# Minutes

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| **Meeting name** | GC0079: Frequency changes during large system disturbances - Phase 2 |
| **Meeting number** | 40 |
| **Date** | 23/03/2016 |
| **Time** | 10.30 – 15.00 |
| **Location** | Energy Networks Association (ENA), Dean Bradley House, London |

**Future meeting dates**

| Meeting Number | Date |
|---|---|
| ~~40~~ | ~~Wed 23rd March 2016~~ |
| **41** | **Wed 20th April - TBC** |
| 42 | Tues 17th May |
| 43 | Wed 29th June |
| Doodle Poll to set dates for remainder of 2016 to follow via circulation… | |

## 1) Introduction

MK welcomed attendees to the meeting.

## 2) Review of minutes/actions

**Minutes**

Adjustments from JD were incorporated and accepted. JD noted that the Enhanced Frequency Control Capability (EFCC) project is also looking at issues surrounding frequency containment and regionally reducing inertia, increasing RoCof and vector shift. This was discussed more later on.

Post meeting – JD has suggested: reviewing:

http://www.nationalgridconnecting.com/The_balance_of_power/EFCC_Dissemination_Event_slides_part_1.pdf

See especially pages:

- 13-15
- 19-31
- 35-44
- 74-76

Also:
http://www.nationalgridconnecting.com/The_balance_of_power/EFCC_Dissemination_Event_slides_part_2.pdf

- GC0079 collaborator PNDC is also involved in EFCC see slides 1-15

**Actions**

136 – GS confirmed more work was needed with Ecofys, notably on PV generation numbers. This work is on-going, so once complete the website upload can be arranged then.

139 - ToR again discussed and updated at GCRP. RJW confirmed RfG withstand was now removed from GC0079 (now with GC0087). The management of existing, and the link to associated work for the EU System Operation Guideline and RfG Frequency (GC0087 was discussed).

It was felt point 11(d) in the ToR potentially commits the workgroup to too much. The key for whether this progresses is whether Phase 2 recommend a RoCoF operating limit change (0.125 - 3), which could be delivered in TSOG. Therefore could the same group (TBC) do RoCoF withstand for existing generation too? For transparency, it was agreed to leave within GC0079 until more about TSOG implementation was known.

CMD mentioned the link to Enhanced Frequency Response (which will deliver quicker Frequency Response pre-2020) and Enhanced Frequency Control Capability (EFCC) a National Grid innovation project to test the capability of wind farms, solar PV, energy storage and demand side response to help control system frequency (potentially kicking off post-2020). Any work on rapid Frequency Response capability will clearly impact the recommendation of GC0079, so this will be monitored (see existing action 145).

The ToR post-GCRP updates were presented; the workgroup reviewed and made a few comments which RJW will update and circulate for final checks, before submitting to GCRP and DCRP. **[ACTION –RJW]**

CMD mentioned discussion at GCRP, where a Panel rep (Sigrid Bolik of Senvion, a wind turbine generator manufacturer) about the required half second delay before RoCoF loss of mains protection activated, effectively introducing a potentially unlimited RoCoF withstand for 5 to 50 MW generators. The workgroup wanted to understand more, so CMD agreed to contact her and invite her to the our next meeting **[ACTION - CMD]**

Continuing the theme of Panel updates, GS presented DNO progress on applying/compliance Phase 1 changes from a report circulated at DCRP. There is a DCRP action on extending the deadline for compliance for which GS has to respond. Contact: Steve Cox. GE noted that an analysis of the effort needed to progress Phase 1 would be key for informing the recommendations of Phase 2. It was agreed to see if there is more information on the generation classed as work in progress on the DCRP report.
**[ACTION GS - Circulate DCRP paper; see if there is more analysis available from David Spillett]**

160 – Could be closed assuming a full set of DNO data had been received – however GS and MK will do a final double check

165 - No DNO feedback on this formally; MK's suggestion of bringing a DNO 'commercial' contact to participate in the workgroup in future to assist with thinking on this was agreed.

171 – IK mentioned the need to cost for conducting site visits. This was discussed more later on

GE confirmed this would be his last meeting. He will provide an alternate contact, potentially Martin Queen, to MK in due course.

Actions 139, 158, 162, 165, 170, 173, 175 and 179 were all closed.

## 3) Workgroup Report

The workgroup reviewed JD's mark-up on Graham's circulated paper "Cost and Benefits -Second Draft". The volume of interconnectors needs to be double checked **[ACTION – GS]**, and the term "curtailing" was considered a little ambiguous when referring to interconnectors, so potentially needs contextualising. CMD also queried whether curtailing imports would be feasible - won't it be expensive?

GS talked the workgroup through the other changes he had made to the above document since the first draft. The implementation cost table (Table 4) was explained; GS asked whether it was comprehensive enough. MK and IK queried whether admin costs were included, including costs for carrying out site visits. **[ACTION – GS]**

GS explained more on the 50% estimate of applicable sites with/without RoCoF based LoM protection (so half need a change) - discussion was that this might be high in reality, but MK countered that it's risky to under estimate. He added that the numbers could be flexed under some scenario/variation options to provide sensitivity analysis on the final cost benefit analysis. JR had concerns that some relays may not be able to be updated with a time delay, but would need to be changed. JR felt maybe more relays might need to be changed than the group thought. JR's £7000/site estimate did include some on-sight testing to check.
In terms of the overall number of sites in consideration (~3000 sites?), this number needed to be verified. There was Week 24 data which quoted about 1000 sites between 1-5MW; other data sources mentioned for generator volumes was the Renewables Obligation (RO) and Feed-in Tariff (FiT) registers which are publically available via Ofgem. It was agreed to use DNOs' week 24 data for all generation apart from that connected under G83. It was also agreed to ignore generation connected under G83 as the PNDC/Strathclyde work had shown that the majority of inverters used for G83 compliant generation was largely immune to RoCoF up to $0.7Hzs^{-1}$. GS would tie the data sources up with the Ecofys work to make a coherent overall picture. **[ACTION – GS]**.

Regarding the costs of a site visit (mentioned by IK earlier), the group agreed to an estimate of £500/site cost (e.g .vehicle, man hours etc.), and probably x4 visits per day.

CMD sought to fix the costs associated with the LoM protection settings change, e.g. moving from 0.25 to say 0.3 - what is our recommendation? He also reiterated GE's challenge to differentiate the benefits from Phase 1 to ensure no double-counting.

MK's proposed G59 and G83 legal text was also reviewed; MK went through the table for protection settings change in section 10.7 of the g59 proposals; MK suggested a two year implementation, though GS felt three years may be better given the experience of Phase 1.

There was some wording which had tracked through incorrectly from the D-Code; MK agreed to correct **[ACTION – MK]**

AD raised questions on the proposed text for testing "relay tripping time" - MK suggested this was dealt with via email circulation with GM and JR [ACTION?]. GM's circulated document on testing also covers this – **[ACTION – GM/RJW check that GM document has gone to AD]**

The workgroup were asked to review MK's legal text for G59/G83 and provide comment before/at the next meeting **[ACTION – All]**

Regarding the funding question, MK confirmed this needed to be part of the 'package' of recommendations put to Ofgem. Discussions had been had with GE on this, but it also needs to be discussed with the generators/suppliers who pay BSUoS. RJW has already discussed this with the

National Grid team who Code Admin for CUSC, and got a slot on their Transmission Charging Methodology Forum (TCMF) in May.

The Ofgem decision key from Phase 1 should be considered when making any recommendations – there were reservations over generators taking the cost burden for compliance for the settings change.

## 4) University of Strathclyde – Analysis on dead times

MK introduced AD's presentation – that dead times on DNO networks are another means of mitigation against islanding. But how effective is it?

AD presentation:

LOM_Review_WG_meeting_23March16.pc

MK felt the analysis being undertaken by AD possibly needs to go a stage further to help with RfG Fault Ride Through. He would raise this to GC0048 workgroup to consider.

AD mentioned his work with the Irish TSO, where dead times are set to 30 seconds. Changing the GB level for dead times will require the risk assessment recommended in his earlier report to be completely redone if coupled with a LoM protection settings change. JR raised a concern that back-up generation has a mains-fail delay of below 30 seconds. It was agreed that this was simply a matter for the owners of back up generation to consider.

Overall from AD's presentation, there was a significant reduction in risk of islanding by increasing DNO dead time to 15 secs. It was felt this risk would be improved in reality too. MK requested AD write this up so that we can include in the report **[ACTION - AD]**. Any such recommendation on a widespread reconsideration of dead times in general was out of scope of GC0079, but DNOs might decide to pick up the suggestion.

## 5) Vector Shift

AD confirmed UoS were working with Northern Ireland on vector shift. He explained the data they had recorded, being used for simulations and tests. The workgroup queried whether their output could be shared? AD confirmed this was a question to Jonny Pollock (NIEN), who has been invited to join GC0079 by MK.

**[ACTION - MK to speak to Jonny Pollock on both attending GC0079 and vector shift knowledge share]**

## 6) AOB

**[ACTION - MK/GS confirm whether we need a full meeting in April or not]**
**[ACTION – RJW to create a Doodle Poll to agree dates for the remainder of 2016]**

| Attendees | | |
|---|---|---|
| **Name** | **Initials** | **Company** |
| Mike Kay [Chair] | MK | ENA |
| Graham Stein | GS | NGET |
| Richard Woodward [Technical Sec.] | RJW | NGET |
| Campbell McDonald | CMD | SSE Generation |
| Gareth Evans | GE | Ofgem |
| Ioannis Koutsokeras | IK | SP Energy Networks |
| Adam Dysko | AD | University of Strathclyde |
| Sam Turner (by phone) | ST | NPG |
| Greg Middleton | GM | Deepsea Electronics |
| John Ruddock | JR | Deepsea Electronics |

| Apologies | | |
|---|---|---|
| **Name** | **Initials** | **Company** |
| Andy Hood | AH | WPD |
| Joe Duddy | JD | RES |
| Martin Lee | ML | SSE Distribution |