

**Frequency Changes during Large System Disturbances Workgroup Meeting 14
22 January 2014
Electricity North West, Linley House, Dickinson Street, Manchester M1 4LF**

Attendees

Name	Initials	Company
Mike Kay	MK	Chairman
Robyn Jenkins	RJ	Technical Secretary
Graham Stein	GS	National Grid
John Knott	JK	SP Energy Networks
Julian Wayne	JW	Ofgem
Jane McArdle	JM	SSE Renewables
Martin Lee	ML	SSEPD
Joe Duddy	JD	RES
Andy Hood	AH	Western Power Distribution
John Ruddock	JR	Deep Sea Electronics
Greg Middleton	GM	Deep Sea Electronics
Alan Mason	AMas	Repower

Apologies

Name	Initials	Company
Mick Walbank	MW	Northern Powergrid
Adam Dyško	AD	Strathclyde University
Paul Newton	PN	EON
Gareth Evans	GE	Ofgem
John Turnbull	JT	EDF Energy
Campbell McDonald	CM	SSE Generation
Mick Chowns	MC	RWE
Alastair Martin	Amar	Flexitricity

Minutes of the last meeting

The Workgroup approved the minutes of meeting 13 subject to clarifying the discussion on allowing existing synchronous generators to specify a setting of 0.5 Hzs⁻¹. RJ noted that these would be published on the National Grid website following the meeting.

Review the Report to the Authority

GS indicated that clarity is needed over who the report is coming from. Presuming the report is submitted by licensees, the report will contain licensees recommendations and provide a record of workgroup recommendations and discussions. MK suggested that the report will come from the Distribution Licensees.

Other items which need addressing include (1) emphasising that the recommendations include a change to the Engineering Recommendation G59 as well as the Distribution Code, (2) explaining the timescales and (3) ensuring that the assessment is against the correct objectives.

GS explained that the assessment is currently against generic code objectives, but should probably be against the Distribution Code objectives. MK noted that the two sets of objectives are similar. He added that it is probably correct to assess the proposal against the Distribution Code Objectives, as the issue is caused by current Distribution Code wording. As the proposal is regarding an effect on the total system, someone could take the view that there should be text in the Grid Code, and then have a consequential change of the Distribution Code. JW suggested that leading this as a Grid Code change rather than Distribution Code change seems counter intuitive given that this modification is primarily affecting Distribution Code generators. JW queried whether any of the generators affected by this modification have to comply with the Grid Code. JD indicated that there are some Large Embedded Generators that have to comply with both the Distribution Code and the Grid Code.

The Workgroup discussed the details of the report by conducting a page turn exercise.

GS noted that a reference to the Engineering Recommendation needs to be made on the first page. MK added that he has not revisited the drafting for G59 yet as it will be a verbatim copy of the Distribution Code wording. JR noted that, in the Distribution Code, it is not immediately obvious that adhering to G59 is a legal requirement. MK agreed to add this to the list of housekeeping changes.

GS suggested that changes to the front page are needed. MK suggested stating Generators between 5 and 50MW as an affected party. JR asked what protection large generators have. MK noted that they tend to be connected at 132kV and they are more likely to have intertripping, plus they are more robustly connected. JW suggested this could be clarified by writing "distributed generators who use RoCoF protection".

GS explained that the executive summary and background sections contain a lot of the information from the Workgroup report. JD suggested that, as the report mentions the Workgroup, the Terms of Reference should be added as an annex. RJ agreed to include this.

JR suggested that the Actions Taken would be a better title for section 6.

MK questioned whether the Workgroup will be writing letters of response to the parties who responded to the Industry Consultation? GS suggested that a suitable alternative approach may be to publish a document containing all of the Consultation responses and the Workgroup's responses to them. JW stated that the Ofgem lawyers would like it if the original responses to the consultation could be added as an annex (this does not preclude the responses being presented in another form in the report). GS agreed that National Grid would draft these based on the discussions in the Workgroup, and the current section 5 of the report.

JR asked when a decision on the proposal can be expected. JW stated that Ofgem has 25 working days to assess the proposal but the clock stops if Ofgem decides to send the report back or conduct an impact assessment. JR noted that the longer the decision making takes, then the closer we get to April 16 which is the intended implementation date. MK noted that that the date can be changed to maintain the two year implementation period.

GS explained that paragraph 1.19 onwards of the Executive summary contains an outline of the consultation responses and the final few paragraphs are the licensees

recommendation and should summarise where we got to on 1Hz^{-1} with the carve out for existing synchronous generators. GM noted that these paragraphs agree with his understanding of the proposal but the legal text as drafted does not. JM noted that he would expect to see 0.5Hz^{-1} in every box, rather than a footnote explaining the exception. MK stated that can be changed. GS noted that this section aims to explain a summary of the discussions. ML suggested that part did not align with what the Workgroup agreed and it should be a 2016 implementation date in the case of a Generator who has already let a contract. JW noted that the table DPC7.4.3.4 may include an unnecessary line, and instead should have the line for generators commissioning on/after 2016, then one line above that says commissioned before 2016, with each split for synchronous and asynchronous generators. MK added that the notes in the table may need to change but the actual table may be correct. The Workgroup indicated that the proposal is that the 1 or 0.5Hz^{-1} setting must be implemented by 2016 whereas the second bottom line looks like they are also mandated up to 2016. GS noted that the table does need to include a transitional period. GM added that an explanatory note at the bottom saying generators should go to as high as a setting as possible as soon as possible would be ideal. JW noted that his recollection was for generators commissioning before 2016 they could specify something else as long as they were compliant by 2016. JM added that the Workgroup also discussed not forcing generators to revisit the setting so the table needs to be clear. AH noted that could be achieved using the explanatory notes below the table. MK indicated that he would rather put the desired setting in the table as that is what people will read and do.

ML queried whether there could be a scenario in the future, if we specify that 1Hz^{-1} is preferable, when a DNO says 1Hz^{-1} is preferable and insists the Generator does an assessment for that. AH noted that the table does not say that. GS suggested that National Grid would be happy with a box that says minimum setting of 0.5Hz^{-1} . GM added that DNOs must not be allowed to have an interpretation which says 1Hz^{-1} is preferable so generators must do that. MK agreed to redraft and circulate the legal text and asked the Workgroup members to provide input to that.

JR noted that there are still a number of references in the text to “measured over”, but it should be a delay. GS noted that this is because the report needs to be consistent with the Workgroup Report but we can put a footnote saying that the Workgroup support time delay where it originally said measured over.

Section 5 provides an overview of the Consultation responses received. JR suggested making it clear that the Workgroup have changed the proposal to 0.5Hz^{-1} for existing synchronous generators in response to some of the consultation comments. MK requested that, Workgroup members review the section and provide any comments

Section 6.

The Workgroup agreed that paragraphs a-h were consistent with discussions subject to some minor drafting issues.

JR asked whether we know the total connected capacity of synchronous generators. GS noted that it is contained within table 6. Table 6 is a summary of the information gathering exercise which the DNOs undertook. The data they collected shows there are a maximum of 146 sites which need a setting change of which a maximum of 114 are synchronous generators. JD indicated that the report needs to be more explicit on what the risk assessment is for - is it for the move to half a hertz or the risk of out

of phase reclosure? The Workgroup concluded that it is the risk of out of phase reclosure and GS agreed to make this clearer.

Table 7, uses the information from Table 6 and removes those sites that do not need to have a setting change. GS noted that following the narrative on implementation costs, there are two paragraphs for implementation timescales and it can be made clearer that the Workgroup are assuming 2 years after the implementation date. JW asked whether the 100k specified in Table 7 for the risk assessment includes the cost of the previous two steps. GS noted that it does not and the costs are additive.

The section also includes some short paragraphs on balancing services savings; GS noted that it will be worthwhile to put the material discussed in the Workgroup meeting into the annexes.

Table 8 summarises the best, central and worst Balancing Services cost scenarios, GS noted that the table stops at 2018/19 to fit on the page, but the full table will be included in an annex. JW noted that the 2017/18 total balancing services cost summary shows savings of 6m and then only 5m in 2018/19. GS noted that there is some variation in increase in costs in each year.

JR questioned who the cost is to and who makes the savings. MK noted that Generators will bear the costs and GB as a whole will make the savings. JW said that the savings would be realised via lower balancing costs. MK added that the decision over who pays is for a different forum the purpose of this group is to do the analysis and suggest the change. JM noted that it will be interesting to see what happens in Ireland. GM added that one decision could set a precedent for the other. AH questioned whether we need to say where the funding decision would be made. MK suggested that the Workgroup will struggle to say anything more. JW confirmed that Ofgem do not see it as an omission that the report to the Authority will not cover who should pay for the changes, as it was not in the terms of reference.

The Workgroup noted that paragraph 7.2 states "electrocution", and queried whether this is the correct terminology. AD suggested that this could be changed to something like "by contact with conductors".

GS noted that the impact and assessment section follows the Grid Code template and still needs a paragraph on impact to Distribution Networks. ML noted that this paragraph needs to be honest and say the risk has increased but its still within the acceptable range. MK agreed to support the drafting of this.

MK noted that it is worth checking whether Ofgem want anything more analytical for the assessment against greenhouse gases. JW agreed to check.

MK suggested that for the assessment against the EU objective, the effect is neutral, but we could also say it is consistent with RfG. JW suggested that neutral is fine.

ML asked whether the report needs a section for the transmission objectives? MK suggested that this was not necessary because there is no change to the Grid Code. GS added that if the Grid Code objectives are included, that section would have to come from National Grid not the distribution network licensees. JD queried whether the report has to come from the licensees or whether it could be from all licence holders. MK noted that there is no precedent for that. JW agreed to ask Ofgem colleagues for thoughts on that. GM asked how the licence holders will approve the report. MK noted that they are all Workgroup members and the DCRP will also approve it. MK added that he is working with the DNOs behind the scenes.

Development of Risk Assessment Guidance for Synchronous Generators

MK explained that the aim of this document is to provide guidance to Generators on what they will have to do, and they will not be able to do it without the DNOs help. MK added that he would like to attach this to the report to Ofgem and if this proposal is approved, the DNOs will have to write to affected parties and they will be able to include this.

JW asked whether this proposal is for 5-50MW Generators or greater than 5MW Generators. GS suggested that it is for any generator subject to the requirements of G59.

MK explained that to support the generators' risk assessments, the DNO will have to provide demand levels added that the DNOs can provide historic and a good estimation of future demand curve. JD asked whether there would be something obliging the DNOs to provide this when asked. MK noted that there is provision with the Distribution code for information to be provided when asked but it needs to be checked to ensure this information would be covered.

JR noted that paragraph 2 mentions a mismatch of up to 20% of but it is not clear what it relates to. MK explained that it depicts the typical generator running conditions and the potential islanded load but AD has suggested this might be nearer 30%. JR noted that when a generator is in fixed export, it is in KW control. AH indicated that provisions for that are in the first paragraph. GM noted that it is implied in the first paragraph but not specifically stated. AH agreed that the words could be made clearer. JR questioned how many sites are in fixed export. MK noted that the number is unknown and asked that, if the Workgroup have any suggestions for word improvements, they should feed them in.

JD queried whether the Workgroup should make any recommendation on what form the DNO could/should provide any information. MK noted that the Workgroup could do but they need to be mindful not to be too prescriptive. JR questioned whether the generator will need to know what other sources there are in the range. MK suggested that they may need to know but the assessment has assumed that there will not be any which should be the case for most synchronous generators.

MK noted that the DNO will need to be aware of where the islands are likely to form. JR questioned who will do the modelling. MK stated that it will be the generators responsibility as it is the generator's risk to manage. AH added that the DNO will provide the load information.

JR commented that, in G59, some of the settings relate to high impedance and low impedance, he also asked whether this is likely to change. MK noted that this concept has been superseded that a fixed Hzs⁻¹ has been recommended.

MK noted the need to be clearer on the demand profile requirements, as one hour granularity is likely to be inadequate, and instead need something akin to ADs specification. GS added that the resolution has an impact on the risk calculation. AM questioned what the sensitivity analysis refers to. MK suggested that it relates to measures such as increasing the dead time or other settings. JR asked whether intertripping is always an option. MK noted that intertripping and generator protection has been an issue for a long time. One DNO has insisted on intertrips for a long time because they did not believe in RoCoF. In this circumstance it would be the

generator asking for Intertrip, rather than the DNO insisting on it but it would be possible to redesign the intertripping scheme to manage the issue.

GS suggested that it would be useful to set out the non-exhaustive list of things a generator can do if their risk assessment concludes that mitigation is required.

MK commented that Ofgem would like some assurance that the Workgroup have appropriately reached out to everyone necessary. As most of the DNOs wrote out to the generators, it would be useful if they could provide that information for inclusion in the report.

Phase 2 Workplan

GS explained that page 28 of the report highlights the steps the Workgroup have completed and are yet to complete but should form part of phase 2.

GS added that the ENA are now in a position to commence Work Package 1 but needs to go through procurement exercise so it is like to be June/July before there are any results, meaning the risk assessments results are likely to be towards the end of the year. There needs to be some input from Workgroup members at the front end, probably over March to May.

GS noted that as a result there may be limited value in meeting in February. JD suggested that the Workgroup may also need to review whether the membership is correct and now the work involves looking a lot at smaller generators we may need more representation from that sector. JM asked how low the proposals will go. MK explained that, in theory, it could go lower than 1MW, but we do not know yet. GM noted that typical small inverters have phase lock loop and are fixed to current so they will trip on frequency limits meaning they should not be a problem.

JW queried whether it is worth splitting phase 2 to look at new generators and existing generators separately as new generators may be a quick win. ML noted that until the risk assessment is completed we do not know what the risk of changing the settings is.

AH added that the Workgroup also needs to look at development of withstand criteria which assumedly applies to all settings. MK noted that he needs to re-read RfG and check.

MK noted that in terms of work packages they are sufficient to go to the industry for proposals and if they are going to go to tender, that will be 4 weeks so we will not have any information by the February meeting. MK added that the Workgroup could use the time to think about what else we need to do and possibly have a presentation from an alternator manufacturer, as a Workgroup we also need to do some planning and prioritisation and but this could be done via teleconference rather than a physical meeting. JR noted that it would be easier to get an alternator manufacturer in March.