

## Minutes

<b>Meeting name</b>	Frequency changes during large system disturbances workgroup, phase 2 (GC0079)
<b>Meeting number</b>	25
<b>Date</b>	19 December 2014
<b>Time</b>	10.00 – 12.00
<b>Location</b>	Teleconference

## Future meeting dates

Meeting Number	Date
26	22 <sup>nd</sup> January 2015
27	25 <sup>th</sup> February 2015
28	23 <sup>rd</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

### 2) Review of previous minutes & actions

SB ran through the open actions. Action 45 on all DNOs to circulate correspondence sent out regarding phase 1 implementation has been met by ENW, UKPN, NPG and SSE. SB reminded other DNOs to provide this. SB informed the group that action 53 had been met, which was for GS, KB and SB to discuss plans for the stakeholder workshop re phase 2 in the New Year. SB noted that this would be covered further in item 6 on the agenda. Re action 58 on all DNOs to provide data to AD as per his requirements, this was left to item 4a (UoS progress update).

The working group acknowledged minor amends from JD and agreed that the minutes could be approved.

### 3) Withstand questionnaire review

GS explained the changes to the questionnaire, highlighted in yellow. The addition of a general confidentiality statement, addition of “turbine blades” to Q3 and a catch all question at the end from JR feedback that allows respondents to highlight any other issues they feel we should consider. GS advised that he hoped this would now be in a suitable state to send out in mid-Jan 2015 to as wide an audience as possible with a request to respond within 4/5 weeks. JW asked that, if there was a specific date in mind for the responses, this was made clear in the questionnaire. GS continued that we can then take a view from the responses, in the Feb or March meeting as to further work we might need to do. Therefore the responses will guide us in what we do next. MK added that it would be good to keep a list of who we have sent it to. Circulation would be NG and ENA contact lists for industry as well as web publication. JD noted the trade bodies too and it was

agreed they'd be included and expected to pass on to their members. GS also added that AMPS would receive it too. ML noted that he had recent discussions with a senior electrical engineer from solar firm who was not aware of our work until the letter highlighting the changes required for phase 1 arrived. For whatever reason the consultation didn't reach him. JW reiterated the Ofgem point of view that stakeholder engagement is very important. As mentioned previously the phase 1 decision was a difficult one but the level of engagement was thorough and Ofgem took comfort that all affected parties had been contacted, making the decision easier. Phase 2 is affecting a far greater community so the engagement challenge is even bigger and should be expected to have similar, if not greater, consideration by Ofgem in making the phase 2 decision. JW added that keeping the contact list would be advisable as through any modification process, Ofgem will always check who is affected and who has been informed. JD asked if the questionnaire would be distributed by NG to all generators that we have connection agreements with, to which GS responded yes. GS added that the stakeholder workshop will also cover some level of the engagement. The withstand questionnaire has a specific purpose so we'll use every possible avenue available to us to get out to industry. KB suggested that the questionnaire should be sent to his contacts from undertaking the initial research. MK agreed. KB will send contacts to SB in readiness for sending out the questionnaire in mid-Jan.

**Action KB: Send contact list from existing work to SB such that a list is ready for when the questionnaire is sent out.**

CM asked what happens if we get responses along the lines of "we can't do this" to which MK explained that this is the point of the questionnaire, to help us define the next steps. JD added that if that happened, we'd ask them to help substantiate that claim. CM suggested that it is the generators' responsibility ultimately but asked what substantiation could they offer? JD noted the similarities with the situation in Ireland. Generators have said they are concerned about the changes, have referenced potentially technical limitations and are now being challenged to substantiate it. CM agreed and noted the quite detailed scenarios to be studied over 36 months. GS noted that there is feedback from some large generators already who are comfortable with the questionnaire. MK noted the catch all question at the end which will invite recipients to point out any other factors not captured by the questionnaire. The reality is that whoever receives the questionnaire will find a way to get back to us if they wish.

MK noted that we can learn from the Irish work and added that we need some real feedback from existing and future generators.

ML and CM had a discussion around the protection settings for new and existing generators and the different rates that have been approved. ML noted that we might not ever need more than 0.5Hz/s but given future uncertainty it's good to have some headroom; otherwise this process would have to be undertaken again. MK highlighted that there are 3 separate strands to this (viz what we expect the system to be secured to (including the capability of existing kit); the capability of new kit; protection settings) which are all related but independent issues. We are determining what the GB system withstand should be, which may or may not be the same as what we secure to. GS added that there is clearly a relationship between the two and that there isn't really another viable option to solve this issue so it's more a case of what settings we should have. ML did note that the

alternative might be to prevent non-synchronous generators from connecting but it was agreed that this was not necessarily the correct economic response, and certainly politically unattractive.

GM asked for clarification whether we were proposing a ROCOF ride-through withstand requirement just for those sets below 5MW or for all, MK replied that it would apply to all sizes of set.

CM asked if the questionnaire was for both frequency rise and drop to which MK responded that it was both. ML noted that the standards cover loss of load and loss of generation. MK concluded that any particular detailed points on the questionnaire should be raised with GS, with a view to publication in mid January.

**Action CM: Provide comments to GS**

**Action GS: Publish withstand questionnaire / consultation**

#### **4) Phase 1 update**

MK will circulate a summary of the DNO progress report re phase 1. ML noted that SSE has sent letters to all customers in England & Wales and the 5-10MW customers in Scotland. SSE had not previously written to >10MW in Scotland because they assumed that NG would normally have done this as they had contractual arrangements with them. This was not the case and SSE is trying to compose a letter to the 10-50MW customers, aiming for the New Year. There was a discussion around Grid Code compliance and the pre-2005 arrangements. MK suggested that SSE and NGET discuss the issue offline.

**Action MK: Circulate a summary of DNO phase 1 progress**

**Action GS/CM/ML: Confirm approach to generators in >5MW category with Loss of Mains protection but subject to Grid Code requirements**

#### **5) Phase 2 update**

##### **5a) University of Strathclyde (UoS)**

AD provided an update on the UoS research. MK had sent more data on LV to AD yesterday at a 1s resolution over a few days and advised that more is to follow. AD thinks it looks like a very good example. Previous data from AH appears to be from a site of >5MW. AD can't use the data unless he scales it down and assumes variability at lower level is of a similar nature. MK suggested that he goes back to AH to confirm. In terms of generator data, AD has nothing new to report. He has recorded PV data to 1s resolution on the unit on the UoS roof. He does also have some half-hourly wind data and asked if anyone had a chance to record output of generation? ML reminded AD that he has some 5s resolution data and AD felt it would still be useful. KB asked if AD had made any progress with his contacts but AD advised he needed to follow up with them. JW noted the possible WPD LCNF project data looking at domestic solar, called the 'Solar Bristol' project. JW will ask colleagues for a contact. MK thinks the contact is Roger Hey if not AH.

AD will forward the note to AH re 5MW data, cc MK and then MK will pass on to his WPD contacts to try and help further. MK advised that he would only be gathering LV data. AD thinks he has a good data set for 11kV from an example from a previous exercise (Bridgewater) which can be used.

However it would be good to have monitoring on an outgoing circuit. MK can provide this if nothing else is forthcoming.

**Action AD: Resend email to AH and cc MK re <5MW data requirements and MK will pass on to contacts at WPD for further help**

AD advised that the contract is now fully signed and the PNDC colleagues are fully working on it. They have followed a few leads with SMA and ABB and have all equipment required for DC supply for inverters. They also have 2 inverters from the lab in the interim period whilst waiting for others. They have a 3kW Polonius unit and 2.6kW SMA wind unit. They have done modelling on synchronous, induction and DFIG type generators and plan to do some injections on RoCoF in the New Year. AD noted that the Ecofys draft report was very interesting to see the contribution of various technologies. AD will speak to Ecofys offline to get some of the data behind the graphs. GS noted that AD is awaiting a lot of information and so how do we close off the last gaps. AD confirmed that he is able to make progress as he has set-up simulation cases software so new data can just be re-added/recalculated.

### 5b) Ecofys

KB and MD updated the working group on the Ecofys research. Ecofys would appreciate comments from the working group on what else may be needed as they feel that they have met the requirements.

MD ran through the first section of the draft report circulated to the group in advance of the meeting. The key messages were around the significance of solar PV which has the largest share of <5MW distributed generation as well as representing 99% of all units. There is a strong focus in England & Wales for small embedded generation and 65% of units are <50kW generators. KB noted that there is some ambiguity distinguishing wind <5MW due to defining what is a unit and what is a wind farm.

MK noted that as AD is the user of the data, he might have some questions. AD noted that the distribution graphs would be useful for him and he used similar in phase 1. If he could get access to the actual numbers behind figures 5&6 that'd be useful for the study. KB advised that only publically available data was used so should be fine to share. AD noted that he does not need to know site names or geographical distribution, just size distribution. KB suggested that they speak offline but that this will be fine. AD noted the comprehensive data on technologies. KB asked the working group if the geographical distribution reflects reality. MK felt it seemed sensible but suggested the group provide comments via email. KB then explained that in parallel to the database analysis, Ecofys had conversations with manufacturers with a special emphasis on PV (as more than 99% PV units). KB noted the good quantity of feedback relating to wind, some from CHP/Bio but that more information concerning hydro would be good. Manufacturers of wind/PV that are equipped with power electronic inverters are generally optimistic about their RoCoF withstand capability. Re synchronous generators, Ecofys learned that stronger RoCoF requirements have been practiced for small generators and that manufactures feel confident that they can comply with stronger requirements. The wind industry felt they could deal with 4Hz/s without a trip. CHP said 1Hz/s was feasible but there is a need to look more individually to certain manufacturers of certain plant. MD added that more interviews were planned but manufacturers had been done and protection requirements

would be explored in next few weeks. MK added that if Ecofys wanted to speak to Network Operators in GB, then this is best done through the WG.

**Action KB / MK: Ecofys to approach MK for help in contacting DNOs**

MK suggested that everyone take the opportunity to individually ask KB & MD questions on the draft report. AD started off the questions and suggested he'd like to see the underlying data. AD also wanted to know what the LoM techniques were for these types of technology but acknowledged there is a section that discusses this. He noted that RoCoF LoM was not used very much <5MW, except for CHP.

GS added that he too would like to see underlying data at the right time and would want to check the data fills all the gaps. GS suggested that AD's data for phase 1 is used to see we've got what we need.

JD asked if we could differentiate between RoCoF withstand and RoCoF protection and be clearer. CM asked about the testing of RoCoF withstand and if it was a physical test. AD advised that it was a simulation but physical testing on the inverter side. In modelling the generation, 2 different control techniques are used with 2 different representations of load. The worst case scenario is taken.

JW was also interested in seeing the underlying data. GM agreed that inverters were unlikely to be a problem but need to do the testing.

GS suggested that all comments are provided to Ecofys by 5<sup>th</sup> Jan such that they can be factored into their next update on the 22<sup>nd</sup> Jan. KB was happy with this and advised that Ecofys would aim to have a near final draft for the next meeting.

**Action All DNOs: Respond to KB questions in report by 5/1 (ensure cc SB)**

**Action KB: Resend updated report following the comments received by the WG**

## **6) Stakeholder engagement plan**

GS updated the group on initial discussions with Ecofys on a March 2015 workshop focussed on the current work on protection setting changes. This was considered to be sufficient time for Ecofys to complete their research and AD might have some initial findings as well. The intention is that it will be held in London and Ecofys will be there in a technical expert capacity, talking about their international experience and findings to date. Input from the working group would be expected nearer the time and GS can coordinate with key individuals offline.

There was a discussion around the national parameters as part of RfG. ML noted that a respondent to the Irish work highlighted the fact that 1Hz/s over the time period does not necessarily represent the worst case mechanical stress. Some machines might see much steeper RoCoFs and withstand capability must consider this. CM added that various scenarios are to be analysed.

**Action GS: Speak to EirGrid re circulation of Irish scenarios work if possible (Eoin Kennedy)**

## 7) Summary of actions / next steps

Name	Action	No.	By
KB	Send contact list from existing work to SB such that a list is ready for when the questionnaire is sent out	61	22/1
CM	Respond to GS with comments on the withstand questionnaire	62	22/1
GS	Publish withstand questionnaire / consultation	63	22/1
MK	Circulate a summary of DNO phase 1 progress	64	22/1
GS / CM / ML	Confirm approach to generators in >5MW category with Loss of Mains protection but subject to Grid Code requirements	65	22/1
AD	Resend email to AH and cc MK re <5MW data requirements and MK will pass on to contacts at WPD for further help	66	5/1
KB / MK	Ecofys to approach MK for help in contacting DNOs	67	12/1
All DNOs	Respond to KB questions in report by 5/1 (ensure cc SB)	68	5/1
KB	Resend updated report following the comments received by the WG	69	22/1
GS	Speak to EirGrid re circulation of Irish scenarios work if possible (Eoin Kennedy)	70	22/1

## 8) Date of next meeting

22<sup>nd</sup> January 2015. It was agreed that there would be value in having a face-to-face meeting in Manchester.

## 9) AOB

None.

**Attendees & Apologies****Attendees**

<b>Name</b>	<b>Initials</b>	<b>Company</b>
Mike Kay	MK	ENW (Chair)
Graham Stein	GS	National Grid (Alternative chair)
Scott Bannister	SB	National Grid (Technical Secretary)
Julian Wayne	JW	Ofgem
Adam Dyśko	AD	Uni. Strathclyde
Karsten Burges	KB	Ecofys
Michael Doering	MD	Ecofys
Joe Duddy	JD	RES
Greg Middleton	GM	Deep Sea Electronics
Martin Lee	ML	SSEPD
Miguel Bernardo (in lieu of KEB)	MB	UKPN
Campbell McDonald	CM	SSE Generation

**Apologies**

Andy Hood	AH	WPD
Mick Walbank	MW	Northern Powergrid
John Ruddock	JR	Deep Sea Electronics
Kevin Burt	KEB	UKPN
Alastair Martin	AM	Flexitricity
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
Matthew Penrose	MP	HSE
Lorna Short	LS	RWE