

Summary of Meeting and Actions

Meeting Name	Frequency Response Technical Sub Group
Meeting No.	3
Date of Meeting	Thursday, 13 th January 2011
Time	10:30am – 13:30 pm
Venue	National Grid House, Solihull

This note outlines the key action points from the third meeting of the Frequency Response Technical Sub Group.

1) Introductions, Minutes and Apologies

The Chair introduced the meeting and reiterated apologies from Damien McCool, Mick Chowns, Tony Lakin, Peter Thomas, Martyn Cunningham, Jytte Kaad Jenson, Peter Wibæk Christensen and Alastair Frew.

2) Previous meeting's minutes and actions

The previous meeting's minutes were reviewed for accuracy and were agreed by the Technical Sub Group. It was agreed to upload them onto the Grid Code website.

Action: National Grid (TI)

KL commented that it would be possible to collect more operational data and agreed to discuss requirements with National Grid.

Action: KL

NG to speak to Nordex to determine what triggering criteria had been used previously. A reference may be required to be added to the previous minutes.

Action: National Grid

The Technical Sub Group (TSG) discussed the issue of the treatment of DC Interconnectors, which National Grid reported was still ongoing. TI thought that currently whilst there were codified obligations on new interconnectors to have the capability to provide frequency response services, they could not be mandated to provide response in the same way as a GC generator.

SW presented charts from studies developed to test both an absolute frequency trigger as well as a df/dt triggers. KL informed the group that he had established frequency testing at four Scottish Power sites and used the following criteria: 0.01, 0.02, 0.03 and 0.04Hz/s. It was found that 0.01Hz/s produced around four false triggers a day whereas 0.03Hz/s and 0.04Hz/s produced far fewer trips. National Grid suggested that if the data is emailed to them, the trips could be assessed against System Operation data in order to validate the effectiveness of the criteria against real system events.

3) TSG update at the Frequency Response Working Group

At the Frequency Response Working Group a summary of the TSG's finding had been presented. AM questioned the use of the time delay of 0.5s in the summary and National Grid confirmed that this was just an illustrative figure and was not a recommendation. TI reported that delivery timescales for the TSG had been discussed at the FR WG and since the WG's work schedule had been extended that it was thought that an extension to the TSG's delivery timescales would also be acceptable.

SL commented that as the scenarios that have been considered to date were not necessarily credible then wasn't further debate required before the TSG could feasibly conclude.

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4) Modelling update

TI confirmed that an electronic copy of the slides presented would be posted on the SG website after the meeting.

Action: National Grid

SW presented the latest suite of modelling work that had been performed by National Grid. Following an action from the previous meeting, studies had been performed in order to model the inertia produced from an absolute frequency trigger (i.e. 'one shot') as well as a df/dt control system. The model also now included ramp rates rather than an instantaneous change in generator output. SW stated that a main conclusion of the work was that it appears that the timescales for Synthetic Inertia delivery could be extended but only up to an absolute limit i.e. the time at which the minimum system frequency is reached. For example the graph which had a 2 second delay for SI was too slow, for the assumed conditions and system.

FL asked which generators were assumed to be providing the response and SW confirmed that in this model that both Synthetic Inertia and the one GW of frequency response were assumed to be smeared across all generation. SW stated that whilst this may not necessarily be feasible in practice, assumption must be made.

It was also shown that a single injection of 500MW triggered at a set frequency could lead to over delivery and therefore an over recovery of system frequency. SW therefore proposed that a more sophisticated control method was required such as df/dt which could produce a more controllable output.

SW also discussed the issue of wind turbine power recovery, which has previously been discussed as significant. Bilateral discussion between National Grid and manufacturers have concluded that as long as the duration of recover is sufficiently long and the amount of SI provided is low, then power recovery should be a large issue.

SL commented that within all the modelled frequency traces a clean 'cliff edge' drop in system frequency is assumed although in reality that is rarely the case and there is a slow persistent drop. SL proposed that this may effect the effectiveness of df/dt triggers. This may also add more support to delta frequency triggers or perhaps a hybrid with df/dt functionality or a stepped absolute frequency trigger, similar to the staged approach of the Low Frequency Demand Disconnections scheme, or the use of a PID controller. It was concluded that df/dt is predictive and so operates quicker.

AM confirmed that a timescale of between 0.5 and 2.0s is far more realistic for SI and gives manufactures more scope for producing a reliable trigger. National Grid confirmed that they would like to define any SI obligation as high level parameters in order to give manufactures enough flexibility to produce innovative solutions. National Grid agreed to perform further modelling on various approach for controllers including delta f and df/dt .

Action: National Grid

SL also commented that the worse case scenarios seem to be particularly extreme and improbable. A minimum demand has been assumed of 25GW at the same time as all wind was operating at a 75% load factor. SL suggested that a 50% load factor and 30GW minimum demand was more plausible. GS reiterated that National Grid must plan for the worst case although that withstanding a pragmatic view must be taken and that there were always NETSO actions that could be taken if very extreme situations occurred.

The TSG asked National Grid to confirm whether the pre-fault system frequency should be assumed to be 49.8Hz rather than 50.0Hz as this was the worse case within the operational range. GS confirmed that SI requirements would not be effected by this and a starting frequency of 49.8Hz would only result in an erosion of primary response. NG agreed that this logic would need to be confirmed once the draft obligations were determined.

5) Generation mix

GS presented a matrix which examined the expected generation mixes for 2020 and 2025 for low, medium and high GB demand levels and the associated SI and response requirements. The level of 'low demand' was determined as the bottom decile from historic data and was

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(25MW). 'High' was the top decile. The generation mix proportions were derived from National Grid's Gone Green scenario which have been recently updated and published.

SL suggested that extreme outliers of total GB wind farm output should be assumed to be statistically inconsistent and ignored and suggested this should be set to 1 or 2%. GS also agreed to include a 'mid wind' scenario.

Action: GS

The TSG agreed that the issue of frequency response and synthetic inertia provision from interconnectors needs to be address and is key to the conclusion of the Working Group. National Grid agreed to discuss their ramp rate assumption with generator manufacturers.

Action: National Grid

The TSG discussed that the current Draft pilot European Network Codes assumes provision of SI only from >50MW generators. This would thought to be appropriate, in that it does not apply to smaller units.

6) Next Steps

National Grid is going to assume that SI and FR are concurrent for future studies but also run again for exclusive operation to see the material effect this would have.

It was agreed that the Working Group report should start to be drafted.

Action: TI

7) Date of Next Meetings

The Sub Group agreed that further meetings will be required. The first meeting is intended to look at the improved studies and discuss some draft obligations. The Second would be to discuss the technical report.

[Post meeting note:

The date and location for the next meetings were confirmed as:

- 28th February 2011, Warwick; and
- 28th March 2011, Warwick]

TI agreed to discuss an extension to the Technical Sub Group's delivery timescales with the Frequency Response Working Group.

Action: TI

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Appendix 1 – Working Group Attendance

Members Present:

Tom Ireland	TI	Working Group Chair
Graham Stein	GS	National Grid
Joe Duddy	JD	Renewable Energy Systems
Stewart Whyte	SW	National Grid
Simon Lord	SL	First Hydro
Steve Curtis	SC	National Grid
Alan Mason	AM	REpower
Chris Hastings	CH	SSE
Bjorn Andresen	BA	Siemens Wind Power
Francois Luciani	FL	EDF Energy
Ken Lennon	KL	SP Power Systems
Sohnke Schierloh	SS	Enercon

Apologies:

Damien McCool	DM	EDP Renewables
Mick Chowns	MCh	RWE Innogy
Tony Lakin	TL	Turbopowersystems
Peter Thomas	PT	Nordex
Martyn Cunningham	MCu	Scottish Power
Jytte Kaad Jensen	JKD	Vestas
Peter Wibæk Christensen	PWC	Vestas
Alastair Frew	AF	Scottish Power