VGrid Code Workgroup Consultation Response Proforma

GC0096 - Storage

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **5pm** on **11 January 2019** to grid.code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

Any queries on the content of the consultation should be addressed to Emma Hart at Emma.Hart@nationalgrid.com

Respondent:	*Gregory Heavens*
Company Name:	*National Grid Electricity Transmission plc*
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	As the proposer, we support this modification. The inclusion of storage in the Grid Code will provide certainty to Users as to the necessary technical requirements for new storage plant and apparatus.

Standard Workgroup Consultation questions

Q	Question	Response
1	Do you believe that GC0096 Original proposal or any potential alternative that you may wish to suggest better facilitates the Grid Code Objectives?	We believe that this modification proposal is positive against objectives i, ii, iii and v, and is neutral against objective iv.
2	Do you support the proposed implementation approach?	Yes. The addition of a date in bullet (j) of EU Code user, which we note will change from 01/01/19 (possibly as a result of the governance process as noted in Question 17 below), will give certainty to parties connecting new storage apparatus as to when the requirements become binding.
3	Do you have any other comments?	No

4	Do you wish to raise a Workgroup Grid Code Alternative Request for the Workgroup to consider?	No

Specific GC00096 questions

Q	Question	Response
5	Do you agree with the proposed 'Electricity Storage' definitions? Please provide your reasoning for your answer to this question. If you answered no, what would you include / amend / remove?	Yes, the definitions of Electricity Storage proposed should ensure that the modification applies to the correct technologies. This aligns with the definition of Storage that Ofgem use in the consultation on Storage Licensing: https://www.ofgem.gov.uk/publications-and-updates/clarifying-regulatory-framework-electricity-storage-licensing
6	Do you agree with the decision to not define 'Energy Storage'? Please provide your reasoning for your answer to this question.	Yes, the attempt to define this term could introduce unforeseen consequences and capture more Plant and Apparatus than the modification intends. E.g. energy converted into heat that is not intended to be converted back into electricity.
7	Do the proposed changes provide suitable flexibility for viable 'Electricity Storage' technologies and topologies? Or, do you feel these proposed changes limit the development of 'Electricity Storage' in any way or present barriers to entry (please provide supporting justification / evidence)?	Yes, by defining in terms of energy conversion the definitions are future proof against innovations for new configurations.
8	Do you believe new Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'? Please provide your reasoning for your answer to this question.	Yes, as far as possible the Grid Code should aim for consistent treatment of alike technologies.

9	Do you believe existing Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'. Please provide your reasoning for your answer to this question.	The modification has not considered retrospectivity, will only apply to new equipment from a certain date. As it is unlikely that changing the technical requirements upon existing pumped storage hydro plant could demonstrate a positive cost benefit, we do not believe this would be appropriate.
10	Do you believe if the definition of Pumped Storage should be included within the definition of Electricity Storage. Please provide your reasoning for your answer to this question.	Yes, as far as possible the Grid Code should aim for consistent treatment of alike technologies going forward.
11	Do you believe there are any unintended consequences behind these proposed changes, either within the Grid Code/D-Code, CUSC, BSC or elsewhere? Please provide your reasoning for your answer to this question.	No, the definition of Electricity storage as part of a power station should mitigate the need for a CUSC modification. We note the in progress BSC modifications P363364, the proposed solution of which (at the time of writing) will enable Electricity Storage as defined here to participate in the BM as standard BMUs.
12	Do you believe that it is appropriate to apply the same approach to Storage providers as adopted for Power Generating Modules? Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be adopted.	Yes, as far as possible the Grid Code should aim for consistent treatment of alike technologies.
13	Do you agree that it is appropriate to include Electricity Storage within the definition of Generation and its related terms. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be explored.	Yes, the definition of Electricity Storage as part of a power station should mitigate the need for a CUSC modification.

14	Do you believe there are any other unintended consequences behind these proposed changes? Please provide your reasoning for your answer to this question.	No
15	Do you believe that it is appropriate to classify storage as an EU Code User with the premise that Generators who own or operate Electricity Storage Modules are explicitly excluded from satisfying the requirements of the EU Connection Codes and that they would not be enforceable under EU law. Please provide your reasoning for your answer to this question. Do you believe that this exclusion is adequately defined in the proposed draft changes to the Grid Code legal text?	Yes, as far as possible the Grid Code should aim for consistent treatment of alike technologies. The Grid Code reflects the obligations from the European Network Codes due to previous Modifications GC100-102; but applies because the NETSO is required to have a Grid Code as part of the transmission licence, and CUSC parties are required to follow the relevant parts of the Grid Code as part of their Contract/Licenses. The obligations of the Grid Code are enforceable via the Electricity Act 1989 as non-compliance can be considered as a breach of license. Though we expect a forthcoming European Network Code on Storage, we believe it is right to include storage in the Grid Code ahead of this as it allows for Consistent and Transparent connection offers sooner.
16	Do you agree that it is appropriate to specify that these requirements are applicable from the date on which main plant items are procured rather than the Completion Date. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why you feel this is the case and if you believe there is a more appropriate solution.	Yes. Specifying when these requirements are applicable from will give certainty to parties connecting new storage apparatus as to when the requirements become binding.
17	The current legal drafting is based on the proposed requirements being applicable based on a Storage User who had concluded Purchase Contracts for its Main Plant and Apparatus on or after 1 January 2019. This assumes implementation is based on the date main plant items are procured as noted in question	Yes, we support an implementation date of 01/01/2020. We are also willing to consider a different implementation date that can be determined as suitable and included in the Code Administrator consultation. Parties connecting before this time can be given the choice to follow the Grid Code as published when they concluded Purchase Contracts or the Grid Code as modified by this solution.

	16, but do you have any preference for an implementation date. Bearing in mind the proposed changes are unlikely to be approved until mid 2019, a more appropriate date may be 1 January 2020. Do you support this implementation date? If not please state why and what alternative you believe would be more appropriate.	
18	Do you believe that Electricity Storage Modules which form part of a License Exempt Embedded Medium Power Station (LEEMPS) are adequately catered for in these provisions and it is clear that a License Exempt Embedded Medium Power Station comprising of storage would be caught by the requirements in the Grid Code from the obligations in the Distribution Code.	Yes, there is no change in the applicability of the Grid Code. Those who must, or choose, to follow the requirements of the Grid Code must still comply with its appropriate provisions. While those stations who are not required to follow the Grid Code, by capacity, connection point or license, are not obligated to by this modification.
19	Do you believe that the list of storage technologies shown in Annex 3 is sufficient or should some technologies be added or subtracted? Please provide your reasons for your answer to this question.	We believe that the list of technologies set out in Annex 3 is sufficient for the consultation. We do not believe that this list should be referenced or replicated in the Grid Code as it could be perceived to limit innovation or require updating, instead the proposed definition of Electricity Storage should be relied upon.
	Legal text comments	
	If you believe there are issues in the legal text, can you please bring these to our attention by using the space provided on the response proforma. These will then be discussed at the next Workgroup, following the closure of this Consultation.	

Grid Code Workgroup Consultation Response Proforma

GC0096 - Storage

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **5pm** on **11 January 2019** to grid.code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

Any queries on the content of the consultation should be addressed to Emma Hart at Emma.Hart@nationalgrid.com

Respondent:	*Alan Creighton*
Company Name:	*Northern Powergrid*
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	

Standard Workgroup Consultation questions

Q	Question	Response
1	Do you believe that GC0096 Original proposal or any potential alternative that you may wish to suggest better facilitates the Grid Code Objectives?	*For reference the applicable Grid Code objectives are:* *(i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;* Positive *(ii) to facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);*

		Positive *(iii) subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole;* Positive *(iv) to efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and* Neutral *(v) To promote efficiency in the implementation and administration of the Grid Code arrangements.* Neutral
2	Do you support the proposed implementation approach?	Yes
3	Do you have any other comments?	Our comments are provided below.
4	Do you wish to raise a Workgroup Grid Code Alternative Request for the Workgroup to consider?	No

Specific GC00096 questions

Q	Question	Response
5	Do you agree with the proposed 'Electricity Storage' definitions? Please provide your reasoning for your answer to this question. If you answered no, what would you include / amend / remove?	Yes, in principle, although the definitions do seem to be more confusing than they need to be. Our view is that these definitions could probably be simplified in such a way as to add clarity and reduce confusion. We have included examples and suggested text in the version of the Glossary and Definitions which forms part of our consultation response.
6	Do you agree with the decision to not define 'Energy	Yes. The technical requirements that the GCode relate to electrical energy.

	Storage'? Please provide your reasoning for your answer to this question.	
7	Do the proposed changes provide suitable flexibility for viable 'Electricity Storage' technologies and topologies? Or, do you feel these proposed changes limit the development of 'Electricity Storage' in any way or present barriers to entry (please provide supporting justification / evidence)?	The proposed changes currently seem appropriate.
8	Do you believe new Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'? Please provide your reasoning for your answer to this question.	Possibly, depending on whether the EU requirements for Electricity Storage, being developed the EU expert group, are expected to align with the existing requirements for Pumped Storage.
9	Do you believe existing Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'. Please provide your reasoning for your answer to this question.	It seems unreasonable for an existing Pump Storage scheme to be required to comply with any retrospectively requirements unless demonstrated to be reasonable via a CBA.
10	Do you believe if the definition of Pumped Storage should be included within the definition of Electricity Storage. Please provide your reasoning for your answer to this question.	See our response to Question 8.
11	Do you believe there are any unintended consequences behind these proposed changes, either within the Grid Code/D-Code, CUSC, BSC or elsewhere? Please provide your reasoning for your answer to this question.	There are consequences for the DCode that will need to be addressed by the DCRP in due course. 1. A DCode modification will be required to collect, for new Electricity Storage connections, the information that NGET propose is included in our Week 24 submission. This information is not currently collected for existing storage facilities and the GCode needs to be drafted to reflect this. 2. The GCode proposal is to require Electricity Storage Modules to comply with EU codes,

		whereas whilst the DCode specifically includes storage in the definition of generation, it excludes the need to comply with some of the EU code requirements. Hence there would be an inconsistency re the technical requirements for transmission and distribution connected storage facilities which needs to be addressed.
12	Do you believe that it is appropriate to apply the same approach to Storage providers as adopted for Power Generating Modules? Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be adopted.	Yes. Storage is either generation or demand at an instant in time. It cannot be both together. Therefore it should treated, as far as possible, with complete parity in respect of technical requirements in the GCode with the existing requirement for generation and demand. However we note that there are some aspects of the ECC where Electricity Storage Modules seem to be treated as an importing HVDC module rather than demand – clarity in this area would be beneficial.
13	Do you agree that it is appropriate to include Electricity Storage within the definition of Generation and its related terms. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be explored.	Yes. Same reason as Q12 above.
14	Do you believe there are any other unintended consequences behind these proposed changes? Please provide your reasoning for your answer to this question.	Please see our response to Question 11.
15	Do you believe that it is appropriate to classify storage as an EU Code User with the premise that Generators who own or operate Electricity Storage Modules are explicitly excluded from satisfying the requirements of the EU Connection Codes and that they would not be enforceable under EU law. Please provide	This is probably reasonable as the ECCs generally relate to new connections, although as the consultation makes clear, at the moment Electricity Storage Modules do not need to comply with EU Code requirements. We recognise that there is a point of view that this was an oversight in the EU drafting process that is being reviewed. However by drafting the GCode as proposed Electricity Storage Modules will need to comply with the ECCs and hence the EU Codes.

	your reasoning for your answer to this question. Do you believe that this exclusion is adequately defined in the proposed draft changes to the Grid Code legal text?	The WG report should explain why this approach is reasonable if only because it is different to the approach in the DCode, where an Electricity Storage Modules does not need to comply with all the EU Code requirements. It might be helpful to clarify those ECC requirements that wouldn't be enforceable by EU law.
16	Do you agree that it is appropriate to specify that these requirements are applicable from the date on which main plant items are procured rather than the Completion Date. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why you feel this is the case and if you believe there is a more appropriate solution.	Yes – developers of Electricity Storage Modules need clarity and sufficient time to implement the requirements. Depending on the progress of this Modification Proposal, we agreed that the suggested 1 Jan 2019 date may need to be deferred. At the moment the definition of Main Plant and Apparatus does not relate to Electricity Storage Modules; this needs to be addressed.
17	The current legal drafting is based on the proposed requirements being applicable based on a Storage User who had concluded Purchase Contracts for its Main Plant and Apparatus on or after 1 January 2019. This assumes implementation is based on the date main plant items are procured as noted in question 16, but do you have any preference for an implementation date. Bearing in mind the proposed changes are unlikely to be approved until mid 2019, a more appropriate date may be 1 January 2020. Do you support this implementation date? If not please state why and what alternative you believe would be more appropriate.	Please see our response to Question 16.
18	Do you believe that Electricity Storage Modules which form	LEEMPS are covered explicitly in section 2.8 of EREC G99 and EREC G99 already also explicitly

	part of a Licence Exempt Embedded Medium Power Station (LEEMPS) are adequately catered for in these provisions and it is clear that a Licence Exempt Embedded Medium Power Station comprising of storage would be caught by the requirements in the Grid Code from the obligations in the Distribution Code.	includes electricity storage as generation. There would be a need to check that that proposed GCode definitions don't affect this existing linkage.
19	Do you believe that the list of storage technologies shown in Annex 3 is sufficient or should some technologies be added or subtracted? Please provide your reasons for your answer to this question.	It is probably sufficient for the time being. To be consistent with the rest of this list each battery technology should be listed as a separate line. However, as mentioned in our response to Qun 11 DNOs would be unable to comply with the requirement as drafted. We have included suggested text in the version of the Planning Code which forms part of our consultation response.
	Legal text comments	
	If you believe there are issues in the legal text, can you please bring these to our attention by using the space provided on the response proforma. These will then be discussed at the next Workgroup, following the closure of this Consultation.	Please see the attached versions of the proposed legal text which form an integral part of our consultation response: Glossary and Definitions Planning Code European Connection Conditions European Compliance Process Operating Code 6 Operating Code 9

Grid Code Workgroup Consultation Response Proforma

GC0096 - Storage

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Please send your responses by **5pm** on **11 January 2019** to grid.code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

Any queries on the content of the consultation should be addressed to Emma Hart at Emma.Hart@nationalgrid.com

Respondent:	Alastair Frew Alastair.Frew@drax.com
Company Name:	Drax Generation Enterprise Ltd
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	

Standard Workgroup Consultation questions

Q	Question	Response
1	Do you believe that GC0096 Original proposal or any potential alternative that you may wish to suggest better facilitates the Grid Code Objectives?	*For reference the applicable Grid Code objectives are:* *(i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;* *(ii) to facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of*

		electricity); *(iii) subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole;* *(iv) to efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and* *(v) To promote efficiency in the implementation and administration of the Grid Code arrangements.*
2	Do you support the proposed implementation approach?	Yes in principle but this appear to be adding lots of similar definitions, but this can be dealt with see answer 5. Also there is an assumption a storage unit and a generating unit will always be the same plant item
3	Do you have any other comments?	The definition of Intermittent Power Source is being changed to include "(excluding Electricity Storage Modules)", does this mean that adding a battery to an Intermittent Power Source immediately removes any relaxation on this plant response requirements, although the battery may be of limited size? Also in the ECC and ECP at various places the phrase "and in the case of an Electricity Storage Module allowance will be made for the storage capability of the Electricity Storage Module." is used, the question is what allowance will be made and does this need to be made more explicit.
4	Do you wish to raise a Workgroup Grid Code Alternative Request for the Workgroup to consider?	
5	Do you agree with the proposed 'Electricity Storage' definitions? Please provide your reasoning for your answer to this question. If you answered no, what would you include / amend / remove?	No, this proposal appears to be taking 2 parallel approaches which a leading to multiple definitions covering the same item, on one hand the existing generator definitions are being modified to include storage units, and on the one hand new storage definitions are being added in parallel to the existing generator definitions which have just been modified. To demonstrate this table 1 shows how

		the proposed definitions interact with each other and the existing definitions. The table starts at the left with a Genset and then moves to the right with the definition of a Genset broken down into its constituent parts in each box, it then continues across breaking each subsequent definition into its constituent parts. As can be seen there are numerous entries next to each other where the same storage are being covered and it is not clear what the benefit of adding all these entries and definitions are. It appear that the work group wish to ensure that storage units continue to meet the appropriate generating requirements whilst they are producing electricity, so it would be simpler just modify the very basic generator definitions which are an Onshore Generating Unit and an Offshore Generating Unit to allow them to be part of a storage unit. Also additional storage requirements need to be defined by an additional set off storage definitions. Given that all generating unit produce electricity by converting another energy source into electrical energy this is no different for a storage unit producing electricity so potential definitions for an Onshore Generating Unit and an Offshore Generating Unit are:- **Onshore Generating Unit** Unless otherwise provided in the Grid Code, Apparatus located Onshore which produces ~~electricity~~ electrical energy by converting another source of energy, including an Onshore Synchronous Generating Unit, an Onshore Non-Synchronous Generating Unit which could also be part of a Generating Module or Electricity Storage Module. **Offshore Generating Unit** Unless otherwise provided in the Grid Code, Apparatus located Offshore which produces ~~electricity~~ electrical energy by converting another source of energy, including an Onshore Synchronous Generating Unit, an Onshore Non-Synchronous Generating Unit which could also be part of a Generating Module or Electricity Storage Module. With these definitions all existing generating

		definitions apply whilst generating. Definitions for when operating in storage mode are also required, whilst looking at the proposed legal text there appear to be only 3 storage definitions used in the rest of the changes being Electricity Storage Module, Synchronous Electricity Storage Module and Non-Synchronous Electricity Storage Module. **Electricity Storage Module** Is either a Synchronous Electricity Storage Unit or a Non-Synchronous Electricity Storage Unit, which could also be part of a Generating Module. **Synchronous Electricity Storage Unit** Apparatus which whilst absorbing electrical energy to convert to another source of energy for storage has a steady state operating frequency of the Apparatus which is in constant ratio of the network frequency and are thus in synchronism, which could also be part of an Onshore Generating Unit or Onshore Generating Unit. **Non-Synchronous Electricity Storage Unit** Apparatus which whilst absorbing electrical energy to convert to another source of energy for storage has a steady state operating frequency of the Apparatus which is not in constant ratio of the network frequency and are thus not in synchronism, which could also be part of an Onshore Generating Unit or Onshore Generating Unit. This arrangement of definitions also allows for the possibility that generation is synchronous and absorption is non-synchronous and vice versa.

Specific GC00096 questions

Q	Question	Response
6	Do you agree with the decision to not define 'Energy Storage'? Please provide your	Yes

	reasoning for your answer to this question.	
7	Do the proposed changes provide suitable flexibility for viable 'Electricity Storage' technologies and topologies? Or, do you feel these proposed changes limit the development of 'Electricity Storage' in any way or present barriers to entry (please provide supporting justification / evidence)?	This is a basic assumption that the generating unit and the storage unit are the same item operating in reverse, there is the possibility they are different and even at different locations eg a pump storage arrangement could be pumping at one location and generating at a completely different location. Questions in terms of what all are considered to be storage units are; does a storage unit need to import electricity through the connection point? How would the situation be treated if for example a solar plant installed a battery connected to the DC side of the converter which only stored energy from the solar plant and used it on-site before the connection and never imported electricity for storage, is this an electricity storage module? And does it need to provide storage unit services? Similarly with a windfarm or something else only using internal generated power for storage and not importing for storage is that required to meet storage unit requirements?
8	Do you believe new Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'? Please provide your reasoning for your answer to this question.	In principle it would appear sensible but current pump storage plant designs may not be able to comply with ECC.6.3.7.16 as varying pump loading with frequency using guide vanes control will very likely cause control system instabilities. Whilst there a trial designs using converter drives for variable speed pump drives this is a major increase in complexity and given there will always be excess generation is there actually a requirement for this?
9	Do you believe existing Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'. Please provide your reasoning for your answer to this question.	Would they be required to meet all the ECC requirements as opposed to their current requirements to only meet the CC. Again existing plants may not be able to comply with ECC.6.3.7.16 as varying pump loading with frequency using guide vanes control will very likely cause control system instabilities.
10	Do you believe if the definition of Pumped Storage should be included within the definition of Electricity Storage. Please	It would appear sensible to treat all storage devices similarly. It should be noted that the proposed changes to the pump storage definitions by removing the station

	provide your reasoning for your answer to this question.	names ends up with no real definition and just 2 circular definitions which just refer back to each and do not actual state an independent definition.
11	Do you believe there are any unintended consequences behind these proposed changes, either within the Grid Code/D-Code, CUSC, BSC or elsewhere? Please provide your reasoning for your answer to this question.	There will need to be D-Code changes to implement similar requirements to embedded storage. In terms of other codes provided trading arrangements are unaltered there should be no obvious issues.
12	Do you believe that it is appropriate to apply the same approach to Storage providers as adopted for Power Generating Modules? Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be adopted.	Yes the approach should be the same as they are to all providing the same services into the same market place.
13	Do you agree that it is appropriate to include Electricity Storage within the definition of Generation and its related terms. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be explored.	Partially if the Apparatus performing the storage function is also the same Apparatus which is performing the generating function then yes, however if the Apparatus performing the storage function is different from the generation apparatus then these need to be treated differently. A possible example of this would an existing hydro station which wanted to be converted to a pumped storage station by the addition of a pumping unit to do the storage only, whilst all the generation was carried out by the existing generating units. In this case there are generating and storage units but none of them perform both tasks. Possible way forward see answer to question 5.
14	Do you believe there are any other unintended consequences behind these proposed changes? Please provide your reasoning for your answer to this question.	
15	Do you believe that it is	Apparatus which is carrying out generating needs

	appropriate to classify storage as an EU Code User with the premise that Generators who own or operate Electricity Storage Modules are explicitly excluded from satisfying the requirements of the EU Connection Codes and that they would not be enforceable under EU law. Please provide your reasoning for your answer to this question. Do you believe that this exclusion is adequately defined in the proposed draft changes to the Grid Code legal text?	to comply with EU Law whilst generating, however it needs to be noted that large sections of the Grid Code are only enforced by Contract Law and licences so areas which are not EU law can still be enforced using current arrangements.
16	Do you agree that it is appropriate to specify that these requirements are applicable from the date on which main plant items are procured rather than the Completion Date. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why you feel this is the case and if you believe there is a more appropriate solution.	This does appear to be a better suggestion than the current arrangement where parties can be caught out by changes made after they have ordered their equipment.
17	The current legal drafting is based on the proposed requirements being applicable based on a Storage User who had concluded Purchase Contracts for its Main Plant and Apparatus on or after 1 January 2019. This assumes implementation is based on the date main plant items are procured as noted in question 16, but do you have any preference for an implementation date. Bearing in mind the proposed changes are unlikely to be approved until mid 2019, a more appropriate date may be 1 January 2020. Do you	If application is based on purchase date then the implementation date is less of an issue. It should be noted that NGET when they originally raised this modification indicated it was needed as parties were applying and were being treated as special cases, there might be an argument for implementation as soon as possible.

	support this implementation date? If not please state why and what alternative you believe would be more appropriate.	
18	Do you believe that Electricity Storage Modules which form part of a License Exempt Embedded Medium Power Station (LEEMPS) are adequately catered for in these provisions and it is clear that a License Exempt Embedded Medium Power Station comprising of storage would be caught by the requirements in the Grid Code from the obligations in the Distribution Code.	Not sure
19	Do you believe that the list of storage technologies shown in Annex 3 is sufficient or should some technologies be added or subtracted? Please provide your reasons for your answer to this question.	Yes
	Legal text comments	
	If you believe there are issues in the legal text, can you please bring these to our attention by using the space provided on the response proforma. These will then be discussed at the next Workgroup, following the closure of this Consultation.	

Table 1 showing hierarchy of definitions as proposed by GC0066
Starting on the left column with Genset the next column gives the definition of a Genset broken down to individual items,
then each subsequent column give the definition of the previous column.
Text in red is the proposed GC0066 changes.
Note some definitions have been adjusted slight to fit into the table for full definitions see the GC0066 report

Genset	Generating Unit... (& see below)	Synchronous Power-Generating Module	Synchronous Generating Unit	Onshore Synchronous Generating Unit	Onshore Generating Unit (& see below)	...Apparatus located Onshore which produces/ stores electricity, including an Onshore Synchronous Generating Unit/or Onshore Synchronous Electricity Storage Unit/or Onshore Non-Synchronous Generating Unit/or Onshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module			
					Onshore Synchronous Electricity Storage Unit (& see below)	Synchronous Electricity Storage Unit located onshore	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism		
					CCGT Unit (& see below)	A Generating Unit within a CCGT Module			
					Synchronous Electricity Storage Unit (& see below)	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism			
					...in which under all steady state conditions the rotor rotates at a mechanical speed equal to the electrical frequency of the NETS divided by the number of pole pairs of the Generating Unit				
				Offshore Synchronous Generating Unit	Offshore Generating Unit... (& see below)	...Apparatus located Offshore which produces/ stores electricity, including an Offshore Synchronous Generating Unit/or Offshore Synchronous Electricity Storage Unit/an Offshore Non-Synchronous Generating Unit/or Offshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module			
					Offshore Synchronous Electricity Storage Unit... (& see below)	Synchronous Electricity Storage Unit located offshore	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism		
					...in which under all steady state conditions the rotor rotates at a mechanical speed equal to the electrical frequency of the NETS divided by the number of pole pairs of the Generating Unit				
			Synchronous Electricity Storage Unit	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism					
		Synchronous Electricity Storage Module	Synchronous Electricity Storage Unit	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism					
		Power Park Module	Onshore Power Park Module	A Collection of Non-Synchronous Generating Units powered by an intermittent Power Source or connected through power electronic conversion technology... (& see below)	Onshore Non-Synchronous Generating Unit... (& see below)	Onshore Generating Unit ... (& see below)	...Apparatus located Onshore which produces/ stores electricity, including an Onshore Synchronous Generating Unit/or Onshore Synchronous Electricity Storage Unit/an Onshore Non-Synchronous Generating Unit/ Onshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module		
						...that is not a Synchronous Generating Unit dy/synchronous Electricity Storage Unit/including for he avoidance of doubt Power Park Units/or Non-Synchronous Electricity Storage Unit/located onshore			
					Onshore Non-Synchronous Electricity Storage Unit... (& see below)	A Non-Synchronous Electricity Storage Unit located onshore	A single item of Electricity Storage equipment which can supply or absorb electrical energy which is not a Synchronous Electricity Storage Unit		
					...could form part of Power Generating Module				
				Non-Synchronous Electricity Storage Units... (& see below)	A single item of Electricity Storage equipment which can supply or absorb electrical energy which is not a Synchronous Electricity Storage Unit				
				... joined together by a System with a single electrical point of connection to the Onshore Transmission System (or User System if Embedded) with no intermediate Offshore Transmission System connections. The connection to the Onshore Transmission System may include a DC Converter or HVDC Convertor.					
			Offshore Power Park Module	A collection of one or more Offshore Power Park Strings... (& see below)	A collection of Offshore Generating Units... (& see below)	Offshore Synchronous Generating Unit... (& see below)	Offshore Generating Unit... (& see below)	...Apparatus located Offshore which produces/ stores electricity, including an Offshore Synchronous Generating Unit/or Offshore Synchronous Electricity Storage Unit/ an Offshore Non-Synchronous Generating Unit/ Offshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module		
							Offshore Synchronous Electricity Storage Unit... (& see below)	Synchronous Electricity Storage Unit located offshore	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism
							...in which under all steady state conditions the rotor rotates at a mechanical speed equal to the electrical frequency of the NETS divided by the number of pole pairs of the Generating Unit		
						Offshore Non-Synchronous Generating Unit... (& see below)	Offshore Synchronous Electricity Storage Unit... (& see below)	A Synchronous Electricity Storage Unit located Offshore	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism
							Offshore Generating Unit... (& see below)	...Apparatus located Offshore which produces/ stores electricity, including an Offshore Synchronous Generating Unit/or Offshore Synchronous Electricity Storage Unit/ an Offshore Non-Synchronous Generating Unit/ Offshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module	
							... that is not an Offshore Synchronous Generating Unit including for he avoidance of doubt Power Park Units/or Non-Synchronous Electricity Storage Unit/located Offshore		
							Offshore Non-Synchronous Electricity Storage Unit... (& see below)	Non-Synchronous Electricity Storage Unit located Offshore	A single item of Electricity Storage equipment which can supply or absorb electrical energy which is not a Synchronous Electricity Storage Unit
						...could also be part of Power Generating Module			
					Power Park Units... (& see below)	A Generating Unit within a Power Park	Not clear what this definition covers which is not covered in Offshore Generating Units in row above, but you could go to Generating Unit chain earlier if you think you want to look further		
					Non-Synchronous Electricity Storage Units... (& see below)	A single item of Electricity Storage equipment which can supply or absorb electrical energy which is not a Synchronous Electricity Storage Unit			
				... joined together by cables forming part of a User System with a single point of connection to an Offshore Transmission System. The connection to an Offshore Transmission System may include a DC Converter or HVDC Converter.					
				... connected to the same busbar which cannot be electrically split or connect to a collection of directly electrically connected busbars of the same nominal voltage and are configured in accordance with the operating arrangements set out in the BCA					
			A Power Park Module may also						
		Non-synchronous Electricity Storage Module	Non-synchronous Electricity Storage Unit	Electricity Storage equipment which is not a Synchronous Electricity Storage Unit					
		Onshore Generating Unit... (& see below)	Onshore Synchronous Generating Unit... (& see below)	Onshore Generating Unit (& see below)	...Apparatus located Onshore which produces/ stores electricity, including an Onshore Synchronous Generating Unit/or Onshore Synchronous Electricity Storage Unit/an Onshore Non-Synchronous Generating Unit/ Onshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module				
				Onshore Synchronous Electricity Storage Unit (& see below)	Synchronous Electricity Storage Unit located onshore	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism			
				CCGT Unit (& see below)	A Generating Unit within a CCGT Module				
				Synchronous Electricity Storage Unit (& see below)	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism				
				... in which under all steady state conditions the rotor rotates at a mechanical speed equal to the electrical frequency of the NETS divided by the number of pole pairs of the Generating Unit					
			Onshore Synchronous Electricity Storage Unit... (& see below)	Synchronous Electricity Storage Unit located onshore	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism				
			Onshore Non-synchronous Generating Unit... (& see below)	Onshore Generating Unit ... (& see below)	...Apparatus located Onshore which produces/ stores electricity, including an Onshore Synchronous Generating Unit/or Onshore Synchronous Electricity Storage Unit/an Onshore Non-Synchronous Generating Unit/ Onshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module				
				...that is not a Synchronous Generating Unit dy/synchronous Electricity Storage Unit/including for he avoidance of doubt Power Park Units/or Non-Synchronous Electricity Storage Unit/located onshore					
			Onshore Non-synchronous Electricity Storage Unit... (& see below)	A Non-Synchronous Electricity Storage Unit located onshore	A single item of Electricity Storage equipment which can supply or absorb electrical energy which is not a Synchronous Electricity Storage Unit				
			...could also be part of Power Generating Module						
		Offshore Generating Unit... (& see below)	Offshore Synchronous Generating Unit... (& see below)	Offshore Generating Unit... (& see below)	...Apparatus located Offshore which produces/ stores electricity, including an Offshore Synchronous Generating Unit/or Offshore Synchronous Electricity Storage Unit/an Offshore Non-Synchronous Generating Unit/ Offshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module				
				Offshore Synchronous Electricity Storage Unit... (& see below)	Synchronous Electricity Storage Unit located offshore	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism			
				... in which under all steady state conditions the rotor rotates at a mechanical speed equal to the electrical frequency of the NETS divided by the number of pole pairs of the Generating Unit					
			Offshore Synchronous Electricity Storage Unit... (& see below)	A Synchronous Electricity Storage Unit located Offshore	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism				
			Offshore Non-Synchronous Generating Unit... (& see below)	Offshore Generating Unit... (& see below)	...Apparatus located Offshore which produces/ stores electricity, including an Offshore Synchronous Generating Unit/or Offshore Synchronous Electricity Storage Unit/an Offshore Non-Synchronous Generating Unit/ Offshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module				
				... that is not an Offshore Synchronous Generating Unit including for he avoidance of doubt Power Park Units/or Non-Synchronous Electricity Storage Unit/located Offshore					
			Offshore Non-Synchronous Electricity Storage Unit... (& see below)	Non-Synchronous Electricity Storage Unit located Offshore	A single item of Electricity Storage equipment which can supply or absorb electrical energy which is not a Synchronous Electricity Storage Unit				
			...could also be part of Power Generating Module						
		Onshore Power Park Module	A Collection of Non-Synchronous Generating Units powered by an intermittent Power Source or connected through power electronic conversion technology... (& see below)	Onshore Non-Synchronous Generating Unit... (& see below)	Onshore Generating Unit ... (& see below)	...Apparatus located Onshore which produces/ stores electricity, including an Onshore Synchronous Generating Unit/or Onshore Synchronous Electricity Storage Unit/an Onshore Non-Synchronous Generating Unit/ Onshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module				
					...that is not a Synchronous Generating Unit dy/synchronous Electricity Storage Unit/including for he avoidance of doubt Power Park Units/or Non-Synchronous Electricity Storage Unit/located onshore				
				Onshore Non-Synchronous Electricity Storage Unit... (& see below)	A Non-Synchronous Electricity Storage Unit located onshore	A single item of Electricity Storage equipment which can supply or absorb electrical energy which is not a Synchronous Electricity Storage Unit			
				...could form part of Power Generating Module					
			Non-Synchronous Electricity Storage Units... (& see below)	A single item of Electricity Storage equipment which can supply or absorb electrical energy which is not a Synchronous Electricity Storage Unit					
			... joined together by a System with a single electrical point of connection to the Onshore Transmission System (or User System if Embedded) with no intermediate Offshore Transmission System connections. The connection to the Onshore Transmission System may include a DC Converter or HVDC Convertor.						
	Power Park Module... (& see below)	Offshore Power Park Module	A collection of one or more Offshore Power Park Strings... (& see below)	A collection of Offshore Generating Units... (& see below)	Offshore Synchronous Generating Unit... (& see below)	Offshore Generating Unit... (& see below)	...Apparatus located Offshore which produces/ stores electricity, including an Offshore Synchronous Generating Unit/or Offshore Synchronous Electricity Storage Unit/an Offshore Non-Synchronous Generating Unit/ Offshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module			
						Offshore Synchronous Electricity Storage Unit... (& see below)	Synchronous Electricity Storage Unit located offshore	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism	
						... in which under all steady state conditions the rotor rotates at a mechanical speed equal to the electrical frequency of the NETS divided by the number of pole pairs of the Generating Unit				
					Offshore Synchronous Electricity Storage Unit... (& see below)	A Synchronous Electricity Storage Unit located Offshore	Single item of Electricity Storage equipment which can supply or absorb electrical energy such that the frequency of the generated voltage, the generator speed and frequency of the network voltage are in constant ratio and thus in synchronism		
					Offshore Non-Synchronous Generating Unit... (& see below)	Offshore Generating Unit... (& see below)	...Apparatus located Offshore which produces/ stores electricity, including an Offshore Synchronous Generating Unit/or Offshore Synchronous Electricity Storage Unit/an Offshore Non-Synchronous Generating Unit/ Offshore Non-Synchronous Electricity Storage Unit which could also be part of a Generating Module		
						... that is not an Offshore Synchronous Generating Unit including for he avoidance of doubt Power Park Units/or Non-Synchronous Electricity Storage Unit/located Offshore			
					Offshore Non-Synchronous Electricity Storage Unit... (& see below)	Non-Synchronous Electricity Storage Unit located Offshore	A single item of Electricity Storage equipment which can supply or absorb electrical energy which is not a Synchronous Electricity Storage Unit		
					...could also be part of Power Generating Module				
				Power Park Units... (& see below)	A Generating Unit within a Power Park	Not clear what this definition covers which is not covered in Offshore Generating Units in row above, but you could go to Generating Unit chain earlier if you think you want to look further			
				Non-Synchronous Electricity Storage Units... (& see below)	A single item of Electricity Storage equipment which can supply or absorb electrical energy which is not a Synchronous Electricity Storage Unit				
				... joined together by cables forming part of a User System with a single point of connection to an Offshore Transmission System. The connection to an Offshore Transmission System may include a DC Converter or HVDC Converter.					
			... connected to the same busbar which cannot be electrically split or connect to a collection of directly electrically connected busbars of the same nominal voltage and are configured in accordance with the operating arrangements set out in the BCA						
	CCGT Module... (& see below)	Generating Units (registered as CCGT module could be within a Power Generating Module)							
		Gas Turbine Units	Generating Unit within a CCGT Module						
		Steam Turbine Units	Generating Unit who's prime mover converts the heat energy in steam into mechanical energy						
	...Large Power Stations and NETS connections								

Grid Code Workgroup Consultation Response Proforma

GC0096 - Storage

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **5pm** on **11 January 2019** to grid.code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

Any queries on the content of the consultation should be addressed to Emma Hart at Emma.Hart@nationalgrid.com

Respondent:	*Andy Vaudin* *andrew.vaudin@edfenergy.com*
Company Name:	*EDF ENERGY*
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	

Standard Workgroup Consultation questions

Q	Question	Response
1	Do you believe that GC0096 Original proposal or any potential alternative that you may wish to suggest better facilitates the Grid Code Objectives?	*For reference the applicable Grid Code objectives are:* *(i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;* *Yes* *(ii) to facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);*

		(iii) subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole; *Yes* *(iv) to efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and* *n/a* *(v) To promote efficiency in the implementation and administration of the Grid Code arrangements.* *n/a*
2	Do you support the proposed implementation approach?	Yes
3	Do you have any other comments?	No
4	Do you wish to raise a Workgroup Grid Code Alternative Request for the Workgroup to consider?	No

Specific GC00096 questions

Q	Question	Response
5	Do you agree with the proposed 'Electricity Storage' definitions? Please provide your reasoning for your answer to this question. If you answered no, what would you include / amend / remove?	Yes The definition is consistent with the Ofgem 2018 consultation on 'Clarifying the regulatory framework for electricity storage: licensing'.
6	Do you agree with the decision to not define 'Energy Storage'? Please provide your reasoning for your answer to this question.	Yes. Energy storage is not within this modification scope.
7	Do the proposed changes provide suitable flexibility for	Yes The proposal notes the importance that the specific

	viable 'Electricity Storage' technologies and topologies? Or, do you feel these proposed changes limit the development of 'Electricity Storage' in any way or present barriers to entry (please provide supporting justification / evidence)?	characteristics of co-located sites are recognized, for example as per the proposed ECP.10.7.
8	Do you believe new Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'? Please provide your reasoning for your answer to this question.	This shouldn't be required because the EU Network Codes and the consequent Grid Code requirements already include pumped storage.
9	Do you believe existing Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'. Please provide your reasoning for your answer to this question.	No – see above and also the approach should not be applied retrospectively
10	Do you believe if the definition of Pumped Storage should be included within the definition of Electricity Storage. Please provide your reasoning for your answer to this question.	No –see above
11	Do you believe there are any unintended consequences behind these proposed changes, either within the Grid Code/D-Code, CUSC, BSC or elsewhere? Please provide your reasoning for your answer to this question.	No unintended consequences known of at present. As noted in the workgroup report Distribution Code changes will be consequential from GC0096, using the proposed solution as a basis.
12	Do you believe that it is appropriate to apply the same approach to Storage providers as adopted for Power Generating Modules? Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be	Yes. As noted in the workgroup report, Ofgem will implement changes to the generation licence to include storage as a subset of generation. In addition, the Government will define storage in primary legislation when Parliamentary time allows.

	adopted.	
13	Do you agree that it is appropriate to include Electricity Storage within the definition of Generation and its related terms. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be explored.	Yes As noted in the workgroup report, Ofgem will implement changes to the generation licence to include storage as a subset of generation. In addition, the Government will define storage in primary legislation when Parliamentary time allows. In addition, the additional Grid Code legal text would significantly simpler with this approach.
14	Do you believe there are any other unintended consequences behind these proposed changes? Please provide your reasoning for your answer to this question.	None known at present.
15	Do you believe that it is appropriate to classify storage as an EU Code User with the premise that Generators who own or operate Electricity Storage Modules are explicitly excluded from satisfying the requirements of the EU Connection Codes and that they would not be enforceable under EU law. Please provide your reasoning for your answer to this question. Do you believe that this exclusion is adequately defined in the proposed draft changes to the Grid Code legal text?	Yes Consistent with the EU Connection Codes.
16	Do you agree that it is appropriate to specify that these requirements are applicable from the date on which main plant items are procured rather than the Completion Date. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why you feel this is the case and if you	Yes Developers require a period of time to contract for plant with the modified Grid Code requirements.

	believe there is a more appropriate solution.	
17	The current legal drafting is based on the proposed requirements being applicable based on a Storage User who had concluded Purchase Contracts for its Main Plant and Apparatus on or after 1 January 2019. This assumes implementation is based on the date main plant items are procured as noted in question 16, but do you have any preference for an implementation date. Bearing in mind the proposed changes are unlikely to be approved until mid 2019, a more appropriate date may be 1 January 2020. Do you support this implementation date? If not please state why and what alternative you believe would be more appropriate.	A 1 January 2020 date implementation is more appropriate based on a mid-2019 approval date, but it should actually this be set at approval as, say, approval date plus six months.
18	Do you believe that Electricity Storage Modules which form part of a License Exempt Embedded Medium Power Station (LEEMPS) are adequately catered for in these provisions and it is clear that a License Exempt Embedded Medium Power Station comprising of storage would be caught by the requirements in the Grid Code from the obligations in the Distribution Code.	Yes
19	Do you believe that the list of storage technologies shown in Annex 3 is sufficient or should some technologies be added or subtracted? Please provide your reasons for your answer to this question.	The relevance of this list is not clear. It is not included within the proposed modification, e.g. within storage definition.

	Legal text comments	
	If you believe there are issues in the legal text, can you please bring these to our attention by using the space provided on the response proforma. These will then be discussed at the next Workgroup, following the closure of this Consultation.	None known of at present

Grid Code Workgroup Consultation Response Proforma

GC0096 - Storage

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **5pm** on **11 January 2019** to grid.code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

Any queries on the content of the consultation should be addressed to Emma Hart at Emma.Hart@nationalgrid.com

Respondent:	*Garth Graham (garth.graham@sse.com)*
Company Name:	*SSE*
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	

Standard Workgroup Consultation questions

Q	Question	Response
1	Do you believe that GC0096 Original proposal or any potential alternative that you may wish to suggest better facilitates the Grid Code Objectives?	*For reference the applicable Grid Code objectives are:* *(i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;* *(ii) to facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);* *(iii) subject to sub-paragraphs (i) and (ii), to promote*

		the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole; *(iv) to efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and* *(v) To promote efficiency in the implementation and administration of the Grid Code arrangements.* **Negative**. This Original Proposal will <u>not</u> promote the efficient implementation and administration of the Grid Code as it is 'over the top' in seeking to make large swaths of changes to many pages of the Grid Code when the vast majority of those changes (as they often involve duplication of existing text) are not required. The achievement of what GC0096 seeks to do could be achieved much more easily, more comprehensively and in a non-discriminatory manner by simply changing the Glossary and Definitions to bring Electricity Storage within the remit of Generation (as Ofgem has outlined in its minded to position).
2	Do you support the proposed implementation approach?	We note that the Workgroup has yet to conclude what the implementation approach should be. The Proposer suggests ten Working Days which, assuming there is no requirement for transition to the new approach, would seem appropriate (unless a period of transition is required).
3	Do you have any other comments?	
4	Do you wish to raise a Workgroup Grid Code Alternative Request for the Workgroup to consider?	Not at this time.

Specific GC00096 questions

Q	Question	Response
5	Do you agree with the proposed 'Electricity Storage' definitions? Please provide your reasoning for your answer to this question. If you answered no, what would you include / amend / remove?	We note the proposed definition (Footnote 1, page 4) as being: "'Is the conversion of electrical energy into a form of energy which can be stored, the storing of that energy, and the subsequent reconversion of that energy back into electrical energy in a controllable manner'" We agree with this definition and note that it will need to be applied consistently to all storage situations in GB, including Pump Storage, to avoid any discrimination in how the Grid Code is applied and / or how the TSO treat different parties.
6	Do you agree with the decision to not define 'Energy Storage'? Please provide your reasoning for your answer to this question.	Our understanding is that 'Energy Storage' differs from the definition of 'Electricity Storage' in that with Energy Storage there is no "subsequent reconversion of that energy back into electrical energy". This being the case then Energy Storage would be; for the purposes of the Transmission (and Distribution) Network; simply demand (as we have had on the Network for many years in the form of, for example, 'Economy 7' type storage heaters). As such we agree that there is no need to formally define 'Energy Storage' within the Grid Code – it's already included via 'Demand' and it's associated definitions.
7	Do the proposed changes provide suitable flexibility for viable 'Electricity Storage' technologies and topologies? Or, do you feel these proposed changes limit the development of 'Electricity Storage' in any way or present barriers to entry (please provide supporting justification / evidence)?	It is important to ensure that a level playing field (that is where all parties offering or doing the same thing are treated the same in all circumstances) exists for all Users including all Electricity Storage providers, which (given Ofgem's minded to position as regards treating storage as generation) includes Pump Storage. It would be detrimental to competition (and thus detrimental to end consumers) if certain Electricity Storage providers were to be treated (on the false application of the word 'flexibility') in a discriminatory way to other Electricity Storage providers (including Pump Storage providers).
8	Do you believe new Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'? Please provide your	In order to ensure both a level playing field and to avoid discriminatory treatment, we believe that new Pump Storage schemes should be treated in the same way as other new Electricity Storage schemes. Furthermore, whilst we note the discussion in the

	reasoning for your answer to this question.	Workgroup Consultation around the application of this proposed change to the ECCs (thus to 'new' projects going forward) we also note the RfG Article 4 procedure; as regards the modernisation of a plant or the replacement of equipment etc.; which means that the GC0096 solution (if approved) could also apply to existing Pump Storage schemes.
9	Do you believe existing Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'. Please provide your reasoning for your answer to this question.	In principle yes, to ensure a level playing field and avoid any discriminatory treatment.
10	Do you believe if the definition of Pumped Storage should be included within the definition of Electricity Storage. Please provide your reasoning for your answer to this question.	In principle yes, to ensure a level playing field and avoid any discriminatory treatment.
11	Do you believe there are any unintended consequences behind these proposed changes, either within the Grid Code/D-Code, CUSC, BSC or elsewhere? Please provide your reasoning for your answer to this question.	It is possible that unintended consequences may arise if a non-level playing field or a discriminatory approach is followed whereby some forms of storage are treated differently to others when both are converting electrical energy into another energy form and then, subsequently, reconverting that stored form of energy back into electrical energy.
12	Do you believe that it is appropriate to apply the same approach to Storage providers as adopted for Power Generating Modules? Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be adopted.	Given Ofgem's stated position as regards the regulatory (i.e. Licence) treatment of generation and storage then, in principle, we believe that if this is the case then it is appropriate to apply the same approach; to Storage providers as adopted for Power Generating Modules; to ensure a level playing field and avoid any discriminatory treatment.
13	Do you agree that it is appropriate to include Electricity Storage within the definition of Generation and its related terms. Please provide your reasoning for your answer to this question, in	Given Ofgem's stated position as regards the regulatory (i.e. Licence) treatment of generation and storage then, in principle, we believe that if this is the case then it is appropriate to include Electricity Storage within the definition of Generation and its related terms as set out in the Glossary and

	particular, if you answered no, please state why and what different approach should be explored.	Definitions Section of the Grid Code. Therefore the quantity of proposed changes to the Grid Code that arise from GC0096 should be substantially less than those shown in the draft legal text that forms part of this Workgroup Consultation. We are concerned that the current draft legal text, which seeks to introduce a whole new classification, does not conform with Ofgem's minded to position as regards the regulatory (i.e. Licence) treatment of generation and storage. Instead it undermines and impedes Ofgem's minded to position. In our view the simplest thing would be to make the minimum necessary changes to the Glossary and Definitions section of the Grid Code only and (as per Ofgem's minded to position) as Storage is to be treated the same as Generation then all the current Generation references elsewhere in the Grid Code are 'fit for purpose' in the context of GC0096.
14	Do you believe there are any other unintended consequences behind these proposed changes? Please provide your reasoning for your answer to this question.	
15	Do you believe that it is appropriate to classify storage as an EU Code User with the premise that Generators who own or operate Electricity Storage Modules are explicitly excluded from satisfying the requirements of the EU Connection Codes and that they would not be enforceable under EU law. Please provide your reasoning for your answer to this question. Do you believe that this exclusion is adequately defined in the proposed draft changes to the Grid Code legal text?	
16	Do you agree that it is appropriate to specify that these requirements are applicable from the date on which main plant items are procured rather than the Completion Date. Please	

	provide your reasoning for your answer to this question, in particular, if you answered no, please state why you feel this is the case and if you believe there is a more appropriate solution.	
17	The current legal drafting is based on the proposed requirements being applicable based on a Storage User who had concluded Purchase Contracts for its Main Plant and Apparatus on or after 1 January 2019. This assumes implementation is based on the date main plant items are procured as noted in question 16, but do you have any preference for an implementation date. Bearing in mind the proposed changes are unlikely to be approved until mid 2019, a more appropriate date may be 1 January 2020. Do you support this implementation date? If not please state why and what alternative you believe would be more appropriate.	See our answer to Question 2 above.
18	Do you believe that Electricity Storage Modules which form part of a License Exempt Embedded Medium Power Station (LEEMPS) are adequately catered for in these provisions and it is clear that a License Exempt Embedded Medium Power Station comprising of storage would be caught by the requirements in the Grid Code from the obligations in the Distribution Code.	
19	Do you believe that the list of storage technologies shown in Annex 3 is sufficient or should	This list should include all known technologies that involves converting electrical energy into another energy form and then, subsequently, reconverting

	some technologies be added or subtracted? Please provide your reasons for your answer to this question.	that stored form of energy back into electrical energy to avoid any purported uncertainty on the part of the parties concerned. There is a helpful list provided by the European Energy Storage Association at: http://ease-storage.eu/energy-storage/technologies/ Looking at that list, there appear to be omissions from the list shown in Annex 3, such as around storage via chemical means – it would seem, for example, that converting electricity into hydrogen and then reconverting that hydrogen back to electricity via a fuel cell (or using the hydrogen in a gas engine?) would not form part of GC0096. This could provide a perverse incentive to build these types of electricity storage projects rather than, for example, a battery based or compressed air based storage project. In addition, should, for example, the list in Annex 3 also include 'StatCom' and 'Static synchronous series compensator'?
	Legal text comments	
	If you believe there are issues in the legal text, can you please bring these to our attention by using the space provided on the response proforma. These will then be discussed at the next Workgroup, following the closure of this Consultation.	See our comments above as to the need to consolidate the changes into just the Glossary and Definitions part of the Grid Code in order to avoid both duplication of work as well as the TSO discriminating in discharging their duties.

Grid Code Workgroup Consultation Response Proforma

GC0096 - Storage

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **5pm** on **11 January 2019** to grid.code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

Any queries on the content of the consultation should be addressed to Emma Hart at Emma.Hart@nationalgrid.com

Respondent:	*Thorsten Bülo, Claus Allert*
Company Name:	*SMA Solar Technology AG*
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	It's a very transparent process with lots of information.

Standard Workgroup Consultation questions

Q	Question	Response
1	Do you believe that GC0096 Original proposal or any potential alternative that you may wish to suggest better facilitates the Grid Code Objectives?	*For reference the applicable Grid Code objectives are:* *(i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;* *(ii) to facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);* *(iii) subject to sub-paragraphs (i) and (ii), to promote*

		the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole; *(iv) to efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and* *(v) To promote efficiency in the implementation and administration of the Grid Code arrangements.* *NO*
2	Do you support the proposed implementation approach?	YES
3	Do you have any other comments?	Instead of the purchase date of the main components, the date of grid connection application would be a more appropriate, since it's a well defined single date.
4	Do you wish to raise a Workgroup Grid Code Alternative Request for the Workgroup to consider?	NO

Specific GC00096 questions

Q	Question	Response
5	Do you agree with the proposed 'Electricity Storage' definitions? Please provide your reasoning for your answer to this question. If you answered no, what would you include / amend / remove?	YES – main aspect is electrical behaviour (power, voltage, current…) and not means of storing energy
6	Do you agree with the decision to not define 'Energy Storage'? Please provide your reasoning for your answer to this question.	YES – see 5.
7	Do the proposed changes provide suitable flexibility for viable 'Electricity Storage'	YES – see 5.

	technologies and topologies? Or, do you feel these proposed changes limit the development of 'Electricity Storage' in any way or present barriers to entry (please provide supporting justification / evidence)?	
8	Do you believe new Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'? Please provide your reasoning for your answer to this question.	YES – for clarification
9	Do you believe existing Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'. Please provide your reasoning for your answer to this question.	NO – not necessary, but can be
10	Do you believe if the definition of Pumped Storage should be included within the definition of Electricity Storage. Please provide your reasoning for your answer to this question.	YES – in order to be technology neutral
11	Do you believe there are any unintended consequences behind these proposed changes, either within the Grid Code/D-Code, CUSC, BSC or elsewhere? Please provide your reasoning for your answer to this question.	NO
12	Do you believe that it is appropriate to apply the same approach to Storage providers as adopted for Power Generating Modules? Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be adopted.	YES

13	Do you agree that it is appropriate to include Electricity Storage within the definition of Generation and its related terms. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be explored.	YES – but may require some additional word regarding load behaviour (during charging), as some requirements during generation (e.g. reactive power behaviour) may not be appropriately or exhaustively defined
14	Do you believe there are any other unintended consequences behind these proposed changes? Please provide your reasoning for your answer to this question.	NO
15	Do you believe that it is appropriate to classify storage as an EU Code User with the premise that Generators who own or operate Electricity Storage Modules are explicitly excluded from satisfying the requirements of the EU Connection Codes and that they would not be enforceable under EU law. Please provide your reasoning for your answer to this question. Do you believe that this exclusion is adequately defined in the proposed draft changes to the Grid Code legal text?	YES – as long as RfG applies to generation mode only
16	Do you agree that it is appropriate to specify that these requirements are applicable from the date on which main plant items are procured rather than the Completion Date. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why you feel this is the case and if you believe there is a more	In principle, YES – in order to minimize risks to all participants, but the date of connection application would be even more appropriate

	appropriate solution.	
17	The current legal drafting is based on the proposed requirements being applicable based on a Storage User who had concluded Purchase Contracts for its Main Plant and Apparatus on or after 1 January 2019. This assumes implementation is based on the date main plant items are procured as noted in question 16, but do you have any preference for an implementation date. Bearing in mind the proposed changes are unlikely to be approved until mid 2019, a more appropriate date may be 1 January 2020. Do you support this implementation date? If not please state why and what alternative you believe would be more appropriate.	In principle, YES, but the date of connection application would be even more appropriate
18	Do you believe that Electricity Storage Modules which form part of a License Exempt Embedded Medium Power Station (LEEMPS) are adequately catered for in these provisions and it is clear that a License Exempt Embedded Medium Power Station comprising of storage would be caught by the requirements in the Grid Code from the obligations in the Distribution Code.	YES
19	Do you believe that the list of storage technologies shown in Annex 3 is sufficient or should some technologies be added or subtracted? Please provide your reasons for your answer to this question.	YES

	Legal text comments	
	If you believe there are issues in the legal text, can you please bring these to our attention by using the space provided on the response proforma. These will then be discussed at the next Workgroup, following the closure of this Consultation.	NO

Grid Code Workgroup Consultation Response Proforma

GC0096 - Storage

Industry parties are invited to respond to this consultation expressing their views and supplying the rationale for those views, particularly in respect of any specific questions detailed below.

Please send your responses by **5pm** on **11 January 2019** to grid.code@nationalgrid.com. Please note that any responses received after the deadline or sent to a different email address may not receive due consideration by the Workgroup.

Any queries on the content of the consultation should be addressed to Emma Hart at Emma.Hart@nationalgrid.com

Respondent:	*Graeme Vincent* *graeme.vincent@spenergynetworks.co.uk*
Company Name:	*SP Energy Networks*
Please express your views regarding the Workgroup Consultation, including rationale. **(Please include any issues, suggestions or queries)**	

Standard Workgroup Consultation questions

Q	Question	Response
1	Do you believe that GC0096 Original proposal or any potential alternative that you may wish to suggest better facilitates the Grid Code Objectives?	*For reference the applicable Grid Code objectives are:* *(i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;* *(ii) to facilitate competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);*

		(iii) subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole; *(iv) to efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and* *(v) To promote efficiency in the implementation and administration of the Grid Code arrangements.*
2	Do you support the proposed implementation approach?	
3	Do you have any other comments?	No
4	Do you wish to raise a Workgroup Grid Code Alternative Request for the Workgroup to consider?	No

Specific GC00096 questions

Q	Question	Response
5	Do you agree with the proposed 'Electricity Storage' definitions? Please provide your reasoning for your answer to this question. If you answered no, what would you include / amend / remove?	Please note there seems to be a difference between the WG Report and the proposed legal text. The words 'in a controllable manner' have been struck through in the G&D, and therefore we understand that these words will not be included in the definition going forward so should be removed from the consultation text on page 9 to avoid any confusion. We understand the rationale behind removing these words
6	Do you agree with the decision to not define 'Energy Storage'? Please provide your reasoning for your answer to this question.	Yes – from our understanding energy storage can cover a much wider set of technologies than are being considered under this particular modification
7	Do the proposed changes provide suitable flexibility for viable 'Electricity Storage' technologies and topologies?	No response

	Or, do you feel these proposed changes limit the development of 'Electricity Storage' in any way or present barriers to entry (please provide supporting justification / evidence)?	
8	Do you believe new Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'? Please provide your reasoning for your answer to this question.	Yes but only in so far as is needed to avoid undue discrimination between these differing types of storage technology.
9	Do you believe existing Pump Storage schemes should be incorporated into the proposed approach on 'Electricity Storage'. Please provide your reasoning for your answer to this question.	Yes but only in so far as to avoid discrimination. It would not be appropriate to place new obligations and costs on existing technology which has previously been shown to be Grid Code compliant
10	Do you believe if the definition of Pumped Storage should be included within the definition of Electricity Storage. Please provide your reasoning for your answer to this question.	
11	Do you believe there are any unintended consequences behind these proposed changes, either within the Grid Code/D-Code, CUSC, BSC or elsewhere? Please provide your reasoning for your answer to this question.	Not that we have identified though we do appreciate that there is a corresponding DCode review being undertaken.
12	Do you believe that it is appropriate to apply the same approach to Storage providers as adopted for Power Generating Modules? Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be adopted.	Yes – storage is only a subset of generation and therefore can have a similar impact on the operation/design of the network as conventional power generating modules.

13	Do you agree that it is appropriate to include Electricity Storage within the definition of Generation and its related terms. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why and what different approach should be explored.	Yes – storage has been identified as a subset of generation and therefore should be included within the overall definition of generation.
14	Do you believe there are any other unintended consequences behind these proposed changes? Please provide your reasoning for your answer to this question.	Not that we are aware of or have identified.
15	Do you believe that it is appropriate to classify storage as an EU Code User with the premise that Generators who own or operate Electricity Storage Modules are explicitly excluded from satisfying the requirements of the EU Connection Codes and that they would not be enforceable under EU law. Please provide your reasoning for your answer to this question. Do you believe that this exclusion is adequately defined in the proposed draft changes to the Grid Code legal text?	Whilst it is appropriate to classify storage as an EU Code User it is also important to note that they were specifically excluded from the scope of the EU Connection Codes and as such it is appropriate that they are excluded from specific requirements arising directly from these codes
16	Do you agree that it is appropriate to specify that these requirements are applicable from the date on which main plant items are procured rather than the Completion Date. Please provide your reasoning for your answer to this question, in particular, if you answered no, please state why you feel this is the case and if you believe there is a more appropriate solution.	It is appropriate and consistent with the process adopted during the introduction of the RfG requirements.

17	The current legal drafting is based on the proposed requirements being applicable based on a Storage User who had concluded Purchase Contracts for its Main Plant and Apparatus on or after 1 January 2019. This assumes implementation is based on the date main plant items are procured as noted in question 16, but do you have any preference for an implementation date. Bearing in mind the proposed changes are unlikely to be approved until mid 2019, a more appropriate date may be 1 January 2020. Do you support this implementation date? If not please state why and what alternative you believe would be more appropriate.	This may lead to practical differences given that the modification proposal has not concluded and the enduring solution has not been finalised therefore there may be some projects which would require to apply additional technical requirements retrospectively. Therefore an appropriate length of time to allow manufacturers and developers to meet any new requirements whilst acknowledging that there is an increasing benefit for giving the additional clarity should be provided. Though a date in January 2020 does seem distant given the length of time that this modification has been in progression.
18	Do you believe that Electricity Storage Modules which form part of a License Exempt Embedded Medium Power Station (LEEMPS) are adequately catered for in these provisions and it is clear that a License Exempt Embedded Medium Power Station comprising of storage would be caught by the requirements in the Grid Code from the obligations in the Distribution Code.	Yes we believe so.
19	Do you believe that the list of storage technologies shown in Annex 3 is sufficient or should some technologies be added or subtracted? Please provide your reasons for your answer to this question.	Should regenerative braking on trains be captured in the list? Network Rail connections can spill energy back into the DNO or TO network. For recent applications Network Rail requested export capacity equipped with settlement metering. regenerative braking *noun* 1. a method of braking in which energy is extracted from the parts braked, to be stored

		and reused.
	Legal text comments	
	If you believe there are issues in the legal text, can you please bring these to our attention by using the space provided on the response proforma. These will then be discussed at the next Workgroup, following the closure of this Consultation.	**<u>Glossary & Definitions</u>** **EU Code User –** why is the 1 January significant for being treated as existing especially as there is not yet clarity for those who connect after this date (this consultation doesn't close until the 11 January 2019. It looks like they are some proposed housekeeping changes to reorder the definitions into alphabetical order. If this is the case then **GSP** (which follows Governor deadband and Governor Sensitivity (which are being moved) should also be moved from its current location. **Main Plant and Apparatus** – it is noted that there is a note saying ' Not required for Storage' however, the MP&A definition is used when defining Storage User under the EU Code User definition – so what MP&A is being referred to within the EU Code User part (e). **Registered capacity (Part C)** What the justification for adding 'auxiliary' into this definition? **European Connection Conditions** Under ECC.6.3.3.1, first paragraph should be **E**CC.6.3.3.1.1. (appreciate that this not strictly related to Storage but it does appear that there are more than just storage changes being made eg. ECC.6.3.3.1.1(d) where 'or an Embedded Power Station' has also been added. ECC.6.3.9.1 – is there is an extra space between 'capability' and 'of' in the text which has been added. ECC.6.6.2.2 - paragraph doesn't align with numbering **European Compliance Processes** ECP.A.6.4.6 – Company should be bold text

		Operating Code 11 – are the changes proposed strictly necessary to accommodate Energy Storage? BC2.A.3.2 – reference should be to GC.6 **Data Registration Code** Schedule 16 – add space between Electricity and Storage