

## Minutes

<b>Meeting name</b>	Frequency changes during large system disturbances workgroup (GC0079)
<b>Meeting number</b>	22
<b>Date</b>	22 September 2014
<b>Time</b>	10.30 – 14.30
<b>Location</b>	ENW Offices, Manchester, M1 4LF (Teleconference option too)

## Future meeting dates

Meeting Number	Date
23	27 <sup>th</sup> October
24	24 <sup>th</sup> November
25	19 <sup>th</sup> December
26	21 <sup>st</sup> January 2015
27	20 <sup>th</sup> February 2015
28	18 <sup>th</sup> March 2015
29	20 <sup>th</sup> April 2015
30	21 <sup>st</sup> May 2015
31	24 <sup>th</sup> June 2015

### 1) Introduction & apologies

MK informed the group that unfortunately ML would not be involved in the WG until further notice.

**Action MK:** find a replacement SSE representative in ML's absence

### 2) Review of previous minutes & actions

The WG noted comments from JD, JW and AD and agreed that the minutes from the last meeting could be approved.

### 3) Terms of Reference update / Ofgem letter re phase 2 work

MK noted the updated Terms of Reference from SB following the letter from JW re phase 2 work. The WG agreed that March 2015 was the most appropriate consultation date to list for phase 2. MK suggested that these updated ToR are ratified via the DCRP/GCRP. JW also advised that we can remove Gareth Evans from WG membership list.

**Action SB / MK:** Send updated ToRs to GCRP / DCRP for approval

The group discussed whether the current membership was still fit for purpose or if we should consider approaching other trade bodies such as RenewableUK or the Solar Trade Authority to see if

they want to be involved. GS noted that we had tried to engage before with little success. MK added that whilst they were not especially interested for phase 1; phase 2 may well see a different response.

JW added that whilst there were some challenging decisions to be made for phase 1, Ofgem took comfort in the thorough engagement that the WG undertook and would be hoping for the same in phase 2, particularly as the phase 2 decision is expected to have similar challenges. GM added that at the very least we can demonstrate that we've reached out to them, even if they still aren't prepared to engage with us.

There was a discussion about the need to consider where implementation costs should fall for Phase 2 work, which was identified as the main point from the letter (point 4). The WG discussed that that may need to involve some joint work with another code to do this; there was discussion about which code this would naturally fall under the remit of (DCUSA got mentioned as a candidate). JW noted that, given this issue felt like fairly new territory, he would be confident that Ofgem would be happy to get involved in discussions to establish how/which code this should be addressed through.

**Action MK:** Reach out to trade bodies via ENA (Dave Spillett) and invite them to engage with the working group re phase 2

#### 4) Phase 1 progress

MK noted that now the phase 1 changes have been approved, DNOs are in various stages of contacting affected generators to inform them of the requirements to modify their RoCoF settings. JD added that he'd received a letter from WPD recently. MK was the first to send out this letter on behalf of ENW and reiterated that he was happy for all other DNOs to use this letter as a template. MK also added that ENW have had 4 or 5 replies but no real feeling yet for how affected generators are acting in order to meet the new requirements.

The WG had previously said that it would try to pull together a formal GB position in time for the next DCRP in Dec 2014. This would aim to inform the DCRP which DNOs have sent letters out, what kind of responses had been received and whether any of the generators had made any progress in applying the changes to protection settings. GS added that we want to provide assurance that compliance is being managed but we also expect to have some difficult conversations with generators who say they cannot make these changes or that it is too expensive. However the WG can be used to share experiences of this type and allow us to be consistent wherever possible in our responses. MK added that he had liaised today with relevant ENW colleagues and there have not been any particular reactions as yet.

GS noted that anyone who is affected by nuisance trips will be pleased by the setting changes to which MK responded that it depends on their risk / balance views. JR added that in some recent tests, it showed that there were ~200 false trips per week at LV in some installations. AH noted that WPD had sent out their letters a few days ago. KB informed the group that UKPN had started the process of writing out to their customers re the changes but that the biggest challenge to this was getting all the details right in the first instance. They had not received any responses of note yet. KB added that any customers who attended the ENA / DG forums would have heard about their plans to write out and are at least aware of these changes. MK summarised that progress will be reported at DCRP in December and keep updating the WG in the meantime.

## 5) Withstand capability questionnaire update

GS explained that there were not any major changes to the initial version of the questionnaire. The plan was, as per the WG view of version 1, to take this to AMPS for comment and also to have a large generator(s) provide comments. JR has a copy and plans to pass on to AMPS, GS will send to a large generator. GS noted that we didn't require them to complete the questionnaire, just provide comments. GS asked the group if they felt version 2 of the questionnaire made sense. There was a group discussion around whether we should be more specific in our meaning of withstand / ride through and whether we should state some assumptions about what happens to Voltage during these events. The general consensus was that GS had defined withstand sufficiently in the opening paragraph of the questionnaire and that we should state that the questionnaire assumes static Voltage throughout.

## 6) Phase 2

### 6ai) Update on proposals

MK updated the group on the proposals. Ecofys now have an order from the ENA. At last contact, they suggested that if work started now they could be in a position to attend the next WG meeting to talk through anything they might need and advise of initial findings. MK suggested that DNOs consider a non-disclosure agreement with Ecofys to give them all the DNO data on DG connected data that they might require. This would allow them to access everything and save the trouble of changing data requirements. MK hasn't heard back from Ecofys on this yet but the suggestion has been made.

**Action MK:** Advise the group when a response is received from Ecofys

GS added that the WG should probably consider how the next meeting will work in that Ecofys will be attending from Germany and we want to ensure they get the maximum possible from attending. MK then advised the WG that ADs proposal was also ready, bar the minor alignment of timelines with Ecofys work, and that a purchase order from the ENA was imminent. GS sent AD the latest Ecofys proposal (with costing details removed) so he could update the timelines accordingly.

### 6aii) Stakeholder engagement

MK highlighted the need to think about our stakeholder engagement activities for phase 2 but that he expected the WG to have a better idea of this after meeting with Ecofys in October. GS noted that Ofgem had emphasised the importance of this engagement in their recent letter and proceeded to summarise the phase 1 stakeholder engagement activities that were run - 4 workshops in total, 2 in London and 2 in Glasgow. They all went fine but given the large volumes of affected parties for phase 2, we might need more people to attend to field questions. Ecofys also offered to do a workshop around international experience. For phase 2, we should probably have a London and Glasgow workshop as a minimum with at least 6 weeks to arrange. MK noted that we might not have much to say until we have some findings from AD's initial research, sometime after Christmas. AD agreed with these timescales. GS responded that we should potentially do something before, an early 'heads up' that this phase 2 work is underway. One option would be to use the Ecofys offer of a workshop on international experience to fill the gap between now and January, maybe November sometime. The idea of using the DG forums was raised but MK noted that these were only once a year and were running now. AH added that these are more about the installation of generation in

any case to which MK responded that we did use them last year, but that we probably didn't mention phase 2.

It was suggested that as MK & GS are primary contacts with the contractors, they would be best suited to draft an engagement plan for discussion with Ecofys / UoS at the October meeting when we would then aim to start pencilling stakeholder engagement events in.

**Action GS / MK:** Draft a plan for stakeholder engagement activity for phase 2 between now and Jan 2015

#### 6a) Network configurations

#### 6aiv) Generator data

#### 6b) Measurement data requirements

AD ran through a presentation on the above three areas relating to his research work. There was a group discussion around where the RoCoF protection sits for HV / LV connections. AD noted he is just considering RoCoF, not vector shift. GM noted that vector shift can appear as a RoCoF depending on the time period it is being measured over. JR commented that for cost saving reasons some Generators connect LV generators via customer owned step-up transformers rather than using HV generators and this may have an effect [I can't remember the detail]. JD noted that the more significant effect from the SO's perspective might be that the reactive power delivered at HV would be reduced. AD noted that it depends on measurement data used (HV or LV) as to whether the transformer reactive power considered.

AD informed the group of the possible island formation situations he would be considering in his work: 1) loss of 33kV feeder; 2) loss of 11kV or 6.6kV feeder; 3) loss of LV circuit.

AD added that you can use the same methodology from phase 1 to extrapolate into phase 2. JW asked if the risk for multiple generators vs. a single generator of same size was higher as multiple generators might self-balance at high-frequency if some trip on over-frequency settings before others? GM noted that lots of domestic PV acting together would be interesting to study. AD noted that when he gets a few different manufacturers, he can connect together to try and emulate the effect, to see if they self-balance. GM added that even if they sustain this for a matter of seconds, it will show it's possible. JR added that it can depend on the mode of the equipment.

GS added that having more generators doesn't itself make the island more stable, it's the inertia within the island and frequency/voltage control. It was also noted that inverters have no protection setting on them, just connect as is.

There was a group discussion around types of faults and their relevance to RoCoF in islanded networks and the large number of permutations possible (e.g. three phase, phase to phase or phase to ground) and the different probabilities of these when considering whether the fault occurs underground or overhead. MK added that around 10% of 11kV faults are phase to phase.

AD moved on to the monitoring data and used the 1 min resolution data MK provided to start off the discussion. MK added that the equipment producing the 1 min data can be reconfigured, but it can be difficult to do, as there are several hundred devices. AD asked whether just a few devices might be reconfigured. MK noted that some devices could be re-configured to record on a short-term basis. JW highlighted the LCNF data available. MK added that this was to be provided in data from

DNOs. JP noted that MW was looking at that from NPG. MK asked for people to provide this. JR mentioned STOR providers as they measure P and Q but he wasn't sure of time resolution. MK explained that all of the DNOs will probably have something, at fairly high resolution, from LCNF. AD said that even 5s data would be useful although 1s would be better. JW asked what the time period for the data was required and AD responded that ideally a couple of weekdays and a couple of weekend days for both summer and winter would be useful as a full profile can then be predicted. JW asked if we could maybe record some if we can't find the data but AD was confident that we could get some. GM enquired whether it was worth setting up something permanently for the future as there seems to be an ongoing requirement. AD said that the problem was you would need somewhere to store millions of lines of data.

AD moved on to discuss DG characterised capacity per size. This data for all DNOs would be useful. MWs data split of 100KW was more for CBA. GS noted that the LTDS data was short of some capacity and had nothing less than 1MW. AH added that WPD were struggling to get the right categories for the data.

AD then moved onto network characterisations. He referenced a large document he had acquired from the Smart Grid Forum WS3 with some interesting information on future trends and potential uptake of different technologies. AD added that once risks have been established for the current state, he can take these predictions and apply some logic to extrapolate the risk into the future (based on WS3 data). MK noted that these predictions are from DECC and are considered slightly optimistic. AD added that Ecofys might find this document useful too as it is a good source of info for them. The document also discusses representative models of typical DG configurations. MK volunteered to send Ecofys a copy.

**Action MK:** Send Ecofys WS3 documentation.

MK noted that we need more detail on how we came to those representations, and DNOs should be able to gather this. AD noted that WS7 work has almost finished but no info available yet. MK explained the roles of WS7 and WS3. MK wasn't sure if WS7 was helpful but that it was worth AD noting. AD discussed the description of the network characteristics that MK sent. MK asked the DNOs in the WG to look at the description of network characteristics and provide comments.

**Action All DNOs:** Review MKs description of network characteristics to check they match their view

AD noted the data he still requires: 1s resolution data from 11kV and LV feeders; any monitoring of typical DG; fault statistics of 11kV and LV and DG capacity statistics from other DNOs.

**Action MK / AD / SB:** Resend AD measurement requirements with a tailored note to the DNOs with a view to get these requirements to LCNF colleagues in order to get some data or at least to understand what they can provide and in what timescales.

**Action All DNOs:** Provide data for AD following completion of above action

JD asked if UoS or other similar research groups have their own DG installations. They may have monitoring on their installations and may grant access or allow AD to install his own? AD thinks he may know someone who can help him. MK suggested that AD contact someone in the ENA re fault statistics.

**Action MK:** Provide AD with ENA contact re fault statistics

There was a brief discussion around the initial feedback from the survey on islanding that some of the group completed. It was noted that the 8 or 9 responses were only based on people's opinions. MK noted the strong push back to the new EU codes in Italy due to the tighter frequency range of their anti-island protection arrangements conflicting with the wider range frequency withstand requirements in the European Network Code on Requirements for Generators. MK added that respondents to the survey would not have been on the same thought journey as the WG.

## 7) Summary of actions

Name	Action	No.	By
MK	Find a replacement SSE representative in ML's absence	34	27/10
SB / MK	Send updated ToRs to GCRP / DCRP for approval	35	27/10
MK	Reach out to trade bodies via ENA (Dave Spillett) and invite them to engage with the working group re phase 2	36	27/10
MK	Advise the group when a response is received from Ecofys	37	27/10
GS / MK	Draft a plan for stakeholder engagement activity for phase 2 between now and Jan 2015	38	27/10
MK	Send Ecofys WS3 documentation.	39	27/10
All DNOs	Review MKs description of network characteristics to check they match their view	40	27/10
MK / AD / SB	Resend AD measurement requirements with a tailored note to the DNOs with a view to get these requirements to LCNF colleagues in order to get some data or at least to understand what they can provide and in what timescales	41	27/10
All DNOs	Provide data for AD following completion of action #41	42	27/10
MK	Provide AD with ENA contact re fault statistics	43	27/10
MK	To prime the appropriate places that might have to opine on implementation cost incidence	44	24/11

## 8) Date of next meeting

27<sup>th</sup> October at ENW offices in Manchester. Ecofys are due to attend this meeting.

## 9) AOB

SB advised the group of the change to a new ID for phase 2 work. The group would no longer operate under GC0035, which would be associated with the approved phase 1 work and that GC0079 would become the identifier for phase 2 work. SB added that in the changeover period, both codes might be used but that once the website had been amended, the aim would be to use only GC0079. GS asked about the availability of DG metered data and MK & JD responded that they believed the data would be considered commercially sensitive and noted that DNOs do not have access to this data. It was suggested that data on DG registered as BMUs is available via the Exelon BM Reports portal.

## Attendees & Apologies

### Attendees

Name	Initials	Company
Mike Kay	MK	ENW (Chair)
Graham Stein	GS	National Grid (Alternative chair)
Scott Bannister	SB	National Grid (Technical Secretary)
Julian Wayne	JW	Ofgem
Joe Duddy	JD	RES
Adam Dyśko	AD	Uni. Strathclyde
Greg Middleton	GM	Deep Sea Electronics
John Ruddock	JR	Deep Sea Electronics
Andy Hood	AH	WPD
Kevin Burt	KB	UKPN
Jim Paine (in place of MW)	JP	Northern Powergrid

### Apologies

Name	Initials	Company
Martin Lee	ML	SSEPD
Mick Walbank	MW	Northern Powergrid
Alastair Martin	AM	Flexitricity
Campbell McDonald	CM	SSE Generation
Gareth Evans	GE	Ofgem
Paul Newton	PN	EON
Jane McArdle	JM	SSE Renewables
John Turnbull	JT	EDF Energy
Mick Chowns	MC	RWE
John Knott	JK	SP Energy Networks