GC0101: Code Admin Consultation Responses

Grid Code Administrator Consultation Response Proforma

GC0101 – EU Connection Codes GB Implementation – Mod 2

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 Friday 2 February 2018** 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.

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Respondent:	*Andy Vaudin* *andrew.vaudin@edfenergy.com*
Company Name:	*EDF Energy*
	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.*

1. Do you believe GC0101 better facilitates the Applicable Grid Code Objectives? Please include your reasoning	Yes. This modification enables the Grid Code to be consistent with the applicable European Network Code requirements.
2. Do you support the proposed implementation approach? If not, please provide reasoning why.	Yes.
3. Do you have any other comments?	None

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Respondent:	*Bernard Gospel (Technical Secretary)*
Company Name:	*The Association of Manufacturers of Power generating Systems (AMPS)* *The Association for Decentralised Energy (ADE)* *Joint Submission*
	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.*
1. Do you believe GC0101 better facilitates the Applicable Grid Code Objectives? Please include your reasoning	The original better facilitates the Grid Code objectives than the baseline as it implements the RfG requirements.
2. Do you support the proposed implementation approach? If not, please provide reasoning why.	Yes
3. Do you have any other comments?	We support the general principle that has been applied in developing this mod of matching the existing Grid Code requirements wherever possible. We have discovered what we believe is a serious defect in the drafting of ECC 6.3.7.1.2 and ECP A.5.8 as far as Type B PGMs is concerned. Type B is only required to have LFSM-O, but ECP only has a test regime that assumes FSM. Further, there is not clarity about what "as much as possible" means in practice in ECC 6.3.7.1.2(iii). We believe you understand the unmeetable challenge that this drafting makes for diesel/gas driven synchronous PGMs in the 1-5MW size range. We believe that more work is urgently needed to modify the legal text here (and the consequential requirements in G99). We would be happy to work with NG and the DNOs to achieve an rapid modification of this text as soon as possible given the necessary change processes.

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Respondent:	*Greg Middleton MSc Principal Engineer* *Greg.middleton@deepseaplc.com* *01723 890099*
Company Name:	*Deep Sea Electronics Plc*
	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.
1. Do you believe GC0101 better facilitates the Applicable Grid Code Objectives? Please include your reasoning	The original better facilitates the Grid Code objectives than the baseline as it implements the RfG requirements.
2. Do you support the proposed implementation approach? If not, please provide reasoning why.	Yes
3. Do you have any other comments?	We support the general principle that has been applied in developing this mod of matching the existing Grid Code requirements wherever possible.

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Respondent:	*Steve Cox* *Steve.cox@enwl.co.uk*
Company Name:	*Electricity North West*
	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.
1. Do you believe GC0101 better facilitates the Applicable Grid Code Objectives? Please include your reasoning	Yes
2. Do you support the proposed implementation approach? If not, please provide reasoning why.	Yes
3. Do you have any other comments?	No further comments

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Respondent:	Alastair Frew
Company Name:	ScottishPower Generation
	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.*
1. Do you believe GC0101 better	Yes and it implements European Law

facilitates the Applicable Grid Code Objectives? Please include your reasoning	
2. Do you support the proposed implementation approach? If not, please provide reasoning why.	Yes
3. Do you have any other comments?	No

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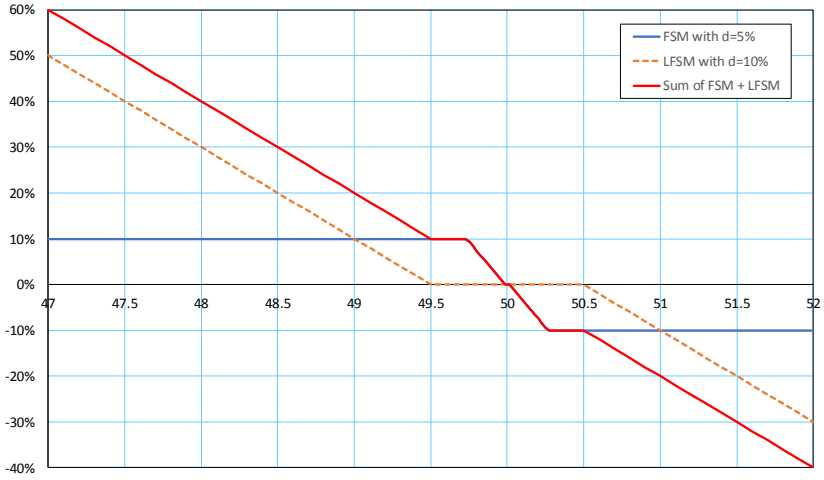
Respondent:	*Andrejs Svalovs, andrejs_svalovs@ge.com*
Company Name:	*GE Power*
	For reference the applicable Grid Code objectives are: *(i) to permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;* *(ii) to facilitate 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.*
1. Do you believe GC0101 better facilitates the Applicable Grid Code Objectives? Please include your reasoning	Yes, for the national implementation of the Connection Codes
2. Do you support the proposed implementation approach? If not, please provide	Yes

reasoning why.	
3. Do you have any other comments?	In regards to the Type C and D, a cumulative operation of FSM and LFSM-O(-U) would be clarified. An example of the minimum requirements for a combined operation of FSM and both LFSMs over the full GB frequency range would be useful. Our interpretation below:  If this interpretation is correct, there is a frequency range when no any further change of the output is expected (e.g. 49.3-45.5 Hz), the output stays flat. Would be useful to clarify if these flat regions are definitive requirements, or a continuation of the governor response will be acceptable. An example would show responses above the minimum line, still being acceptable. For example, an existing GB-FSM looks to be above the minimum cumulative requirements of ECC-FSM plus ECC-LFSMU, thus satisfying the ECC.6.3.7.3.2 together with ECC.6.3.7.3. Considering the minimal requirements can be surpassed, another workaround would be not to limit the power change to +/-10% but to change the droop at the respective frequency deviations to 10%. This would then correspond to a change of the onset frequencies of the LFSM-U and LFSM-O to values closer to the nominal frequency (but only for FSM on).
	Reference to Pmax in ECC.6.3.7.3.3 In regards to the Combined Cycle Power Plant, a reference to Pmax is not absolutely clear, as the CC output depends on the ambient conditions. Please clarify if this effectively refers to the output at the coldest day, or the current / typical ambient conditions would apply in defining the Maximum Capacity.

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Respondent:	*Dr. Isaac Gutierrez* *Senior Electrical Engineer* *Telephone number work: 01416143104* *Mobile: 07761693652* *Email: igutierrez2@scottishpower.com*
Company Name:	*Scottishpower Renewable ltd (UK)*
	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.
1. Do you believe GC0101 better facilitates the Applicable Grid Code Objectives? Please include your reasoning	Yes
2. Do you support the proposed implementation approach? If not, please provide reasoning why.	No, timescales for implementation of the modifications are being rushed and a grace period shall be implemented so developers that are in contract negotiations with manufacturer of generating equipment now are not penalised later with additional cost in order to meet the new Grid Code requirements
3. Do you have any other comments?	No

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Respondent:	*Dr. Tim Ellingham* *Connections Manager* *RWE Supply and Trading, RWE Generation* *Windmill Hill* *Swindon* *SN5 6PB*
Company Name:	**RWE Generation UK**
	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.

1. Do you believe GC0101 better facilitates the Applicable Grid Code Objectives? Please include your reasoning
Not in its current form, please see the next section.
2. Do you support the proposed implementation approach? If not, please provide reasoning why.
Context: *This proposal seeks to modify the Grid Code to comply with the obligations in the EU Connection Codes:* *1. Set the Voltage & Reactive requirement in GB, as required in RfG; and HVDC; and* *2. Set the Frequency requirements in GB, as required in RfG and HVDC* RWE believes that on the grounds of inconsistency and onerous requirements; this code cannot be fully appraised on implementation approach. Specifically, RWE believes that the following clauses require significant review and amendment prior to the code entering into UK legislation. **1 Operation above Rated MW** Removal of clause CC.6.3.2 a) i) constitutes a significant modification to the Grid Code: • which is not mandated by the EU Regulation • which is more onerous than the current grid code • and which is therefore beyond the scope of the changes permitted within this Code Modification, therefore requiring independent consultation and review. Grid code objectives include: "*to facilitate competition in the generation and supply of electricity...*" and "*…to promote the security and efficiency of the electricity generation…*". Due to the impact removal of this clause will have on asset efficiency and capability, it is RWE's belief that this modification is in opposition to these objectives, where these are considered in the full context of the Grid Code Objectives. Dependant on the enduring definitions (and including the current proposed definitions) of "**GB / EU Code User**", removal of this clause is potentially life limiting for existing Onshore Synchronous Generation assets, for which modification or upgrade is an option. There is also a significant impact on commercial expectations and business planning for new Onshore Synchronous Generation assets, as the as the main plant and apparatus must either be overrated, or some MW capability sacrificed. Further, in previous bilateral communications with the implementation team, no satisfactory response has been provided as to why clause CC.6.3.2 a) i) cannot be translated into the European Connection Conditions. Reference was made to conversion between current Stator Terminal reactive capability definition to a Grid Entry Point definition, but there is no

justification for why clause CC.6.3.2 a) i) cannot also be translated in this manner.

Based on the above, a power factor option for Onshore Synchronous Power Generating Modules operating above Rated MWs (Maximum Capacity) should be included, using the same transposition method as was used to convert 0.95/0.85 to +/-0.92pf.

For reference CC.6.3.2 a):

> In addition to the above paragraph, where **Onshore Synchronous Generating Unit(s)**:
>
> (i) have a **Connection Entry Capacity** which has been increased above **Rated MW** (or the **Connection Entry Capacity** of the **CCGT module** has increased above the sum of the **Rated MW** of the **Generating Units** compromising the **CCGT module**), and such increase takes effect after 1st May 2009, the minimum lagging **Reactive Power** capability at the terminals of the **Onshore Synchronous Generating Unit(s)** must be 0.9 **Power Factor** at all **Active Power** output levels in excess of **Rated MW**. Further, the **User** shall comply with the provisions of and any instructions given pursuant to BC1.8 and the relevant **Bilateral Agreement**; or
>
> (ii) have a **Connection Entry Capacity** in excess of **Rated MW** (or the **Connection Entry Capacity** of the **CCGT module** exceeds the sum of **Rated MW** of the **Generating Units** comprising the **CCGT module**) and a **Completion Date** before 1st May 2009, alternative provisions relating to **Reactive Power** capability may be specified in the **Bilateral Agreement** and where this is the case such provisions must be complied with.

For clarity, an example is outlined below to highlight the impact on generators:

Generator A (GB Code User) has a rating of 500MVA and an auxiliary load of 10MW.

- Rated MW at 0.85p.f. equates to 425MW
- Operation above Rated MW at 0.9p.f. equates to 450MW
- Declared Registered Capacity is therefore 440MW

Generator B (EU Code User) has a rating of 500MVA and an auxiliary load of 10MW.

- Maximum Capacity at 0.92p.f. equates to 0.85p.f. (Rated MW) on the generator terminals
- Maximum Capacity is therefore 415MW (taking into account auxiliary load)

Therefore a EU Code generator would have a **25MW** deficit compared to a GB Code generator in this example.

This is not as significant an issue for new generators, who can over-specify their generator rating, however this has an impact on GB Code Users' who may find themselves redefined as an EU Code User. That said, over-specification of assets is also not in the spirit of efficient & economic generation.

2 Simultaneous V & F Requirement

We acknowledge that Article 16.2(a)(ii) of the RfG enables National Grid to write in the requirement for operation under simultaneous voltage and frequency events, however we are unhappy with the final legal text in ECC.6.3.13.5.

Our interpretation is that to avoid having to over-specify plant in order to cope with the extreme events, we would need to request permission from National Grid in order to install

protection suitable for protecting our plant from damage due to operation outside of their design parameters.

This request is not in the spirit of fair competition and Code transparency, this could result in generators all having individual operating points with settings dependant on how well they negioate terms with National Grid.

Our preference would be the continued allowance for generators to specify appropriate protection for their plant, however if National Grid feel that they need to specify a minimum requirement, then they should refer to appropraite electrical equipment standards and set limits according to those which the plant has been constructed to.

3. Do you have any other comments?

None.

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Respondent:	*Paul Youngman* *paul.youngman@Drax.com*
Company Name:	*Drax Power Limited*
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1. Do you believe GC0101 better facilitates the Applicable Grid Code Objectives? Please include your reasoning	Yes. It satisfies objective (iv) to the extent that it introduces into the Grid code the requirements of European Network codes, and is therefore better than the baseline. The modification can also be seen as enabling aspects of Objective (i) and (iii) relating to the efficient maintenance and operation of the system and enhancing aspects of security of supply.
2. Do you support the proposed implementation approach? If not, please provide reasoning why.	Yes
3. Do you have any other comments?	No comment.

Grid Code Administrator Consultation Response Proforma

GC0102 – EU Connection Codes GB Implementation – Mod 3

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Respondent:	*Alan Creighton*
Company Name:	*Northern Powergrid*
	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.*
1. Do you believe GC0102 or its	Our comments relate generally to GC0100,

alternative solution better facilitates the Applicable Grid Code Objectives? Please include your reasoning	GC0101 and GC0102. We believe that the Original proposals better facilitate the GCode objectives (i), (ii) and (iii) as they facilitate the implementation of the EU RfG network code in an open and transparent manner.
2. Do you support the proposed implementation approach? If not, please provide reasoning why.	Yes
3. Do you have any other comments?	We have two observations related to the draft code changes: **Glossary and Definitions** included as GC0100. There are some changes which are DCC related rather than RfG related; it is inappropriate to include these in a RfG focussed change. Of particular concern is the definition of a GB Code User. The proposed definition of a GB Code User c) A **Network Operator** or **Non Embedded Customer** whose **Main Plant and Apparatus** was connected to the **System** before 7 September 2018 or who had placed **Purchase Contracts** for its **Main Plant and Apparatus** before 7 September 2018 or has not **Substantially Modified** their **Plant and Apparatus** after 7 September 2018. Should be changed to: c) A **Network Operator** or **Non Embedded Customer.** **DRC**. Schedule 11 page 68 is unclear whether DNOs are required to report the number of Generation Units or PGMs installed at a Power Station.

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Respondent:	*Rob Wilson* *Robert.wilson2@nationalgrid.com* *07799 656402*
Company Name:	*National Grid*
	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.
1. Do you believe GC0101 better facilitates the Applicable Grid Code Objectives? Please include your reasoning	National Grid as the GB SO supports the original proposal to which no alternative was progressed by the workgroup. Note that the choice of fault ride through parameters in GC0101 (specifically the post-fault retained voltage) led to the need to demarcate between smaller diesel plant and larger gas turbines to avoid compromising a class of generator while also maintaining operational support, and hence to the need for a B/C threshold of 10MW as in the original proposal for GC0100. An assessment of the original proposal against the Grid Code objectives is as follows: *i. To permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity* Positive. In developing this code modification the task of the workgroup has been to find a balance between the costs that will be incurred by owners of equipment in complying with a more onerous specification and the benefit to the system in avoiding operational costs that would otherwise be incurred in providing support due to the connection of less capable equipment. This is also the aim of the European Network Codes as stated by ENTSO-E and is particularly important given the development of the system and the shift in the generation portfolio from larger, centrally despatched units to smaller and embedded renewable generation. *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. Ofgem have made clear during the workgroup proceedings that their decisions will be based on evidence in both directions – ie that where choices are made these are based on a tipping point being reached where the costs of choosing more onerous settings is evidenced to outweigh the operational benefit. Evidence

	supporting the National Grid proposal is provided in the report. *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, as stated above, in making balanced choices for the overall benefit of the end consumer. *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* Positive. This modification is required to implement elements of the 3 European Connection Codes forming part of the suite of European Network Codes resulting from the EU 3rd Package legislation (EC 714/2009). *v. To promote efficiency in the implementation and administration of the Grid Code arrangements* Neutral. So as noted above, the GC0101 original proposal better facilitates objectives (i)-(iv) and is neutral against objective (v).
2. Do you support the proposed implementation approach? If not, please provide reasoning why.	Yes.
3. Do you have any other comments?	No.