

Minutes of the Ninth Meeting of the ER P28 Joint GCRP and DCRP Working Group

21st April 2016

Held at the ENA, Dean Bradley House, 52 Horseferry Road, London, SW1P 2AF

1. Welcome, Introductions

GE welcomed everybody to the ninth meeting of the ER P28 Joint GCRP and DCRP Working Group (WG) to review the case and proposed scope of review of ENA Engineering Recommendation P28 Issue 1 Planning Limits for Voltage Fluctuations caused by Industrial, Commercial and Domestic Equipment in the UK (P28).

Attendance, apologies and absences were noted (see Appendix B for Attendance List including member initials).

2. Address by the Chair

GE thanked the WG members for their contributions and presented the agenda (see Appendix C for Agenda)

[Document reference: P28 WG_Paper_9_1_Agenda_P28 WG_Meeting 9_21.04.16_v0.1]

[Document Reference: Presentation_P28 WG_Meeting 9_21.04.16_v2]

In addition to the standard agenda items the purpose of the meeting was threefold:

- Review status of the Phase 3 Revision (section 5)
- Review sub-WG progress (section 6)
- Review Papers and Proposals from the WG (section 7)

There were no comments.

3. Update/Actions from Last Meeting

GE summarised the comments received from JD on the draft meeting minutes and actions from meeting no.8. It was agreed to add the following wording before Action 8.18: "JD provided feedback on P28 WG_Paper_8_9 on 26/2/16 including several comments on the summary and the body of the report proposing potential improvements and areas for further investigation".

[Document Reference: Slides 6-7 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

Subject to adding the agreed wording before Action 8.18 it was agreed the draft minutes were a fair and accurate account of the previous meeting and could be published in the public area of the DCode website without amendment.

[Document Reference: P28 WG_Paper_9_2_P28 Meeting Minutes and Actions_03.03.16_v0.1_Issued]

ACTION 9.1: Subject to amending wording before Action 8.18 publish the approved P28 minutes meeting no. 8 03.03.16 on the DCode website (GE)

GE presented an update on the actions from the last meeting.

[Document Reference: P28 WG_Paper_9_3_Update P28 Meeting Minutes and Actions]

GE noted the actions marked 'Complete' in the 'Due by' column had been completed and, where applicable, the number of the Paper was referenced. Only Actions 8.7, 8.10 and 8.13 were still in progress.

With respect to Action 8.4a, GE noted an email response had been received from David Spillett - Secretary of the DCRP on the 29/03/16 confirming that: *"the Phase 2 Review Report for ER P28 Issue 1 2016 - Recommendations for Revision was presented to the DCRP. There was no dissenting responses from the Panel. I therefore respond on behalf of the DCRP agreeing that a separate supporting engineering report will be beneficial in capturing background and explanatory information, including supporting justification for the changes in P28 Issue 2"*.

[Document Reference: Slide 9 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

JD recommended that the DCRP representative, who has been tasked with reviewing the application of the EU Network Codes to GB, be contacted with respect to advising any perceived impacts on revision of P28.

ACTION 9.2: Obtain response from DCRP representative with respect to the perceived impacts of the EU Network Codes on P28 (GE)

4. Terms of Reference (ToR)

[Document Reference: P28 WG_Paper_9_4_ER P28 WG_ToR_v2.2_Issued]

DCRP Paper CRP_16_01_05b concerning clarification of the ToRs for the P28 WG was discussed at the March 2016 meeting of the DCRP. GE noted an email response had been received from David Spillett - Secretary of the DCRP on the 29/03/16 confirming that: *"With regards to the second paper that was submitted on behalf of the P28 Working Group where the working group was seeking views from the Panel on whether assessments and/or emission limits related to voltage fluctuation in the proposed revision of ER P28 should apply to network operators and not just customer connections. Following discussions the Panel agreed with the working group's view that P28 remains a customer facing document and recommends that the working group continues and completes its work on that basis"*.

[Document Reference: Slide 10 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

5. Status of Phase 3 Revision

GE briefly highlighted the status of the Phase 3 Revision noting the current stage was preparation of the 1st Draft. GE stated that completion of a 1st Draft of P28 Issue 2 by the beginning of June was ambitious. Notwithstanding, the WG did not raise any concerns about the project plan at this stage.

[Document Reference: Slide 13 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

6. Reports from sub-WGs

6.1 Flicker Assessment & Limits sub-WG

DV presented an update on the progress made by the Flicker Assessment & Limits sub-WG [Document Reference: P28 WG_Paper_9_21_Draft Minutes of Meeting Flicker sub-WG]

The current thoughts of the sub-WG were as follows:

- Effect of transfer co-efficients on planning levels
 - The sub-WG has prepared a spreadsheet to show the effects of transfer co-efficients on planning levels through various system voltage levels

- The application of transfer coefficients does not appear to work unless alpha of 4 is used, at least when considering flicker transferred from different voltages suggesting that there could be more diversity in flicker sources (when considering different voltage levels) than under standard assumptions when $\alpha=3$ is used.
- The assessment of transfer coefficients and their effect on planning levels is deemed useful for the accompanying report, if not for P28
- P28 Flowchart & Stage 1, 2 & 3 Assessment Process
 - The sub-WG has prepared a provisional process map showing the application of the Stage 1, Stage 2 and Stage 3 Assessment Process
 - A Stage 3 hybrid approach of headroom allocation for transmission systems and granting of full planning level for distribution networks may be a possible solution but requires careful consideration

A summary of the issues raised by the sub-WG and discussion in the meeting were as follows:

- There is no evidence that flicker emissions are approaching anywhere near planning levels. Could the flicker exponent being too pessimistic account for this (i.e. $\alpha = 3$ as opposed to $\alpha = 4$) (AH)?
- It appeared that the standard transfer co-efficients in PD/IEC TR 61000-3-7 could be applied
- The possibility of transferring flicker from an LV disturbing load to MV and back to other customers at LV was highlighted (KL)
- It would be beneficial to include some additional information to capture requirements of the assessment process, in particular for heat pumps based on the ENA heat pump connection forms
- FG commented that it would be possible to obtain some simultaneous flicker measurements at different voltage levels for a disturbing load connected at 275 kV in the South-West of England
- AH stated that the EV manufacturing industry has issued a statement, which raises concerns about the size of loads to be connected to LV systems. The WG agreed a watching brief should be maintained across the area of EV connections

ACTION 9.3: Arrange to carry out simultaneous flicker measurements over a period for a disturbing load at 275 kV in the South-West of England (FG/AH)

ACTION 9.4: Follow up with DC what data can be obtained in relation to Action 8.10 (GE)

ACTION 9.5: Send updated draft minutes of last meeting of Flicker sub-WG to GE for circulation (DV)

ACTION 9.6: Circulate latest P28 Issue 2 draft to Flicker sub-WG to assist with drafting section on Stage 1 assessment (GE)

6.2 Voltage Step Change sub-WG

RB presented an update on the progress made by the Voltage Step Change sub-WG [Document ref: P28 WG_Paper_9_11_160415 - Voltage Step Change Definition]

A summary of the issues raised by the sub-WG and discussion in the meeting were as follows:

- The G59 definition of step voltage change has been considered
- Two options exist for defining step voltage change (time based or voltage gradient based)

- JD stated the voltage gradient option had the advantage of defining the start of an event
- A sliding 1 s time window requires more work to establish steady state conditions. FG commented that 'off-the-shelf' power quality measuring instruments in accordance with IEC 61000-4-40 can measure rate of change of voltage over a sliding 1 second window
- The SVC sub-WG agreed to summarise the pros and cons of both options (time based and voltage gradient based) for defining step voltage change and to make a recommendation to the main WG
- The WG discussed the relative pros and cons of defining step voltage change limits as a percentage of system nominal voltage or pre-event voltage
 - One view expressed was it should be as a percentage of nominal voltage as this is easier to calculate
 - The SVC sub-WG agreed to make a recommendation on whether step voltage change limits should be based on percentage change from nominal system voltage or pre-event voltage following a review of ETR 125 and IEC 61000-2-8
- FG commented that GC0076 does not refer to step voltage change and that the impact on transmission systems would need to be considered. For the time being the proposal should relate to distribution system disturbances only
- SM pointed out that there does not appear to be an issue with the current understanding and application of step voltage change in ER P28 Issue 1, which should be borne in mind
- The origin of the 3% step voltage change limit was raised and the linkage with flicker limits. The WG agreed to consider the rationale for the 3% step voltage change limit and how this aligns with Figure 4 of ER P28 Issue 1

ACTION 9.7: Summarise the pros and cons of both options (time based and voltage gradient based) for defining step voltage change and to make a recommendation to the main WG (RB)

ACTION 9.8: Recommend whether step voltage change limit should be a percentage of nominal system voltage or pre-event voltage (RB)

ACTION 9.9: Establish why there is a 3% limit for step voltage change between steady state conditions - where does it come from and how does it align with Figure 4 of ER P28 Issue 1? (DV)

Action 9.10: Review ETR 125 for nominal voltages / pre event values / sensitivity to change and IEC Standard 61000-2-8 (SVC sub-WG)

6.3 Rapid Voltage Change sub-WG

MH presented a revised summary of proposals for RVC, which included voltage swells.
[Document Reference: P28 WG_Paper_9_12_P28 RVC]

ACTION 9.11: Upload updated version of RVC sub-WG Paper 9_12 PowerPoint presentation (includes useful notes not contained in PDF version) onto P28 WG website (GE)

A summary of the issues raised by the sub-WG and discussion in the meeting were as follows.

- Remanence is based on 0.5 pu - considered to be more realistic in accordance with CIGRE work. FG confirmed that relevant Papers by National Grid consider 0.5 pu as

a worst case. AH and FG believe there is no technical evidence to support different remanence values for different types of transformer (e.g. cast resin). PTh commented that energisation data for modern cast resin transformers supports this view, where inrush currents are lower than traditional transformers

- A probabilistic approach as opposed to worst case has been taken
- MH/FG confirmed that the RVC envelopes are compatible with G59 Stage 1 & 2 protection settings and that the original paper on RVC by Simon Scarbro has been considered
- KL asked what customer events would have a 10% voltage dip after 2 s. MH confirmed that although this condition would fall within the RVC envelope, in practice such a condition was extremely rare given the exponential characteristic of RVCs
- AH noted that G59 protection settings would need to be reviewed in light of any reduction in the lower statutory voltage limit for LV, which would trigger a review of the RVC envelopes
- FG confirm that energisation of transformers had been considered at a pre-event voltage of 90%
- DV comment that Figure 4 in P28 Issue 1 does not follow the IEC flicker curve. The frequency of dip is dependent upon frequency of events and that a simplistic approach of 3% dip not less than every 600 s should be considered. The RVC sub-WG agreed to consider switching times for frequent events and to comply with the IEC flicker curve if required
- MH confirmed that the RVC envelopes were absolute and variation outside the envelopes are not permitted in any circumstance
- FG confirmed that a worst case switching angle for energisation had been assumed and that the envelopes only applied to normal planned switching. In the event that the results are marginal compared with the envelope then more realistic switching angles can be considered. DV stated that the effects depend on the type of earthing system (e.g. solidly earthed) and P28 Issue 2 will need to spell this out.
- Voltage swells were discussed
 - Envelopes for voltage swells would need to be proposed in light of further research work required
 - The main causes of voltage swells were considered to be capacitor bank switching
 - The considerations for setting voltage swell limits were briefly discussed including: primary equipment insulation levels, rise of earth potential values, Grid Code limits (i.e. 5% overvoltage for 0.5 s)

ACTION 9.12: Update WPD briefing paper on RVC in light of RVC sub-WG proposals (SSc)

ACTION 9.13: Send voltage swell considerations to GE by 12.05.16 (All)

ACTION 9.14: Contact ENA Earthing Standards Group Coordinator for ETR 129 - Rise of Earth Potential Report (GE)

6.4 Measurements & Specific Applications sub-WG

PTh presented a summary of wind turbine flicker and transformer mag inrush data compiled from commissioning of various types and sizes of wind turbine connected to 11 kV and 33 kV systems at various locations in the UK.

[Document Reference: P28 WG_Paper_9_9_P28-PGT-Flicker]

[Document Reference: P28 WG_Paper_9_10_P28-PGT-Inrush]

[Document Reference: P28 WG_Paper_9_20_Wind Farm Tx Mag Inrush Data]

Conclusions from the data are summarised in Document Reference: Slides 28 to 34 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

A summary of the issues raised by the sub-WG and discussion in the meeting were as follows:

- The flicker data indicates that background levels ($P_{st} > 0.3$) dominate wind turbine flicker
- Flicker from wind turbines appears to have a marginal negative effect on flicker emissions at the PCC
- In some cases, the connection of wind turbines with the latest technology may reduce flicker severity - due to locally raising the system fault level
- Actual transformer mag inrush currents were found to be considerably lower than those shown in curves issued by the manufacturers. Overly pessimistic results will be obtained if peak current is used directly in transformer inrush calculations. Also the curves produced by manufacturers are based on a remanence of 0.8 pu and worst case switching angle
- Transformer inrush appears to be generally lower for transformers that comply with the new version of BS EN 50464-1, which has introduced lower fixed iron losses
- Measurement of actual flicker and voltage dips after connection is beneficial in validating calculations and modelling

KL presented an updated spreadsheet containing mean average P_{st} and P_{lt} measurements for sites in Merseyside and North Wales and Scotland to include 11 kV primary substation measurements. A slide showing flicker P_{st} pre- and post-solar farm connection at Ruabon was presented.

[Document Reference: P28 WG_Paper_9_18_KL flicker at sites without site names 20.04.2016]

[Document Reference: P28 WG_Paper_9_19_Ruabon Pre and post solar connection 99 and 95 percentile]

In summary:

- It would appear that solar farms increase flicker levels at 11 kV - more data is required to confirm this
- The flicker P_{st} data from the solar farm at Ruabon indicates:
 - a significant increase in background flicker post-solar farm connection
 - the increase in the value of the 99th percentile is considerably higher than the 95th percentile - suggesting that significant variations may be excluded from the 95th percentile of measurements
- Care needs to be taken to flag and omit abnormal voltage events from measurements to understand the actual contribution to flicker background levels

AH highlighted that high background flicker levels can occur at 11 kV in WPD's network.

The WG agreed there would be benefit in obtaining flicker background measurements from other network operators to see what trends and conclusions can be drawn. Notwithstanding, KL highlighted obtaining historical flicker data at LV locations would be difficult because flicker is rarely measured at the same location.

ACTION 9.15: Contact transformer manufacturers to clarify how magnetic inrush is impacted by new transformer designs (GE)

ACTION 9.16: Upload PTh spreadsheet of wind turbine flicker data and KL spreadsheet of P_{st} flicker background levels onto the P28 WG website and circulate additional papers received (GE)

ACTION 9.17: Contact Jim Cardwell Northern Powergrid for a copy of LCNI smart grid presentation on EVs (GE)

ACTION 9.18: Network operators to compile background flicker data (Pst - 95th percentile) from sites with monitoring over the last few years to determine trends and draw conclusions (Network Operators)

6.5 Drafting sub-WG

GJE presented a summary of progress made by the Drafting sub-WG

[Document Reference: Slide 35 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

- Progress continues to be made with general non-technical aspects
 - Section 3 Terms & Definitions being developed
 - Comments on the preliminary draft being incorporated
- Technical aspects
 - Section 5 'Compatibility & Planning Levels' – general requirements being developed
 - Section 6 'Assessment' – Operating conditions for assessment being drafted
 - Some work being carried out on Measurements or Specific Applications (with respect to including relevant aspects from P28 Issue 1)

The WG had no particular comments.

7. Review Papers and Proposals from WG

Responses to Action 8.18 (Paper 9-5 & Paper 9-7)

GE presented Paper 9_5 and the conclusions drawn from WG member responses to the support for an allocation method approach.

[Document Reference: Slide 37-38 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

[Document Reference: Slide 41 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

A member of the WG highlighted that a form of allocation was already part of the Stage 1 and Stage 2 assessment process in P28 Issue 1.

The support for a hybrid approach at transmission levels and where there is competition for capacity was discussed:

- MH commented that a hybrid approach may be unfair to new customers to be connected at transmission levels who are required to be allocated headroom. This assumes that another connectee will come along afterwards and require connection
- FG commented that an allocation method was more appropriate to distribution networks, where background levels are higher and there is a greater possibility that planning levels will be exceeded. FG also commented that both IEC 61000-3-13 and IEC 61000-3-7 advocated an allocation approach. Retaining the current 'first come first served' approach would be contrary to this
- There was no consensus in the meeting about whether an allocation of headroom approach should be adopted. It was agreed that GE would prepare paper to highlight the circumstances where an allocation approach could be considered for Stage 3 assessment

ACTION 9.19: Prepare paper to highlight the scenarios where an allocation approach could be considered for Stage 3 assessment at different voltage levels (GE)

Responses to Paper 9-6 (Issues with Planning Levels)

GE presented Paper 9_6 and the conclusions drawn from WG member responses to the issues with current planning levels.

[Document Reference: Slide 39-40 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

The merits of restricting assessment of LV flicker emission to Stage 1 and Stage 2 were highlighted. This would mitigate the possibility of planning levels being exceeded and voltage complaints being received (AH).

JD pointed out that there should be a clear argument and justification for omitting Stage 3 assessments for LV connections. PTw stated one justification would be the high volumes of potentially disturbing equipment to the LV network and the need to focus on compliance with product standards.

Paper 9-8 (Alpha Values - Exponent in Flicker Summation Law)

GE briefly presented conclusion from Paper 9_8 with respect to exponents in flicker summation law.

[Document Reference: Slide 42-46 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

The WG had no particular comments.

ACTION 9.20: Check Paper 9_8 against IEC 61400-21 (JD)

Paper 9-16 Modifications to the Grid Code in Ireland

[Document Reference: Slide 47 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

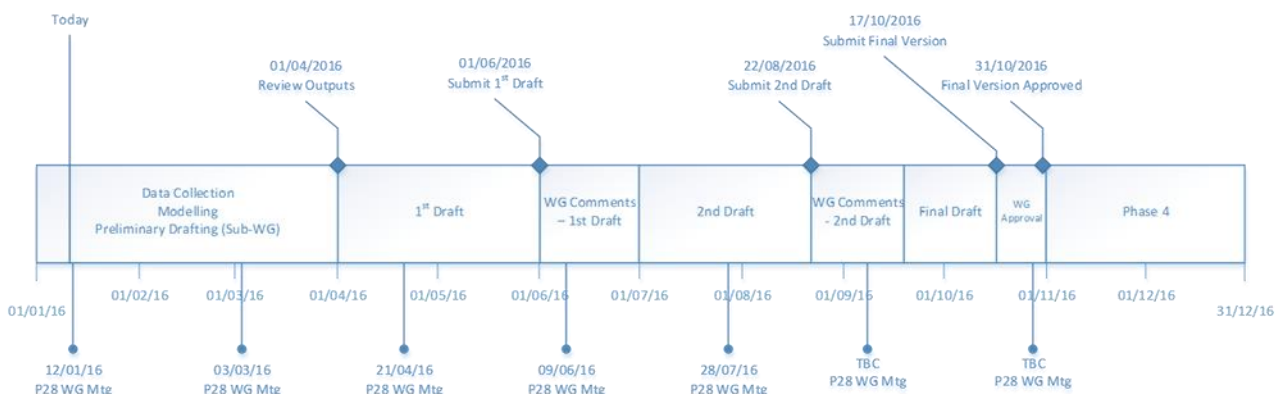
Due to time constraints there was insufficient time to discuss Paper 9_16. The WG agreed individual members should review and advise GE of any comments before the next WG meeting.

ACTION 9.21: Individual members to review and comment on Paper 9_16 (EirGrid Grid Code Changes) before the next WG meeting (All)

8. Project Plan

[Document Reference: P28 WG_Paper_7_6_ENA_EREC_P28_Ph3_Project Plan_v0.1]

No changes had been made since the last meeting. The P28 WG agreed Phase 3 was still running to plan.



- The deadline for the data collection, modelling and preliminary drafting of the sub-WG outputs is 1st April 2016

- The final version of the Phase 3 Revision document should be approved by P28 WG 31st October 2016
- The final Phase 4 Acceptance & Adoption is due to commence thereafter

9. General Management/Administration

Arrangements for general management and administration had not changed since the previous meeting.

10. AOB

Status of ENA ER P2 Review/Revision

JD presented a summary of the ENA ER P2 review/revision project and its current status. This was based on material presented at the recent P2 Stakeholder Engagement Workshop on the 9th March. In summary, no clear 'N-1' scenarios may exist for revision of P28 and G5.

[Document Reference: P28 WG_Paper_9_22_P2 presentation to P28 WG]

The WG briefly discussed the high level options for reform and the likely timeframes for completion. GE pointed out that the timeframes for completion of the P2 project were likely to be considerably longer than those of P28. Given the timeframes and uncertainty of the nature of revision of P2, GE asked the WG to consider whether it is appropriate P2 is referenced in P28 Issue 2.

ACTION 9.22: Consider whether it is appropriate P2 is referenced in P28 Issue 2 and, if not, how should security of supply standards be addressed? (GE)

Update on Membership

GE provided an update on P28 WG membership matters

[Document Reference: Slide 51 in Presentation_P28 WG_Meeting 9_21.04.16_v2]

In summary:

- Nicola Waters, Primrose Solar has been nominated as a sitting member of the P28 WG. No objections to this nomination were raised and Nicola Waters would be included on relevant correspondence and invited to the next meeting of the P28 WG
- Gareth Evans left OFGEM on the 31.03.16 and has ceased to be a member of the P28 WG. MB confirmed he would be the sole Ofgem representative on the P28 WG for the time being

Competition Act Compliance

The WG noted ENA requirements for compliance with the Competition Act, which had been emailed to the WG with the agenda for the meeting.

No other business was raised by members of the WG.

11. Date and Venue for Future Meetings

The following dates have been proposed for future meetings:

- 9th June 2016
- 28th July 2016
- 8th September 2016

- **26th October 2016**

The WG were asked to note the change to the October 2016 meeting date. This meeting will now be held on the 26th October 2016. No objections were received from the WG.

The venue for P28 WG meetings in 2016 is:
Energy Networks Association, 6th Floor Dean Bradley House, 52 Horseferry Road,
London SW1P 2AF

Appendix A

ER P28 Joint GCRP & DCRP Working Group Meeting No.8

Summary of Actions from Current Meeting

Item	Action	Who	Due by
9.1	Subject to amending wording before Action 8.18 publish the approved P28 minutes meeting no. 8 03.03.16 on the DCode website	GE	
9.2	Obtain response from DCRP representative with respect to the perceived impacts of the EU Network Codes on P28	GE	
9.3	Arrange to carry out simultaneous flicker measurements over a period for a disturbing load at 275 kV in the South-West of England	FG/AH	
9.4	Follow up with DC what data can be obtained in relation to Action 8.10	GE	
9.5	Send updated draft minutes of last meeting of Flicker sub-WG to GE for circulation	DV	
9.6	Circulate latest P28 Issue 2 draft to Flicker sub-WG to assist with drafting section on Stage 1 assessment	GE	
9.7	Summarise the pros and cons of both options (time based and voltage gradient based) for defining step voltage change and to make a recommendation to the main WG	RB	
9.8	Recommend whether step voltage change limit should be a percentage of nominal system voltage or pre-event voltage	RB	
9.9	Establish why there is a 3% limit for step voltage change between steady state conditions - where does it come from and how does it align with Figure 4 of ER P28 Issue 1?	DV	
9.10	Review ETR 125 for nominal voltages / pre event values / sensitivity to change and IEC Standard 61000-2-8	SVC sub-WG	
9.11	Upload updated version of RVC sub-WG Paper 9_12 PowerPoint presentation (includes useful notes not contained in PDF version) onto P28 WG website	GE	
9.12	Update WPD briefing paper on RVC in light of RVC sub-WG proposals	SSc	
9.13	Send voltage swell considerations to GE by 12.05.16	All	
9.14	Contact ENA Earthing Standards Group Coordinator for ETR 129 - Rise of Earth Potential Report	GE	
9.15	Contact transformer manufacturers to clarify how magnetic inrush is impacted by new transformer designs	GE	
9.16	Upload PTh spreadsheet of wind turbine flicker data and KL spreadsheet of Pst flicker background levels onto the P28 WG website and circulate additional papers received	GE	
9.17	Contact Jim Cardwell Northern Powergrid for a copy of LCNI smart grid presentation	GE	
9.18	Network operators to compile background flicker data (Pst - 95th percentile) from sites with monitoring over the last few years to determine trends and draw conclusions	Network Operators	
9.19	Prepare paper to highlight the scenarios where an allocation approach could be considered for Stage 3 assessment at different voltage levels (GE)	GE	
9.20	Check Paper 9_8 against IEC 61400-21	JD	
9.21	Individual members to review and comment on Paper 9_16 (EirGrid Grid Code Changes) before the next WG meeting	All	

Item	Action	Who	Due by
9.22	Consider whether it is appropriate P2 is referenced in P28 Issue 2 and, if not, how should security of supply standards be addressed?	GE	

Summary of Outstanding Actions from Previous Meetings

Item	Action	Who	Due by
8.7	Advise what measurement data/analysis is required from Network Operators to support recommendations from Flicker sub-WG and email ENA PQ&EMC Group	DV/ GJE	In Progress
8.10	PQ&EMC Group to advise what data/analysis can be provided by Network Operators in response to Item 8.7	DC	In progress
7.3	WG members to advise justifications why existing Stage 1 Assessment is not acceptable	All	In Progress
7.18	Obtain the latest developments on connections by EV manufacturers	PTh	In Progress
7.28	Obtain information on the different allocation methodologies that other countries use and forward to DV/GE	All	In Progress
7.29	Measurement & Specific Applications sub-WG to consider problem with defining flicker & harmonics when not in generating conditions	PTh	In Progress
6.12	Find out the high level cost of Stage 3 Assessment	GE	In Progress
5.8	Ask ENA what the formal mechanism is for obtaining access to data that has been gathered	GE	In Progress
4.14	Ask person who responded to Briefing Paper 1 regarding possible relaxation of planning limits for 'weak' networks with "hydro connections" to provide clarification of technical issue and more detail on flicker/RVC caused by these connections	GE	In Progress

Summary of Completed Actions in Current Meeting

Item	Action	Who	Due by
7.15	Consider different technologies and how to treat them in the Phase 2 Report (e.g. equipment with different alpha values)	GE/DV	Complete - See Paper 9_8
8.1	Publish the approved minutes P28 meeting no.7 12.01.16 on the DCode website	GE	Complete
8.1a	Prepare a Paper on application of alpha values to new technologies	GE/DV	See Paper_9_8
8.2	Upload flicker data for various wind farm connections and provide analysis	PTh	Complete - see Paper_9_9 & Paper_9_10
8.3	Forward comments on draft DCRP Paper	SSc	Complete
8.4	Address comments on draft DCRP and resubmit to David Spillett	GE	Complete
8.4a	Raise requirement for a technical report to support P28 Issue 2 with the Secretary of the DCRP	GE	Complete - see email 29.03.16
8.5	Email DV notes on product standards referenced in previous SSc paper	SSc	Complete
8.6	Provide Flicker sub-WG with original ENA ERs including ACE 7 referred to in P28 Issue 1	GE	Complete

8.8	Provide DV with information on Flickermeter measurement flagging concept and recommendations for measurement probability and periods	FG	Complete
8.9	Provide copy of IEC 61000-4-15 to Measurements sub-WG	GE	Complete - email sent on 25/03/16
8.11	RVC sub-WG to consider limits for voltage swell	FG/MH	Complete mail sent on 12/04/16
8.12	Amend proposals from RVC sub-WG to provide clarity on limits for 'energisation 4 times per month', whether voltages are line voltage or phase voltages etc.	MH	Complete - see Paper_9_12
8.13	Provide SPEN flicker data for 11 kV sites	KL	Completed in meeting see Paper_9_18
8.13 a	Circulate flicker values for 132 kV, 275 kV & 400 kV sites previously provided by National Grid	GE	Complete - see Paper 9_14
8.14	Circulate Paper and definition of steady state voltage to P28 WG provided by FG	GE	Complete - see Paper 8_16
8.15	Provide any relevant references, papers and supporting information to support Flicker sub-WG work	All	See comments from SSc
8.16	Resend invitations for future P28 WG meetings to MH	MJC	Complete
8.17	Circulate latest draft of EREC P28 Issue 2	GE	Complete
8.18	Provide comments on P28 WG_Paper_8_9 and indicate whether you support: 1) retaining current 'first come first served' approach or 2) adopting an allocation method approach or 3) a hybrid approach	All	Complete - see Paper_9_5

Appendix B

ER P28 Joint GCRP & DCRP Working Group Meeting No.9

Attendance List

21st April 2016 ENA Office, London

Attendees:

Name	Initials	Company
Roshan Bhattarai	RB	Northern Powergrid
Adrian Ellis	AE	SSE
Forooz Ghassemi	FG	National Grid
Andrew Hood	AH	WPD
Mark Horrocks	MH	HVMS
Peter Johnston	PJ	NIE
Ken Lennon	KL	SP Energy Networks
Steve Mould	SM	UKPN
Peter Twomey	PTw	ENW
Davor Vujatovic	DV	VandA Engineering Services
Peter Thomas	PTh	Nordex
Matthew Ball	MB	OFGEM
Mark Kilcullen	MK	Department of Energy & Climate Change
Joe Duddy	JD	RES Group
Gary Eastwood	GE	Threepwood Consulting Ltd
Michelle Chambers	MJC	Threepwood Consulting Ltd

Apologies:

Tony Headley	THe	BEAMA
Sridhar Sahukari	SS	Energy UK
David Crawley	DC	ENA

Absences:

Gareth Evans		Left Ofgem 31.03.16
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Appendix C

ER P28 Joint GCRP & DCRP Working Group Meeting No.9 Thursday 21st April 2016, 10:30 – 15:30

Agenda

1.	Welcome, introductions	GJE	10:30
2.	Address by the Chair	GJE	
3.	Update/actions from last meeting	GJE/ALL	
4.	Terms of Reference (ToR)	GJE/ALL	
5.	Status of Phase 3 Revision	GJE/ALL	
6.	Reports from sub-WGs <ul style="list-style-type: none">• Progress• Issues for discussion with Main WG	GJE/ALL	
7.	Review Papers and Proposals from WG	ALL	
8.	Project plan	GJE	
9.	General management/administration <ul style="list-style-type: none">• On-line repository requirements• Consultation process• Support requirements	GJE	
10.	AOB <ul style="list-style-type: none">• Update on membership• Impacts of ENA ER P2 revision	ALL	
11.	Future meetings <ul style="list-style-type: none">• Dates<ul style="list-style-type: none">• Proposed change to October date• Agenda items		15:30