ANNEX 6

	Consultation Question	AMPS	EDF	NPG	SPEN	WPD	SSE Generation
Q1	(i) Do you believe that GC0079 better facilitates the appropriate Distribution Code objectives? If not, why do they fail to do so?	No comments to all questions	Yes	Yes	Yes	Yes	Yes
Q2	(ii) Do you support the proposal to exclude VS protection technique as loss of main protection for new embedded generators? Please clarify why.		Yes Analysis carried out by the workgroup suggests that the risk of inadvertent operation of VS protection during a transmission system fault is significant yet the risk of VS protection being unable to detect genuine islanding events remains high.	Yes The research evidence is that VS is not an effective form of Loss of Mains protection and that RoCoF protection is a more effective technique for detecting islanded distribution networks.	Yes based on the evidence from the work group the continued use of the VS technique poses significant additional risks to the operation of the GB Transmission System. It has also shown to be relatively ineffective at detecting islanded situations and therefore its use should be promoted as an acceptable means of LOM going forward.	Yes Studies and our experience have shown that vector shift protection is relatively insensitive to generator islanding (particularly for synchronous generators) and very sensitive to local faults. These characteristics make vector shift protection un-suitable for loss of mains protection, going forward.	Yes. VS has been shown to be susceptible to wider area faults yet increasing the trip threshold decreases its effectiveness. Moving to ROCOF only would greatly reduce the risk of embedded generation tripping whilst only marginally increasing the risk from out of phase reclosing.
Q3	(iii) Do you support the proposed change in RoCoF to setting 1Hzs 1 with a delay of 500ms for distributed generators below 5MW? Please clarify why.		Yes The National Grid SOF and SNAPS documents detail the requirement for National Grid to maintain a 0.125 Hz/sec rate of change of frequency (RoCoF) maximum Operational Limit. In the event of an infeed loss, this Operational Limit prevents tripping of a significant portion of the estimated 5GW of embedded generators with Loss of Mains relays set at this limit The proposed change will mean that there is no future significant increase in the capacity of generation that would trip on a 0.125Hz/sec RoCoF event, over and above the currently estimated 5GW.	Whilst adopting the proposed RoCoF settings will increase the relative risks compared to the existing RoCoF settings, we agree with the workgroups view that the absolute risks are much lower than those implied in the University of Strathclyde work. We recognise that the workgroup has taken a pragmatic view to balance the increase in risks against the financial implications of managing the transmission system to avoid widespread inadvertent tripping of distributed generation. (Yes)	Yes – due to the increasing proportion of generating units falling into this category, and the potential cumulative effect of these units tripping in unison it is important that similar protection settings to those 5MW and above are adopted. This also lessens any perceived discrimination in treatment between generators of differing sizes.	Yes These less sensitive settings will help to mitigate against the reduction in system inertia and associated increase in the rate of change of frequency experienced during sudden changes in load (e.g. loss of generation etc.)	Yes
Q4	(iv) Do the proposed changes facilitate efficient connection and operation of distributed generators? If not, why do they fail to do so?		Yes the proposed changes mitigate the risk of spurious tripping of the generators	The proposals form part of a package of measures related to Loss of Mains protection that will help NGET System Operator efficiently manage the operation of the transmission system. We agree that, given the increased knowledge of the behaviour of VS protection, it is reasonable to prohibit the application of VS protection to new distributed generation plant as soon as possible. The proposals, by avoiding inadvertent protection operation, should facilitate the operation of distributed generators. The proposals, particularly Option 1, should not have any financial implications for the connection of distributed generators.	By specifying the requirements applicable to generators connecting to the system, then these changes facilitate the connection and operation of distributed generators (interpreted as yes)	Yes	Yes
Q5	(v) Do you agree with the workgroup's recommended Option 2 of applying the changes to all embedded generators including type tested generating units and why?		Yes This will mitigate the risk that type tested generators, connecting to the system in the future, could present a significant additional capacity of plant at risk of trip.	The costs and timescales for all manufacturers of type tested generating plant to re test their equipment and use all stocks of existing equipment by February 2018 is uncertain at the moment. If manufacturers believe that it is practical and reasonable to implement Option 2, this would be our preference, because it would eliminate the risks associated with the use of VS protection on new generation connections as soon as possible. If this was not considered to be practical, we would support Option 1 on the understanding that the modifications to type tested plant proposed by the workgroup would be implemented as part of the changes required to implement the EU Requirement of Generators Network Code – i.e. by May 2019.	To avoid any perceived discrimination and to ensure that the cumulative effect of the connection of large volume of type tested generators is taken into consideration we agree that the changes should be applied to all generators.	Yes See the responses to Q2 and Q3	Yes. This is required to ensure that there is not a large proportion of embedded generation 'at risk' from unintended tripping

Q6	(vi) In particular do you agree that manufacturers of type tested generating plant should ensure type tested equipment is compliant with the new requirements by 01/02/2018?		Yes Unless evidence is presented to the contrary this would appear to be a reasonable timescale.	Please see our response to Q5. (Depend on the response from manufacturers)	Yes, it is important to ensure that the risks posed by the use of VS are prevented from increasing as soon as practicable. Adopting a 01/02/2018 compliance date strikes an appropriate balance between the increase in risk and giving manufacturers the time/opportunity to ensure compliance of their equipment.	Yes	
Q7	Are there any additional manufacturing costs associated with these requirements? If so what are what are they and what is their proportion to the existing cost? Please provide evidence (in confidence if necessary).		Not known – no evidence appears to have been presented to the workgroup.	No response.	No response	-	
Q8	(viii) Do the proposed changes introduce any material risks for distributed generators? What are these risks? And have they been or will they be appropriately mitigated?		The workgroup reports states that "the risk related to accidental electrocution (IRE) for the proposed RoCoF settings 1Hzs-1 with 500ms time delay is in the region of 10−7 per annum, and therefore lies within what is termed as the "broadly acceptable" region of personal risk accepted as consistent with the Health and Safety at Work Act 1974".	As in our response to Q3, we are of the view that the increased risks to generators are not material.	No response	-	
Q9	(ix) Do the proposed changes impose any additional material risks on the system operator, eg reduced stability margins, reduced reactive capability margins, or difficulty in managing transmission system voltages? If yes, please highlight these risks.		No On the contrary, the proposals will mean that there is no future significant increase in the capacity of generation that would trip on a 0.125Hz/sec RoCoF event, over and above the currently estimated 5GW.	We are of the view that the proposals should reduce the technical risks that the system operator needs to manage and that this should also reduce the system operators costs, which should result in reduced costs to customers.	No response.	-	
Q10	(x) Do the proposed changes impose any additional material risks on distribution network operators, eg stability and security issues safety risks, or any additional investment that might be neither economic nor efficient? If yes, please highlight these risks.		None known	As in our response to Q3, we are of the view that whilst there may be a theoretical increase in risk to some circuit breakers, in practice any such risk is not material.	None that we are aware of at this moment in time.	No	
Q11	(xi) Do the proposed changes adequately protect the interests of all distribution network users? If not, why do they fail to do so?		Yes	The proposals, particularly Option 1, should not increase the costs to distribution system users, and should bring benefits in terms of increased system resilience and reduced System Operator costs.	Ensures equitable treatment to all generator users and should reduce the impact which arises from the inadvertent disconnection of generation using VS techniques.(Yes)	Yes	In our view, yes
Q12	(xii) Are there further technical considerations to be taken into account? If yes, please highlight these technical considerations.		None	We are not aware of any relevant issues that have not been considered by the workgroup.	No response	No	No
Q13	(xiii) Is there any evidence that Users will be inappropriately or adversely affected by the changes proposed? If so, please provide details.		No evidence appears to have been presented to the workgroup in this respect.	We are not aware of any evidence that users may be inappropriately or adversely affected by the changes proposed.	We are not aware of any to our knowledge.	No	
Q14	(xiv) Do the modifications proposed strike an appropriate balance between the needs of generators, DNOs, transmission licensees, and other interested parties? If not, why do they fail to do so?		See XV	Yes.	Yes	Yes	Yes
Q15	(xv) Please provide any other comments you feel are relevant to the proposed change.		We are concerned that the proposal does not include retrospective changes. The workgroup still needs to continue its investigation to determine the benefit of applying these RoCoF changes retrospectively to the estimated 5GW of plant in the less than 5MW category. Using a 1Hz/sec RoCoF protection setting for this plant will allow operation of the system at a higher RoCoF Operational Limit, reducing the requirement to curtail large losses and /or constrain plant with inertia on to the	No further comments		-	

			system. There are clear economic and operational benefits to the whole system from amending RoCoF settings for existing less than 5MW generators. There is also a need for a timely investigation of the benefits from retrospectively changing VS protection for all affected plant. Although increasing the RoCoF, Loss of Mains trip settings from 0.125 Hz/sec to 1 Hz/sec could allow National Grid to increase the RoCoF Operating Limit to above its present value of 0.125 Hz/sec there also needs to be an assessment that all existing plant on the distribution and transmission system is able to withstand RoCoF events of up to and beyond any new Operating Limit (the Withstand Limit). There does not appear to be a process in place or work underway to do this yet (noting that it has taken several years to do this in Ireland). We are of the view that the RoCoF Operating Limit should be included in the SQSS, so that there is standard governance around the level that is used.				