elsewhere	GC0087 Workgroup		Comment
		Develop Proposals	Put on hold	
Clearer ramp rate and delay definition		✓		Recognised benefits for all parties. Parameters required for RfG Implementation.
Low Load Operation			✓	Potential benefits recognised. No clear need for a change at this time.
Alternative on-site sources			✓	Potential benefits recognised. No clear need for a change at this time.
Rapid-Frequency Response for non-synchronous generators	✓			Polarised positions on costs and benefits. Need case has to be well quantified by NGET (2015 FES/SOF) before issue can progress further.
Inertial Response from Synchronous generators	✓			NGET to work with generators to verify modelling assumptions

Why we need to define delay and ramp rate

- National Grid makes assumptions about how quickly frequency response is delivered when working out how much is required.
- Our experience has been that response times vary.
- Issues have arisen during compliance testing due to varying interpretations of the Code.
- Current provisions leave some uncertainty over the performance requirements for generators delivering frequency response. There is clear system sensitivity to the ramping capability of responsive generation and how quickly response is initiated.
- How quickly a generator meets its primary response requirement in 10 seconds can be critical.
- Decreasing levels of synchronous plant on the system results in greater operational challenges.

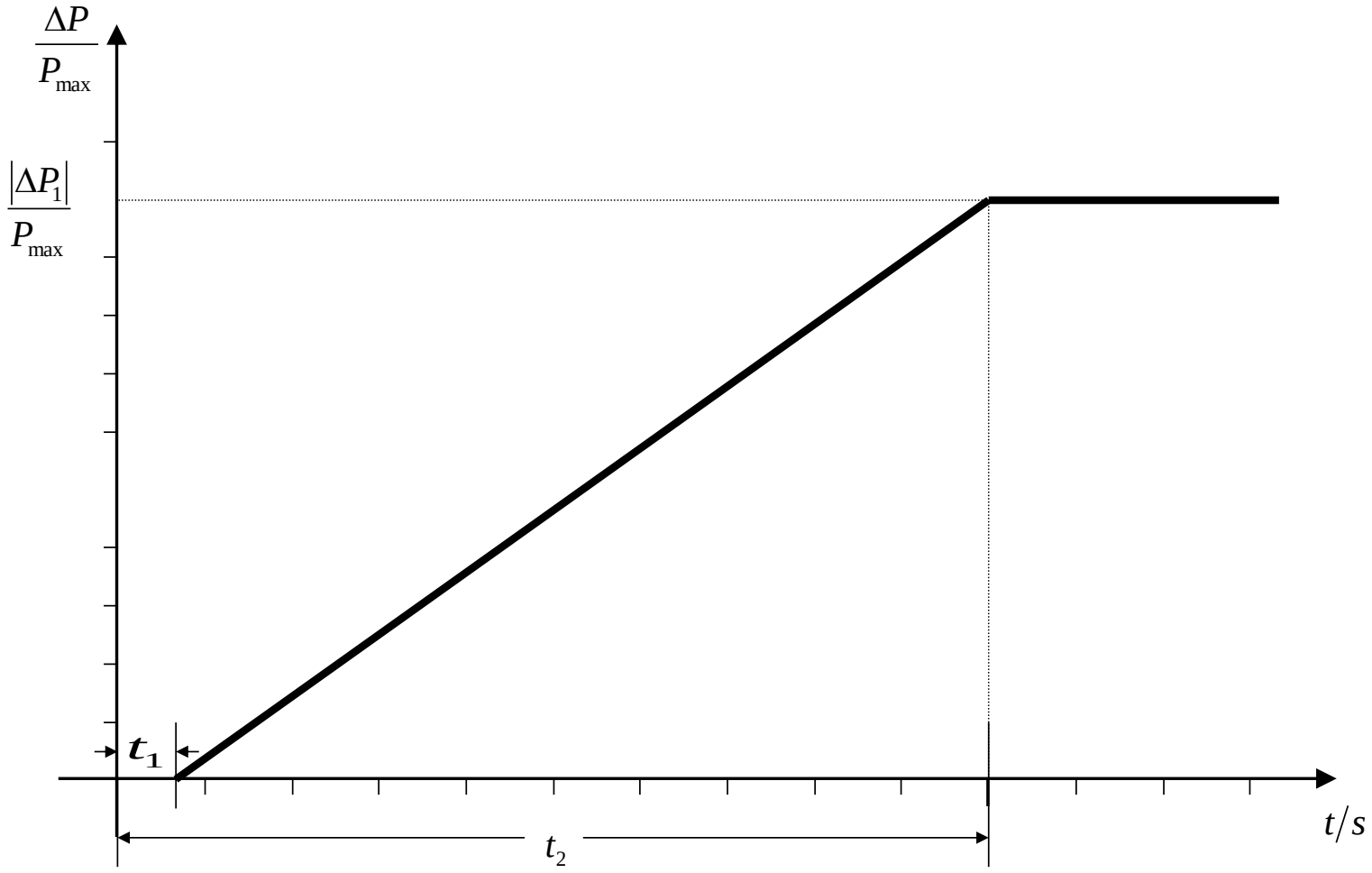
Progression

- Grid Code Process
- Terms of Reference
- Workgroup Timescales

RfG definitions

- **Synchronous power generating module**: …….can generate electrical energy such that the frequency of the generated voltage, the generator speed and the frequency of network voltage are in a constant ratio and thus in synchronism.”
- **Power Park Module**: “a unit or ensemble of units generating electricity, which is either non-synchronously connected to the network or connected through power electronics, and that also has a single connection point to a transmission system, distribution system including closed distribution system or HVDC system”

Article 15, figure 6 in RfG



RfG Requirements

Parameters	Range of Values	Current Status in GC
Active Power range related to maximum capacity (frequency response range) $\frac{\lvert\Delta P_1\rvert}{P_{\max}}$	1.5 – 10%	Current GB requirement is 10%
For Power generating modules with inertia, the maximum admissible initial delay t_1 unless justified otherwise in line with Article 15 (2) (d) (iv)	2 seconds	Not currently defined in Grid Code
For power generating modules without inertia, the maximum admissible initial delay unless t_1 justified otherwise in line with Article 15 (2) (d) (iv)	as specified by the relevant TSO	Not currently defined in Grid Code
Maximum admissible choice of full activation time t_2 unless longer activation times are allowed by the relevant TSO for reasons of system stability.	30 seconds	Currently in Grid Code

Article 15 (2) (d) (iv)

(iv) The initial activation of active power frequency response required shall not be unduly delayed.

If the delay in initial activation of active power frequency response is greater than two seconds, the power generating facility owner shall provide technical evidence demonstrating why a longer time is needed.

For power generating modules without inertia, the relevant TSO may specify a shorter time than two seconds. If the power generating facility owner cannot meet this requirement they shall provide technical evidence demonstrating why a longer time is needed for the initial activation of active power frequency response;

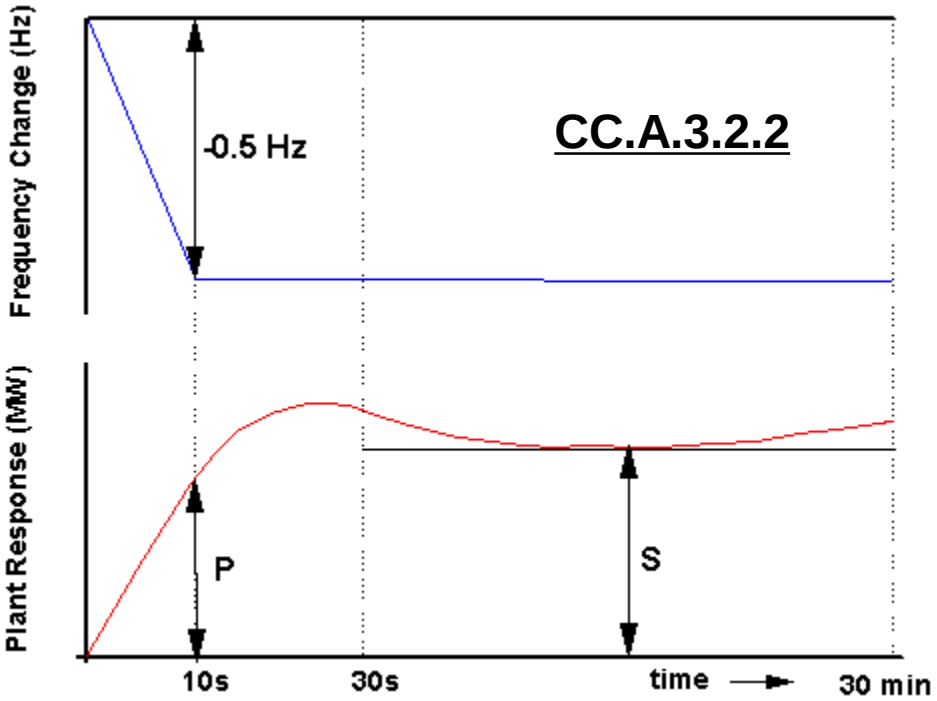
Grid Code – what needs to be changed?

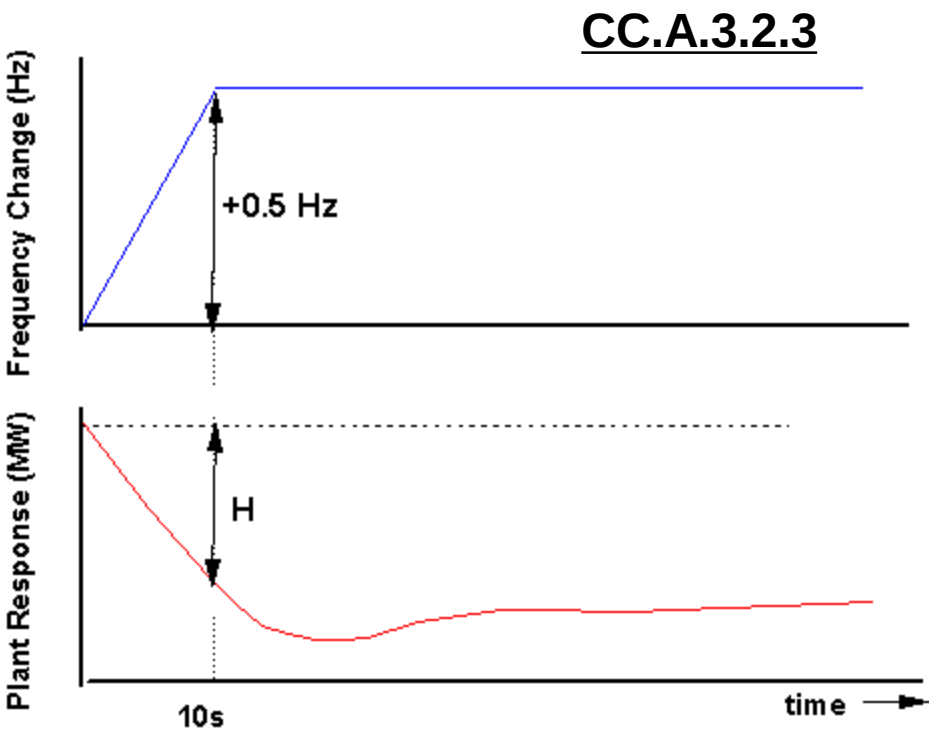
- **Primary Response** The automatic increase in **Active Power** output of a **Genset** or, as the case may be, the decrease in **Active Power Demand** in response to a **System Frequency** fall. This increase in **Active Power** output or, as the case may be, the decrease in **Active Power Demand** must be in accordance with the provisions of the relevant **Ancillary Services Agreement** which will provide that it will be released increasingly with time over the period 0 to 10 seconds from the time of the start of the **Frequency** fall on the basis set out in the **Ancillary Services Agreement** and fully available by the latter, and sustainable for at least a further 20 seconds. The interpretation of the **Primary Response** to a –0.5 Hz frequency change is shown diagrammatically in Figure CC.A.3.2.

Grid Code – what needs to be changed?

- High Frequency Response: An automatic reduction in **Active Power** output in response to an increase in **System Frequency** above the **Target Frequency** (or such other level of **Frequency** as may have been agreed in an **Ancillary Services Agreement**). This reduction in **Active Power** output must be in accordance with the provisions of the relevant **Ancillary Services Agreement** which will provide that it will be released increasingly with time over the period 0 to 10 seconds from the time of the **Frequency** increase on the basis set out in the **Ancillary Services Agreement** and fully achieved within 10 seconds of the time of the start of the **Frequency** increase and it must be sustained at no lesser reduction thereafter. The interpretation of the **High Frequency Response** to a + 0.5 Hz frequency change is shown diagrammatically in Figure CC.A.3.3.

CC.A.3.2 & CC.A.3.3 Frequency Response





Discussion