Initial Assessment	**GC0117** Improving transparency and consistency of access arrangements across GB by the creation of a pan-GB commonality of generator requirements
Purpose of the document	**GC0117** was raised by SSE Generation Ltd on the 20 June 2018. The **Grid Code Review Panel** reviewed the modification and decided to set up a Workgroup to assess the modification. The initial Proposal form can be located at the following link: https://www.nationalgrideso.com/codes/grid-code/modifications/gc0117-improving-transparency-and-consistency-access-arrangements The Panel specified that as part of their Terms of Reference they require an Initial Assessment of the scale, scope and wider implications, to be submitted to them following the initial Workgroup meeting(s). The Grid Code Review Panel and Code Administrator can then use the information provided to inform Industry of the potential impacts and assess Workgroup membership and potential cross code impacts.

Contents

1 How does Large, Medium and Small work today?

The concepts of Large, Medium and Small Power Stations were introduced at Privatisation in 1990 and have been a cornerstone of the industry codes since that time.

They define-

- The Connection Process
- Charging Arrangements
- Connection and Operational Requirements

At privatisation, there were separate arrangements for England & Wales, and Scotland (ie a separate Grid Code existed for England & Wales from that which existed for

Scotland) and there were differences in the thresholds used to differentiate between Large, Medium and Small power stations.

With the introduction of BETTA in 2005, the England & Wales and Scottish Grid Codes were merged to form the GB Grid Code. As a consequence of this merger, and the alleged significant differences between the design and operational characteristics between the Scottish System and the England and Wales System, these regional differences were reviewed, and some minor revisions made but overall were maintained, ie the definition of Small, Medium and Large remains different for each Transmission Area. At the time of BETTA, details of these regional differences were discussed in a Regional Differences Working Group (RDWG) which reported to the Grid Code Review Panel. This Working Group requested a report from National Grid to summarise the role of the regional differences in operating the system. The current arrangements are defined in the Grid Code and are outlined below:

The categorisation is based on the Registered Capacity of a Power Station and not CEC / TEC or any other commercial product;

Large

- England and Wales Transmission Area – 100MW or Greater
- SPT Transmission Area – 30 MW or greater
- SHETL Transmission Area – 10MW or greater
- Offshore Transmission Area – 10MW or greater

Medium

- Applies only in England and Wales – 50 MW or greater but less than 100MW

Small

- England and Wales Transmission Area – Less than 50MW
- SPT Transmission Area – Less than 30MW
- SHETL Transmission Area – Less than 10MW
- Offshore Transmission Area – Less than 10MW

These thresholds determine what part (if any) of the Grid Code Generators are required to comply with.

With the approval by Ofgem of the Grid and Distribution Code modifications associated with the implementation of the European Network Code '**Requirements for Generators'** on 16 May 2018, the connection requirements are now mainly based on whether the Power Generating Module is of ***Type, A, B, C or D*** rather than the Power Station size. These requirements are common across the whole of the GB synchronous area.

- **Type A** 800W – <1MW
- **Type B** 1MW – <10MW
- **Type C** 10MW – <50MW
- **Type D** 50MW and above or connected at or above 110kV

The connection process, charging arrangements and participation in the BM however are still dependent upon the Large, Medium and Small criteria as described below:

As the Connection and Use of System Code (CUSC) and Grid Code apply to Large Power Stations (irrespective of whether the Power Station is embedded or directly connected) it means that the following generators:

- SPT Transmission Area – 30 MW or greater
- SHETL Transmission Area – 10MW or greater
- Offshore Transmission Area – 10MW or greater

will have to meet the applicable requirements of the Grid Code (including BC1 and BC2), the CUSC and have an agreement with National Grid whereas in England and Wales generators up to 100MW would only require a connection agreement with the DNO and have to meet the Distribution Code requirements (although Embedded Medium Power Stations do have to meet some Grid Code obligations -see below).

Hence all embedded 10MW Power Stations in the north of Scotland have to have an agreement with National Grid, be a party to CUSC and satisfy the requirements of the Grid Code whereas none of this would apply to a 10MW embedded Power Station in the south of Scotland or England and Wales. Equally for generation in the south of Scotland (Scottish Power's Transmission Area) an embedded Power Station of 30MW or greater has to be a party to the CUSC and satisfy the requirements of the Grid Code whereas this would not apply to the same size plant in England and Wales.

Generators with Power Stations in England and Wales of between 50 – 100MW are not parties to the CUSC nor have an agreement with National Grid though, through the arrangements under LEEMPS (Licence Exempt Embedded Medium Power Stations), they would be required to satisfy certain requirements under the Grid Code – mainly relating to data and technical requirements through obligations in the Distribution Code. They would not be required to satisfy the requirements of BC1 and BC2 which would be a requirement on a Generator with a Large Embedded Power Stations in Scotland less than 100MW

When is a Generator caught by the requirements of the Grid Code?

This is defined in both the CUSC and the Grid Code but can be summarised as being where the generation is:

- directly connected (irrespective of being Small, Medium or Large)
- Large (either embedded or directly connected)
- Embedded Medium or Small and applies for TEC
- a LEEMPS (Licence Exempt Embedded Medium Power Stations)
    - Generators with a LEEMPS are not CUSC parties and there is no contract between National Grid and. DNOs however do have obligations under CUSC in respect of LEEMPS
    - Generators with a LEEMPS have to meet specific requirements of the Grid Code in relation to data submission (PC.3.3) and technical requirements (CC3.3 / ECC3.3) through obligations in the Distribution Code

- Generators with a LEEMPS do not need to satisfy the requirements of the Balancing Codes or Operating Codes unlike generators with BELLAs.
- Any site specific requirements that National Grid require from a LEEMPS are placed in the agreement (Appendix E) between National Grid and the DNO which the DNO in turn places on the Generator through its connection agreement.

What is the relationship between Small, Medium and Large and Type A, B, C and D?

- Type A, Type B, Type C and Type D relates to the rating of Power Generating Modules as defined in the Grid Code. The thresholds between each Type are the same across GB and they define the technical requirements which are required of each module. There are no regional differences between Type A – D Power Generating Modules. The technical requirements for Type A, B, C and D Power Generating Modules are broadly the same in the Grid Code and DCode (implemented via EREP G99 and there are no significant differences between them other than in respect of site specific requirements specified by the System Operator (be this either the Transmission System Operator or Distribution Network Operator).
- A Small, Medium or Large Power Station could generally be made up of any combination of a Type A, Type B, Type C or Type D Power Generating Modules.
- If a Power Generating Module is connected at 110kV or above, it is classified as Type D.

2 Scope of modification

Scope

The Workgroup agreed the following scope at the initial Workgroup meeting that was held on 11 October 2018;

- To consider harmonisation (ie removal) of the regional differences for Small/Medium/Large
- To consider simplification of the existing system of generator classifications that now include those established through implementation of RfG
- That the modification would only cover pump storage (not any other type of Storage) but should the Authority publish or indicate that this should be different this would be reassessed at a later stage in the process
- That this modification **would not** cover demand
- That this modification **would** cover data exchange requirements

It was noted by the Workgroup that they should ensure that the solution(s) developed should be in harmony with the work that is being undertaken by the Open Networks forum.

- It was further noted that the Workgroup cannot address impacts on the CUSC and the BSC that may be caused by a re-assessment the 'Large' classification in the Grid Code which is used in these codes, but can highlight such possibilities.

The Proposer noted during the development of this Impact Assessment that it was not the intention with GC0117 to oblige existing Small, Medium or Large power station owners to retrospectively meet more onerous connection conditions than they do currently. In simple terms if an existing party had to comply with the 'CC' Connections Conditions today then, with GC0117, they would not have to retrospectively comply with the 'ECC' Connections Conditions.

The only situation where this would not be the case would be where, in accordance with Article 4 (RfG), they substantially modified their plant such that it was no longer classified as 'existing' but, according to RfG, it was classified as 'new' in which case, depending upon the modifications etc., undertaken on the plant they may have to comply with some (or all) of the ECCs – but that would not be because of this GC0117 change.

For the avoidance of doubt, as the system operational requirements, such as data provision, metering etc, are set out in SOGL rather than, for example, the RfG, DCC or HVDC connection codes, these apply to both 'new' and 'existing' parties based, in the case of generation, on whether the PGMs are Type A or B or C or D. As such these operational requirements would be retrospectively applied irrespective of whether a generator was historically classified as Small, Medium or Large. Similarly, in respect of the balancing requirements set out in EBGL, these would also be applied to both 'new' and 'existing' parties.

Noting that this modification is only concerned with changes to the Grid and Distribution Codes, it is worth considering that the 'large' threshold is currently used in the CUSC and BSC to determine the size at which connection agreements are required with the ESO and BM participation becomes mandatory. Whilst it is up to these panels to determine how they reflect any changed arrangements in the Grid Code going forwards, the workgroup does need to be mindful of this interaction and the likelihood that Ofgem would expect any associated changes to be presented to them for a decision at the same time rather than being consequential.

3 Analysis completed by Workgroup

The first assessment that the Workgroup have undertaken was to look at what requirements are currently in place for generators based on whether they are categorised as Large, Medium or Small across the Grid and Distribution Codes (where appropriate). This will assist in assessing what impact any potential solutions could have.

3.1 What are the differences in the Grid Code requirements between Small, Medium and Large?

If a power station is directly connected there is very little difference between the Small, Medium and Large requirements other than a few minor data items and technical requirements - some minor differences apply in terms of how specific items are delivered – eg operational metering.

The table below sets out the main Grid Code requirements for transmission connected power stations:

Transmission Connected

Grid Code Requirement	Transmission Connected Small	Transmission Connected Medium	Transmission Connected Large
Planning Code	Y	Y	Y
European Connection Conditions	Y	Y	Y
European Compliance Processes	Y	Y	Y
Operating Codes	Y	Y	Y
Balancing Codes	Y	Y	Y
Data Registration Code	Y	Y	Y

The differences in the Grid Code DRC requirements transmission connected power stations are set out below:

DRC Schedule	Transmission Connected Small	Transmission Connected Medium	Transmission Connected Large
Schedule 1 – Power Generating Module and HVDC Data	Y	Y	Y
Schedule 2 – Generating Planning Parameters		Y (Part)	Y
Schedule 3 – Large Power Station Outage Programmes, Output Useable and Flexibility Information			Y
Schedule 4 – Large Power Station Droop and Response Data			Y
Schedule 5 – Users System Data	Y	Y	Y
Schedule 6 – Users Outage Information	Y	Y	Y
Schedule 7 – Load Characteristics at Grid Supply Points			
Schedule 8 – Data supplied by BM Participants	Y	Y	Y
Schedule 9 – Data supplied by The Company to User's	Y	Y	Y

DRC Schedule	Transmission Connected Small	Transmission Connected Medium	Transmission Connected Large
Schedule 10 – Demand Profiles and Active Energy Data			
Schedule 11 – Connection Point Data			
Schedule 12 – Demand Control			
Schedule 13 – Fault Infeed Data			
Schedule 14 – Fault Infeed Data (Generators)	Y	Y	Y
Schedule 15 – Mothballed Generating and HVDC Data	Y	Y	Y
Schedule 16 – Black Start Information			Y
Schedule 17 – Access Period Data			
Schedule 18 – Offshore Transmission System Data			
Schedule 19 – User Data File Structure Data	Y	Y	Y

The table below sets out the main Grid Code requirements for distribution connected power stations:

Distribution Connected

Grid Code Requirement	Embedded Small	Embedded Small (BEGA)	Embedded LEEMPS	Embedded Medium (BEGA)	Embedded Large (Scotland) with BELLA	Embedded Large
Planning Code	No	Part	Part as defined under PC3.3	Y	Y	Y
European Connection Conditions	No	ECC.6.5 (Note equivalent RfG requirements	Part as defined under ECC3.3	Y	Except EDL	Y

		are applied by the D Code)				
European Compliance Processes	No	Y	No	Y	Y	Y
Operating Codes	No	Part	No	Y	Y	Y
Balancing Codes	No	Only in respect of them operating as a BM Participant	No	Part	BC1/2 apply only in respect of Generating Units not BM Units BC3 does not apply	Y
Data Registration Code	No	Only in respect of them operating as a BM Participant	As required under PC	Y	Y	Y

3.2 What are the implications of changing the Large, Medium and Small boundaries?

Two cases have been considered relating to changing the Large, Medium and Small boundaries.

Case 1 Transition from Small to Medium (note Small is not used in the Distribution Code)

The case considers that the requirements for generators currently categorised as Small or Medium would be considered as being Medium. The table below identifies those additional DCode requirements that would apply to Small power stations.

Given that all the Medium power station performance requirements are now included in G99, there seems to be a case to ensure that data and operational issues are appropriately documented in G99 (to the extent that they might not be) and then remove the concept of Medium from distribution documents. The concept of Large and Small power stations has already gone.

Ref	Text	Implications
DPC7.3.3(a)	The DNO has an obligation under PC3.3 of the Grid Code to submit certain planning data relating to Embedded Medium Power Stations to NGC. The relevant data requirements of the Grid Code are also listed in PC3.3 of the Grid Code. It is incumbent on Embedded	Reducing this threshold will extend the observability area (PCA2.2.2b) to the power station. Fault infeed and other data might be more onerous than is currently requested in the D Code. DNOs will have to provide more network constraint data.

Ref	Text	Implications
	Medium Power Stations to provide this data listed in PC3.3 of the Grid Code to the DNO.	Additional loading points (MLP1-6) required. Mothballed information required.
DPC7.5.2	In addition to the requirements in DPC7.4, the DNO has an obligation under CC 3.3 of the Grid Code to ensure that all relevant Grid Code Connection Condition requirements are met by Medium Power Stations. These requirements are summarised in CC 3.4 of the Grid Code. It is incumbent on Medium Power Stations to comply with the relevant Grid Code requirements listed in CC3.4 of the Grid Code as part of compliance with this Distribution Code.	In general (and possibly 100% completely) these requirements are all met from the Type C and Type D performance requirements on new generators.
DPC7.5.4.4	The technical designs and parameters of the Embedded Medium Power Stations will comply with the relevant Connection Conditions of the Grid Code. A statement to this effect, stating compliance with OC5.8 of the Grid Code is required to be presented to the DNO, for onward transmission to NGC, before commissioning of the Power Station.	In general (and possibly 100% completely) these requirements are all met from the Type C and Type D performance requirements on new generators.
DOC5.6.1.1	NGC may, from time to time, but generally not more than twice in any calendar year, request that the DNO procure from the Generator a statement confirming compliance with the relevant Grid Code Connection Conditions at the Embedded Medium Power Station not subject to an embedded generation agreement in question.	In general (and possibly 100% completely) these requirements are all met from the Type C and Type D compliance requirements on new generators.
G59 10.3.2 (note no equivalent in G99)	LoM is mandatory for all Small Power Stations. For Medium and Large Power Stations the DNO will advise if LoM is required. The requirements of	The DNO would need to advise the Generator – via the Connection Offer

Ref	Text	Implications
	10.5.2 apply to LoM protection for all Power Stations.	

Case 2 Transition from Small or Medium to Large (note Small and Large are not used in the Distribution Code)

The case considers that the requirements for generators currently categorised as Small or Medium would be considered as being Large. The table below identifies those additional CUSC requirements that would apply to Small and Medium power stations.

There are no obvious requirements in the D Code or G59 or G99 that are not just a redirection to the Grid Code.

Ref	Text	Implications
CUSC 6.5.1(b) and (c)	(a) Any User who owns or operates a Distribution System shall not Energise the connection between a Large Power Station (other than an Embedded Exemptable Large Power Station where the provisions of Paragraph 6.5.1(b) and (c) apply) and its Distribution System nor permit the use of its Distribution System by the same until the person owning or operating the Large Power Station has entered into a Bilateral Agreement in the appropriate form with The Company and (if such person is not already a party to CUSC) has entered into an Accession Agreement. (b) Any User who owns or operates a Distribution System shall not Energise the connection between any Embedded Exemptable Large Power Station and its Distribution System nor permit the use of its Distribution System by the same until the person who owns or operates the relevant Embedded Exemptable Large Power Station has (if such person is not already a party to the CUSC) entered into an Accession Agreement, and until The Company has confirmed to the User that any Transmission Reinforcement Works associated with the Embedded Exemptable Large Power Station listed in the	Whatever the relevant Large threshold is, a DNO cannot connect a Large Power Station without allowing NG to contract with it directly.

	relevant Construction Agreement have been completed. (c) Without prejudice to Paragraph 6.5.1(b), any User who owns or operates a Distribution System shall use its best endeavours to procure that any person who owns or operates an Embedded Exemptable Large Power Station and with whom the User has an agreement for connection to or use of the User's Distribution System shall (if such person is not already a party to the CUSC) enter into an Accession Agreement.	

3.3 Balancing and Settlement Code, D Code and Connection and Use of System Code Impact

Should the threshold of 'Large' be amended as part of this modification this may have an impact on the BSC, D Code and the CUSC. The scale of the impact will be determined by which solution(s) are considered and put forward to the Authority. The Code Administrator recommends reviewing whether a BSC, a D Code and / or a CUSC modification is required, where a defect is identified, throughout the development of this modification. The Code Administrator will consider any cross code working based on the impact of any solutions developed.

It is worth noting that the CUSC does not seem to have any concept of retrospective action – so a lowering of the Large threshold in England and Wales would force the DNOs to allow NGESO to enter into BELLA type contracts with each Generator affected. This need will need further analysis.

4 Potential solutions

The Workgroup and Proposer will be considering the following options in order to form a solution and any alternative solutions for the Authority to consider. The initial thoughts on the advantages and disadvantages for each of the solutions have also been included below. In all cases it is assumed that the concept of a Medium Power Station is removed and that Large and Small are adopted going forward. The options below detail the options for different thresholds between Large and Small.

A key consideration is whether to retain the concept of Large and Small relating to Power Stations, or whether for the purposes of harmonization it is better to focus on Power Generating Modules, both for new installations and existing (in which case the RfG definitions of PGM would need to be applied to existing installations).

Option 1:

Align across GB with SHET Transmission Area 'large' threshold

Generator Size	Direct Connection to:

	SHET	SPT	NGET
Small	<10MW	<10MW	<10MW
Large	10MW+	10MW+	10MW+

Option 2:

Align across GB with SPT Transmission Area 'large' threshold

Generator Size	Direct Connection to:		
	SHET	SPT	NGET
Small	<30MW	<30MW	<30MW
Large	30MW+	30MW+	30MW+

Option 3:

Align across GB with NGET Transmission Area 'medium' threshold

Generator Size	Direct Connection to:		
	SHET	SPT	NGET
Small	<50MW	<50MW	<50MW
Large	50MW+	50MW+	50MW+

Option 4:

Align across GB with NGET Transmission Area 'large' threshold

Generator Size	Direct Connection to:		
	SHET	SPT	NGET
Small	<100MW	<100MW	<100MW
Large	100MW+	100MW+	100MW+

Advantages and disadvantages of each potential option

	Advantages	*Disadvantages*

Option 1 ***10MW Threshold***	▪ Aligns with RfG 'type B'/'C' threshold ▪ Aligns with offshore requirements ▪ Achieves wider BM access an important aspect at a time when balancing costs are rising so the ESO will have visibility down to 10MW ▪ Gives operational support at lower sizes than currently in SPT and NGET TO areas	▪ Cost to generators in SPT and NGET areas ▪ Additional data requirements ▪ Additional administration costs in satisfying both Grid Code and D Code. Additional costs would fall on DNOs/TOs. DNO costs would be connection design costs and enduring provision of information costs.
Option 2 ***30MW Threshold***	▪ Achieves wider BM access as BM threshold brought down to 30MW instead of 100MW ▪ Greater SO visibility ▪ Gives operational support at lower sizes than currently in NGET TO areas	▪ Cost to generators in NGET area ▪ Reduction in system support in SHET TO area ▪ Less visibility to National Grid as ESO in Scotland
Option 3 ***50MW Threshold***	▪ Aligns with RfG 'type C/D' threshold ▪ Achieves wider BM access in E&W ▪ Gives operational support at lower sizes than currently in NGET TO area ▪ Greater visibility to National Grid as ESO	▪ Cost to generators in NGET area ▪ Reduction in system support in SHET and SPT TO areas ▪ Less visibility to National Grid as ESO in Scotland
Option 4 ***100MW Threshold***	▪ Reduction in costs to smaller generators, particularly in SHET and SPT areas (need to consider treatment of 'medium' in NGET area)	▪ Doesn't align with RfG ▪ Reduction in system support in SHET and SPT TO areas ▪ High Balancing Costs potentially ▪ Less visibility to National Grid as ESO than currently

Implications of changing the Thresholds

As part of this Impact Assessment one of the main questions is what it would mean if, say, the threshold between Small and Large was changed to 10MW. The same arguments apply irrespective of this threshold, but the list below attempt to summarise these issues.

Although the requirements for connexion are not intended to be retrospective, any change in thresholds for compliance with operational or market requirements is likely to drive some retrospective requirements.

Going forward, if a new embedded 10MW generator was being connected in England and Wales, the Generator would:

- require a bilateral agreement with National Grid;
- need to become a party to the CUSC;
- have to meet the applicable requirements of the Grid Code in the same way as a Generator with BELLA would in the north of Scotland – ie meet PC3.3 and ECC 3.3 (although Type C and Type D have to meet ECC 3.3 requirements anyway); and
- have to meet the requirements of BC1 and BC2.

In addition, LoM protection requirements for Power Stations in the 10-50 MW range would need to be reviewed.

At this stage and one issue that would require further discussion is how you introduce old Small, Medium and Large with New Large and Small.

5 Summary of the Impact Assessment

This Impact Assessment has identified a number of issues that should be considered further by the Workgroup:

- The operational requirements and the need or otherwise for the proposal to be retrospective
- Whether the proposal would affect any existing power stations (or have potential implications depending on the GB implementation of SOGL)
- The areas of the DCode, CUSC and BSC that would need to be considered further by their respective Panels
- Etc etc referring back to the scale, scope and wider implications

