Minutes

Meeting name	Frequency changes during large system disturbances workgroup, phase 2 (GC0079)
Meeting number	31
Date	24 June 2015
Time	10.30 – 15.00
Location	Electricity North West Offices, Linley House, Dickinson Street, Manchester, M1 4LF (teleconference option also)

Future meeting dates

Meeting Number	Date
32	28th July 2015
33	25th August 2015

1) Introduction & apologies

2) Review of previous minutes from meeting 30

The workgroup approved the minutes from meeting 30.

JD noted the discussion in the previous meeting re inverter power output. Key minutes extract included for information:

"Re the second bullet on slide 4 (PV and modern wind inverter ride through) ML agreed but asked if the power output decreased as if so, the RoCoF would be much worse. He asked if when testing, the inverter continue to produce same rate of power. IA responded that one of the inverters he'd tested did reduce output during the RoCoF event (no power output for 1sec) and this was only for one inverter. ML noted that this might make the RoCoF event worse. ML will discuss further with IA and AD. KB highlighted two difficulties; whether it is representative of the whole population and not being able to test wind turbines due to size. Anything <5MW has no fault ride through. GS added that if we now identify emerging risks then we should recognise this in management of the system."

JD recommended that the workgroup should contact Lisa McMullan at EirGrid to investigate whether her work on Voltage Dip-Induced Frequency Dips in the Irish system can inform our response to the concerns raised by Martin in the minutes.

MK accepted this was probably in our ToRs but that we should confirm and took an action to do so.

Action GS / MK: Determine if the issue JD raised is within ToRs (establish if this should be discussed at next meeting)

3) Phase 1 update

MK circulated the latest phase 1 update from the last DCRP in early June 2015. He summarised that around a third of affected generators have complied with the changes; a third do not have RoCoF protection; and a third are still to be determined.

JD queried the reason for having two tables in the latest update (1 for <5MW and 1 showing sites connecting since 2010). MK advised that this was to highlight and explain the reasons for the discrepancy previously identified by JW. It was essentially found that this discrepancy was due to growth in connections over recent years. CM suggested this should be fully captured in the minutes such that when we extrapolate our figures for phase 2 we can justify them. GS noted that the complete dataset will be available in July (once SSE has provided updated data) and so this will allow us to give a good explanation of the discrepancy.

Action GS / MK: Document the reasons for phase 1 figure changes such that SB can record accurately in the minutes

4) Phase 2 update

4a) Ecofys

KB & MD were both in attendance to present the final Ecofys report. KB noted that despite this being the final report, they would be happy to provide thoughts until the work is complete. MD ran through the first section of the Ecofys slide pack (see GC0079 external website). MD noted that in establishing the <5MW data, they had to overcome some challenges but were happy that the final dataset was robust and representative of GB. MD added that there were three main aspects to their work. The first was to establish an inventory of DG; the second was around technology specific issues; and the third covered international experience.

MD explained how various databases had been assessed to create one final combined dataset. MD added that the only limitation of this dataset is that any sites not already captured in the various data sources will not be included in the final dataset; however MK considered this to be of low risk to our work. CM recommended making assumptions clear. MK noted that we need to be clear on the date where the accurate data collation ends and the extrapolation starts (for which we need to agree a method). This date was considered to be December 2013. GS noted the significant rise in PV since then is the key growth area and so we know where to look. It was suggested that Ecofys complete a brief cross-check of the FiT numbers to see how much PV has connected since Dec 2013, which KB was happy to do. AD felt that the Ecofys findings aligned with his studies. CM queried the numbers for Hydro at HV / LV but it was noted that the split was arbitrary and set at 300kW. There was a brief discussion round diesel generation, which has not been captured. It was agreed that a DNO dataset could be extrapolated if we wanted to include this to give a national view and present the worst case scenario.

KB then talked to the slides for technology specific issues and there was a discussion around “internal” (inbuilt RoCoF protection which might fulfil island detection or equipment protection

functions) versus “external” RoCoF protection (normally installed to provide island detection) and whether these settings might conflict with one another. It was agreed that it was worth re-visiting the group’s terms of reference so a clear view could be established on how best to address “internal” protection and other “withstand” requirements for existing generation. It was noted that we have some figures to quantify this scenario though. Fault ride through requirements and future and existing withstand requirements were also discussed in some detail. MK noted that it would be good to use the same assumptions as for setting changes as for phase 1.

Action KB: Complete a brief cross-check of the FiT numbers to see how much PV has connected since Dec 2013

Action SB: Find assumed costs for setting changes in phase 1

Action GS / MK: Re-visit the group’s ToRs to determine how best to address “internal” protection and other “withstand” requirements for existing generation

4b) PNDC / University of Strathclyde (UoS)

AD provided an update on his research (see slides on external GC0079 website). He also provided a short update on behalf of the PNDC. The PNDC latest findings were summarised by AD. Essentially islanding protection on the inverters subject to test works as expected and did not identify any islands during tests hence no NDZs were identified. There was one point of note which was that one inverter showed a decrease in power output at 0.7Hzs^{-1}. JD suggested discussing this with the inverter manufacturer to see if this is deliberate or a side effect. It was also noted that this may even be a faulty unit which should be checked. No issues were found at <0.5HZs^{-1} and given the inverter manufacturer does not have a big market share, the WG do not envisage this being a problem. The WG generally felt that the frequency traces were reasonable, and more reassuring than the previous results.

AD moved on to discuss UoS research. AD explained how he had resolved the issue which was identified at the last meeting, where simulations of small AC systems reached an unexpected stable state. The issue would seem to have arisen because of the artificially balanced load with lumped impedances in parallel, which meant that generation settled at a resonant frequency coincident with nominal. The Workgroup were comfortable with AD’s recommended revised approach which was demonstrated to give credible results.

AD updated on his on DG register following receipt of Scottish data. This has been averaged and he has identified an additional dominant group (DFIG on its own). Therefore he is now studying 6 dominants groups for GB. There was a discussion around the fourth possible islanding scenario for risk assessment. MK queried whether we actually need to study it.

There was a group discussion about the setting changes that would be proposed under phase 2. It was agreed that one credible approach was that 1.0Hzs^{-1} could be recommended for new plant and that 0.5Hzs^{-1} could be recommended for existing as we are aware of the costs to change. ML suggested that GS could establish a figure at which the SO would not expect to need to operate the

system above out to 2035 so that if possible we could recommend a higher limit for existing plant and potentially avoid making any changes again in the future. It was acknowledged that this was difficult for the SO. It was noted that we do not know if the existing <5MW generators could actually physically change to 1.0Hzs^{-1}. GM suggested that we could consult at this level and see what response we received.

Action AD: Discuss inverter power output decrease (at 0.7 Hzs^{-1}) with manufacturer to determine if deliberate

Action GS/MK: Reflect on the future changes we might wish to propose in the report and how these align with the WG ToRs

5) Review of actions (old & new)

SB updated on any open actions (please see action log for updates) and summarised new actions.

6) Future meeting arrangements (dates & locations)

AD advised he would not be able to attend the next meeting as he is on leave until 3 August. He advised that IA may be able to attend again from PNDC. It was suggested that we cover withstand in July.

28 July was agreed to be the next meeting date. There is a good chance that this might be a teleconference but SB will explore room options in Warwick / London.

25 August was agreed as the date for the following meeting.

Action SB: Establish locations of next two meetings & communicate to WG

7) AOB

It was noted that JW would be leaving Ofgem at the end of July and thus we should seek a replacement.

Action SB: Establish who from Ofgem will replace JW on the workgroup from August 2015

8) Summary of actions

WG Member	Action No.	Action	Due
GS / MK	119	Determine if the issue JD raised is within ToRs (establish if this should be discussed at next meeting)	28/7
GS / MK	120	Document the reasons for phase 1 figure changes such that SB can record accurately in the minutes	28/7
SB	121	Find assumed costs for setting changes in phase 1	28/7
GS / MK	122	Re-visit the group's ToRs to determine how best to address "internal" protection and other "withstand" requirements for existing generation	28/7
KB / MD	123	Consider WG comments from 25/6 and produce final report	14/7
GS / MK	124	Reflect on the future changes we might wish to propose in the report and how these align with the WG ToRs	28/7
SB	125	Establish locations of next two meetings & communicate to WG	14/7
SB	126	Establish who from Ofgem will replace JW on the workgroup from August 2015	14/7
KB	127	Complete a brief cross-check of the FiT numbers to see how much PV has connected since Dec 2013	25/8
AD	128	Discuss inverter power output decrease (at 0.7 Hzs^{-1}) with manufacturer to determine if deliberate	25/8

Attendees		
Name	**Initials**	**Company**
Mike Kay	MK	ENW (Chair)
Graham Stein	GS	National Grid (Alternative chair)
Scott Bannister	SB	National Grid (Technical Secretary)
Adam Dyśko	AD	Uni. Strathclyde
Karsten Burges / Michael Doering	KB / MD	Ecofys
Jacob Allinson	JA	RWE
Greg Middleton	GM	Deep Sea Electronics
Sam Turner	ST	Northern Powergrid
Martin Lee	ML	SSEPD
Ioannis Koutsokeras	IK	SP Energy Networks
Campbell McDonald	CM	SSE Generation
Joe Duddy (t-con)	JD	RES
Apologies		
Mick Walbank	MW	Northern Powergrid
John Ruddock	JR	Deep Sea Electronics
Julian Wayne	JW	Ofgem
Gareth Evans	GE	Ofgem
Alastair Martin	AM	Flexitricity
Paul Newton	PN	EON
John Turnbull	JT	EDF Energy
Ken Morton	KM	HSE
Andy Hood	AH	WPD
Lorna Short / Mick Chowns	LS / MC	RWE
Kevin Burt / Miguel Bernardo	KEB / MB	UKPN