National Grid

Options for the implementation of the Requirements for Grid Connection applicable to all Generators European Network Code

October 2012

[Working Draft]

Introduction

1.1 This paper sets out the various Options for implementation of the Electricity European Network Codes ("**ENCs**"), which are currently under development by ENTSO-E and ACER, pursuant to the Third Energy Package[1] and the advantages and disadvantages relating to those Options.

1.2 Two Options have been identified for further progression at this stage while a number of others have been discussed and ruled out. This paper sets out why the Options chosen have been selected and what the next steps are.

RfG ENC

1.3 It is expected that the ENCs will be directly applicable regulations. As a result, there is a need to establish how best to reconcile the ENCs with the Great Britain ("**GB**") Grid Code, as well as other industry codes (for example the CUSC, STC, BSC, GB Distribution Code etc).

1.4 For the purposes of this paper the focus is provided by the draft Network Code for Requirements for Grid Connection applicable to all Generators ("**RfG**"), the final version of which was submitted by ENTSO-E to ACER on 13 July 2012[2]. ACER's opinion[3] on this draft was published on 13 October 2012 as a result of which a number of issues were passed back to ENTSO-E for further consideration.

1.5 The RfG ENC poses a number of implementation challenges as this is an area where requirements are already in place in GB and the RfG ENC itself is detailed. There are a number of high-level issues, which are common across all the Options for implementation of the RfG ENC, including:

1.5.1 ***Retrospectivity:*** Existing generators can be "captured" by the RfG ENC either at implementation of the RfG ENC or upon reassessment on a periodic basis under Article 3(2) and Article 45. Any captured existing generators could be required to comply with all the requirements of the RfG ENC or just specified

[1] Regulations 713/2009 and 714/2009; Directive 2009/72/EC.
[2] https://www.entsoe.eu/resources/network-codes/requirements-for-generators/
[3] Relevant pages of ACER website: http://www.acer.europa.eu/Electricity/FG_and_network_codes/Pages/Grid-connection.aspx

provisions. In addition, under Article 10(2)(g), upon the replacement of generating equipment, such new equipment must "comply with the respective requirements which are relevant to the planned work." In theory this could result in generating units at the same station being deemed existing, existing (captured) and new at the same time and thereby having to comply with different requirements. In order, and solely to fully consider all the possible consequences upon implementation, this paper has been prepared on the assumption that some existing generators will be "captured" by the RfG ENC[4] for at least some provisions. Where applicable, amended Bilateral Agreements could be used to set out/cross refer to any provisions which "captured" generators are required to comply with (whilst acknowledging that this could be administratively burdensome to manage and maintain). The Network Code presents the clear principle that existing grid users are included only when the benefits of adopting new requirements outweigh the cost of retrospective application.

1.5.2 ***'Significance' and Thresholds:*** application of the RfG code is limited to "significant grid users". This is defined as generators of above 800W in size and is then split into four new generating capacity thresholds of Type A, B, C and D power generating modules[5] with a sliding scale of application of the RfG. The capacity thresholds introduced by the RfG ENC differ from the current classification of Large, Medium and Small Power Stations under the existing GB Grid Code. The application of specific obligations under the GB Grid Code and RfG ENC are both set out by reference to these respective thresholds. As a result, whilst the obligations within the two Codes may be the same, the obligation under the RfG ENC could have a wider application; for example the requirements of CC6.3.7, which deals with frequency requirements, are limited to Large and Medium Power Stations (i.e. with a generating capacity of 50MW when connected to NGET's system) under the GB Grid Code, whereas the frequency requirements under the RfG ENC Article 10 apply to all Type C and D power generating modules, (i.e. connected at 110kV or above or with a generating capacity of 10MW and above). The aggregating effect of large numbers of extremely small generators also needs consideration, in particular regarding the difficulties of placing code obligations upon these.

1.5.3 ***Regional variations:*** at present, the generating capacity thresholds definition of Small, Medium and Large Power Stations in the GB codes vary depending on whether the generating plant is connected to National Grid's transmission system, Scottish Power's transmission system, SHETL's transmission system or Offshore. The RfG ENC does not provide for such regional variation (within a country).

1.5.4 ***Options and discretion:*** the application of non-mandatory requirements and TSO discretion elements within the RfG ENC (also referred to as "exhaustive" and "non-exhaustive" requirements

[4] It has yet to be determined if any existing generators will be captured.

[5] Type A Power Generating Modules are defined as units with a generating capacity of 800W up to 1 MW connected at a voltage below 110kV, Type B Power Generating Modules are defined as units with a generating capacity of 1 MW up to 10MW connected at a voltage below 110kV, Type C Power Generating Modules are defined as units with a generating capacity of 10MW up to connected at a voltage below 110kV and Type D Power Generating Modules are defined as units with a generating capacity of 30 MW and above connected at a voltage below 110kV or all power generating modules connected at 110kV or above.

1.5.5 ***Definitions:*** in particular whether the RfG ENC definitions/provisions may be amended for implementation to add clarity and how to ensure that there is consistency across the definitions used in various ENCs and GB industry codes.

1.5.6 ***Governance:*** in particular the change procedures to determine non-mandatory RfG ENC requirements and discretionary elements and those applicable to mandatory requirements imposed by the RfG ENC.

1.5.7 ***Structure:*** The RfG ENC is structured as a regulation and is different to the GB Grid Code, by setting out and layering the requirements by threshold.

1.5.8 ***Interpretation:*** The implementation of the RfG ENC would be intended to contextualise and contractualise the RfG ENC. Nevertheless, this process may require an element of interpretation of the obligations of the RfG ENC, by restating them in GB "language" and adding in further detail.

1.6 It should be noted that it will be difficult to implement the RfG ENC in isolation, as other significant changes to the GB industry framework will be required by different ENCs. As each ENC addresses a different area and differs in the scale and scope of its interactions with the GB industry codes, each ENC may require an individual approach to implementation. For example, unlike the RfG ENC, the Demand Connection Code ("**DCC**") ENC contains mainly new requirements, which do not need to be reconciled with existing GB requirements. The challenges posed by the DCC ENC will be where to place these obligations and how to assimilate the definitions effectively. Nevertheless, ideally an implementation Option should be sought which can accommodate the needs and complexities of all ENCs.

1.7 Moreover, whilst this document focuses only on the GB Grid Code it is acknowledged that changes to other documents which make up the GB framework will also be required – in particular the Option pursued should be applicable across the range of GB Codes.

The Options

1.8 It should be noted that the process/work required to achieve the implementation of the RfG ENC will be substantially the same whichever Option is chosen, but there will be variation in terms of the resulting presentation and maintenance of GB codes. The decision on how to implement is an industry decision, which National Grid hopes this work will support.

1.9 The following six Options for the implementation of the RfG ENC were identified:

Option 1 - start a "new" Grid Code solely for ENCs;

Option 2 - amend the GB Grid Code to include ENC requirements;

Option 3 - remove all ENC-related provisions from the GB Grid Code and create a stand-alone EU relevant document;

Option 4 - rewrite the GB Grid Code completely to align with new RfG thresholds;

Option 5 - combine the GB Grid Code and GB Distribution Code;

Option 6 - amend the GB Grid Code to cross-refer directly to the RfG ENC.

1.9 The advantages and disadvantages of each Option were considered and as a result Option 1 and Option 4 have been identified for further progression. This paper provides a description of these Options, including an explanation of why they have been selected for further work. Appendix A provides a description and initial analysis on the Options not currently being progressed. The paper concludes by outlining next steps.

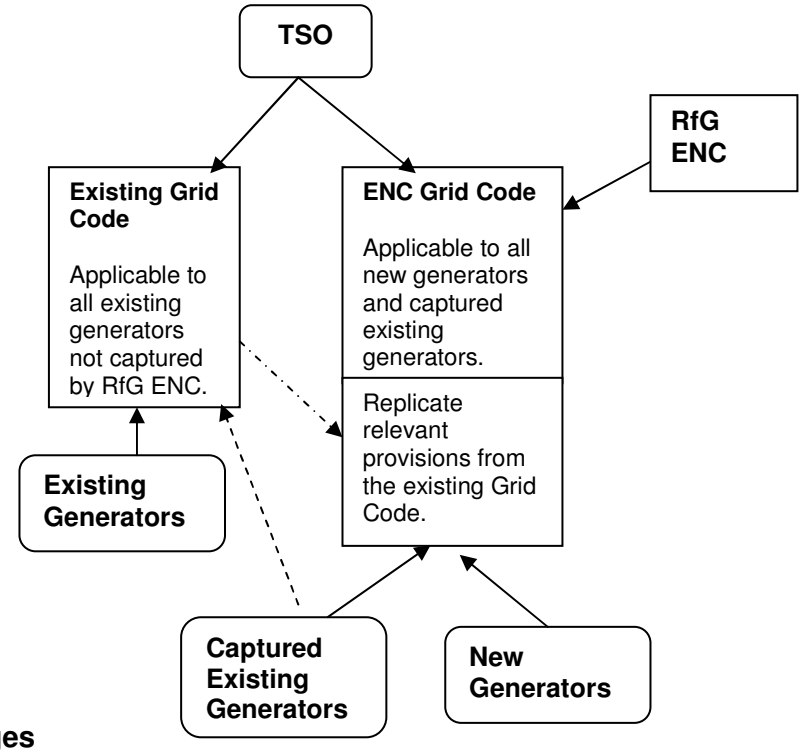
Option 1 – Start a "new" Grid Code solely for ENCs

1. Approach

This Option would involve the creation of a GB ENC Grid Code.

This would capture all the new requirements contained in the RfG ENC (as well as other ENCs). This GB ENC Grid Code would also replicate the existing GB Grid Code in all areas not dealt with by the RfG ENC so that it was a "complete" combined version of GB and EU requirements.

This new Code would be in force in parallel to the existing GB Grid Code. It would be applicable to all new generators, as well as any "captured" existing generators which have been identified under Articles 3(2) and 45 of the RfG ENC[6].



2. Advantages

2.1 ***Thresholds:*** This approach would enable the new thresholds contained in the RfG ENC to be reflected into the GB framework for new and captured existing generators. The replication of the GB requirements into the ENC Grid Code (and the alignment of the GB thresholds to the new RFG thresholds) would require careful definitions and drafting to ensure that, where the RfG ENC does not apply, the existing GB requirements continue to apply to intended users.

2.2 ***Categories:*** It also offers a solution to the issue of the differing requirements for existing "non-captured" and new generators. This approach would leave the existing GB Code untouched, reducing the impact on existing "non-captured" generators.

[6] The ENC Grid Code would cover all relevant elements of other ENCs, with similar documents prepared for other GB Codes, e.g. "ENC Distribution Code" and "ENC CUSC".

2.3 ***One reference point:*** Once a generator was clear which Code applied to them, they would only have to refer to one document (subject to not being an existing "captured" generator).

3. Disadvantages

3.1 ***Captured existing generators:*** Where captured existing generators are only required to comply with specified provisions of the RfG ENC, then this Option would require that generator to refer to the ENC Grid Code for those provisions (disregarding any GB alone requirements within it) and to the GB Grid Code for the remainder.

3.2 ***Governance:*** This Option would mean that two GB Grid Codes would be running in parallel in GB for the foreseeable future and introduce the inherent risk of a "two tier" system. Whilst the intention is that the new Code would "reflect" the existing GB Code, there is the risk that requirements of two Codes would diverge. In addition, both of the two GB Codes would require ongoing maintenance and the governance system of these parallel Codes would need to be carefully considered.

3.3 ***Licence changes:*** This approach could require amendments to be made to the licence conditions of users to ensure that they have a duty to comply with their relevant obligations under the two Codes and ensure that these requirements are enforceable by Ofgem.

3.4 ***Changes to other GB Codes:*** Consequential changes to other GB Codes (e.g. CUSC) would require a similar approach, resulting in multiple European GB Codes.

Option 1a

As a variation on Option 1, this derivation would entail, once the ENC Grid Code has been produced and including replication of all relevant sections from the GB Grid Code, the existing GB Grid Code "frozen" with no future changes being made to the document. It would then continue to apply to existing users in its current form only and any retrospective changes applied in the future (through the ENC process or GB change process) would only be made to the ENC Grid Code. This would most likely require utilisation of Bilateral Agreements to aid user understanding of which provisions apply to them.

The deviation in this Option would have the advantage of not requiring ongoing governance and maintenance of two documents, with Users of the "frozen" GB Grid Code diminishing over time. On the other hand, as retrospective changes are applied via the ENC Grid Code (particularly through the GB change process) the impact on existing Users will be greater as they will have to refer to two documents.

CONCLUSION

Option 1 is to be progressed as:

- It will demonstrate the concept of running 2 parallel Codes in GB;
- It offers some significant advantages which will benefit from further exploration.

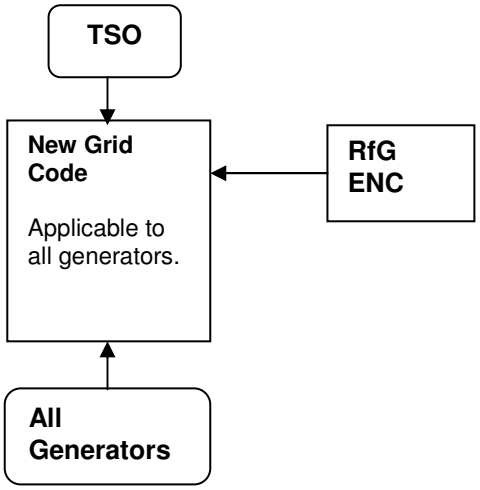
Option 1 and the 1a derivative would both look the same on day 1 of application. As such they will therefore be progressed as one Option at this stage.

Option 4 - Rewrite the GB Grid Code completely to align with new thresholds and significance criteria

1. Approach

This Option would involve redrafting the GB Grid Code, in order to fully align it with the generating capacity thresholds and definitions introduced by the RfG ENC which would then be used in identifying the application of both the ENC and GB requirements.

This Option is an extension of Option 2 and would result in all generators being re-categorised as a Type A, B, C or D using the RfG thresholds and all sections of the GB Grid Code amended to align with this.



2. Advantages

2.1 ***Thresholds:*** This approach would mean there would be greater clarity and uniformity within the redrafted GB Grid Code, as there would only be one set of thresholds and definitions used.

2.2 ***Future-proofing:*** This Option would ensure that the RfG ENC is fully incorporated into the GB regime. This wholesale change could avoid a lengthy and potentially administratively burdensome transition process. The complete loss of categorisations of "small", "medium" and "large", which are variously used to determine what obligations bite, would be significant and would have to be carefully considered. This approach is also consistent with the broader aims of harmonisation across Europe – with the European terminology becoming the "common language" in GB.

3. Disadvantages

3.1 ***Categories:*** Each clause would still need to have provisions for existing generators and for new and captured existing generators.

3.2 ***Impact on existing generators:*** As a result of implementing this Option, all categories of generators would need to familiarise themselves with a new Grid Code. Whilst the obligations on existing generators would not change, the categorisation of

these generators could. This would result in potentially unnecessary disruption for otherwise unaffected existing generators.

3.3 ***Proportionate:*** It should be considered whether this Option is proportionate given the circumstances. This approach would be a significant job and involve radical change to the GB arrangements. It is also unclear if this approach is proportionate given the requirements of future ENCs (which may not require such a radical approach to be adopted).

3.4 ***Impact of further ENCs:*** As the rest of the ENCs are implemented it is conceivable that further wholesale reviews of the Grid Code would be required.

3.5 ***Significance:*** This has been highlighted in ACER's opinion document as an area requiring further clarification which while in principle sensible will be complex to achieve while keeping in line with ENTSO-E's original drafting intent for application of the code across all generators that could have a system impact either singly or in aggregation.

CONCLUSION

Option 4 to be progressed:

- Demonstrates some key long term advantages, including representing the most holistic approach;
- Would benefit from further exploration to determine the challenges which might arise through such wholesale amendment of the GB Grid Code.

Next Steps

1. Identify specific RfG clauses to be used as examples to work through Options 1 and 4
    a. These examples will seek to assist in the assessment of the Options by demonstrating how they would work in practice;
    b. In working through the examples what the output would look like as well as the process undertaken will be demonstrated;
2. Based on the clauses identified, worked examples will be prepared for both the GB Grid Code and GB Distribution Code;
    a. NGET will begin by preparing examples for the Grid Code; this will be shared with the DNOs for consideration against the Distribution Code;
3. The timeline will see a discussion of the output from this exercise between NGET, DNOs and Ofgem pre-Christmas.
4. Following this, sharing with wider stakeholders will take place in early 2013.

Appendix A – Options not being progressed at this stage

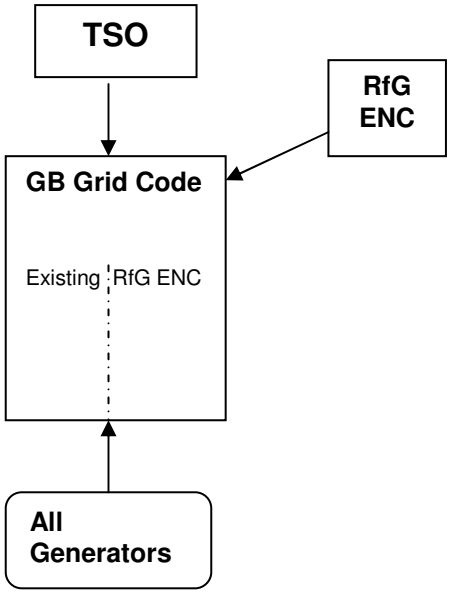
Option 2 - Amend the GB Grid Code to include the ENC requirements

1. Approach

This Option would require a merging of the GB and ENC requirements within the same document to cover existing, captured existing and new generators by placing GB existing and new RfG ENC requirements side by side.

As a result, each section would be updated to contain the requirements for existing, captured existing and new generators at all thresholds.

A number of sub-options exist to this depending on the presentational approach adopted. This could include: replicating each ENC article directly beside the Grid Code article; insertion of ENC text at the end of each Grid Code section; inserting all ENC text as a part 2 of the Grid Code.



2. Advantages

2.1 ***One document:*** This Option does not require the creation of an additional new Code or document and would require all generators, including captured existing generators who are only required to comply with specified provisions of the RfG ENC, to refer to one document, limiting the number of codes to maintain and keep aligned/consistent. This Option would work well where there are consequential changes needed to other GB Code (e.g. CUSC) as a similar approach could be taken for all GB Codes.

2.2 ***Uniformity:*** As the requirements of the RfG ENC would be incorporated into the GB Grid Code, clause by clause, this Option limits the risk of a "two tier" system or divergent Codes.

3. Disadvantages

3.1 ***Categories:*** This Option would result in the RfG ENC being fully assimilated into the GB Grid Code. As a result, all categories of generators would need to read each clause and work out which subsection applied to them, which may result in an unwieldy document. Thus, it would be vital that there is clarity as to which provisions apply to each of existing, captured existing and new generators.

3.2 ***Impact on existing generators:*** Changing the layout of the GB Grid Code could have a disproportionate impact on existing "non-captured" generators, who are unaffected by the RfG ENC though the impact of this could be mitigated depending on the presentational approach adopted.

3.3 ***Thresholds:*** This approach would require the existing GB Grid Code to apply to a wider range of generators (going down to ENC categories A and B) and again it would need to be clear which provisions apply to which thresholds of generators (and practically some of those generators would previously only have been affected by the Distribution rather than the Grid Code). This would mean that each clause would potentially need to have a number of subsections to deal with each permutation.

CONCLUSION

Option 2 not to be progressed at this stage.

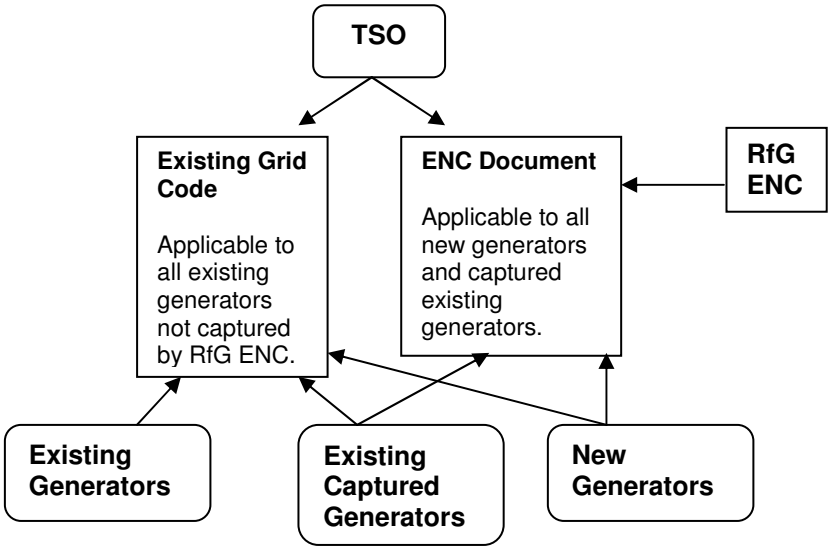
- Option 2 is a deviation which sits between Options 1 and 4, which are to be progressed. The work undertaken to consider Option 1 could be applied to this Option at a later date if it is required. By progressing only Options 1 and 4 a broader range of considerations can be achieved.

Option 3 - Remove all ENC-related provisions from the GB Grid Code and create a stand-alone document

1. Approach

This Option would involve creating another document which would deal with all ENC-related provisions. This ENC document would be applicable to all new and captured existing generators. The existing GB Grid Code would retain all provisions which were unaffected by the RfG ENC.

Please note the only difference to Option 1 is that the GB Grid Code provisions beyond those covered by the RfG ENC are not replicated in this ENC document.



2. Advantages

2.1 ***Impact on existing generators:*** This Option would maintain the status quo, minimising the impact on unaffected existing generators.

3. Disadvantages

3.1 ***Categories:*** This approach does clearly distinguish between two Codes. As a result, new and captured existing generators would be required to refer to two documents under which they would be defined differently using different thresholds, which may create ambiguity, as well as presenting practical difficulties – it may not be that easy to divorce an ENC obligation from a GB one.

3.2 ***Thresholds:*** Whilst this approach would allow the thresholds of the RfG ENC to be partially reflected into the GB regime albeit solely for ENC purposes, users who had to use both "documents" would have to use both thresholds definitions, which could create confusion.

3.3 ***Licence changes:*** This approach could require amendments to be made to the licence conditions of users to ensure that they have a duty to comply with their relevant obligations under the GB Grid Code and ENC document and ensure that these requirements are enforceable by Ofgem.

3.4 ***Governance:*** This approach would require the governance and maintenance of two documents on an ongoing basis even as the number of existing Users reduces.

CONCLUSION

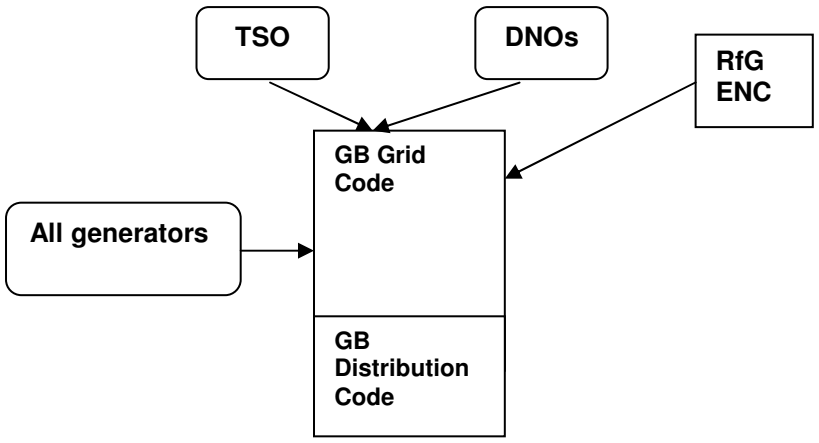
Option 3 is not to be progressed at this stage

- Option 3 is very similar to Option 1, with some presentational differences. As Option 1 is being progressed at this stage, this Option will not be taken forward.

Option 5 - Combine the GB Grid Code and GB Distribution Code

1. Approach

This Option would involve introducing a GB "network code", by combining the GB Grid Code and GB Distribution Code, which would be redrafted to be compliant with the RfG ENC. This could be an additional step to other Options.



2. Advantages

2.1 ***Thresholds:*** The RfG ENC thresholds cover generators who currently solely use the GB Grid Code, generators who use both the GB Grid Code and GB Distribution Code and generators who solely use the Distribution Code. This Option would ensure that all thresholds of generators can use the same Code, with all relevant provisions being captured in one place.

2.2 ***Rationalisation:*** In GB, all users are currently required by the standard conditions of their licence to comply with the GB Grid Code and GB Distribution Code as far as it is applicable to that user.[7] As a result, this approach would mean that all generators would only have to refer to one document rather two, as at present (or potentially more).

3. Disadvantages

3.1 ***Differences:*** Whilst the GB Grid Code and GB Distribution Code deal with similar subjects, they are drafted in a different way. In addition, their governance procedures are not aligned. Technically each distribution network operator (**"DNO"**) maintains its own distribution code and, as a result, this approach would require the input of a number of new stakeholders into the amendment process, in particular, DNOs and the Distribution Code Review Panel.

3.2 ***Proportionality:*** It should be considered whether this Option is proportionate given the circumstances. The general principle is that a change to industry codes should only be made if it better meets that particular code's relevant objectives than the current

[7] Generation Licence Standard Conditions 5 and 6; Supplier Licence Standard Condition 11; Interconnector Licence Standard Condition 3; Distribution Licence Standard Condition 20; Transmission Licence Standard Condition C14 and C15.

arrangement. Therefore, it would need to be demonstrated that merging the GB Distribution Code with the GB Grid Code would fulfil this test for both Codes.

3.3 ***Impact on existing generators:*** This Option would affect existing generators under the GB Grid Code, as well as users of the GB Distribution Code who are not captured by the RfG ENC requirements.

3.4 ***Licence changes:*** This approach could require amendments to be made to the licence conditions of users to ensure that they have a duty to comply with their relevant obligations under the new network code and ensure that these requirements are enforceable by Ofgem.

CONCLUSION

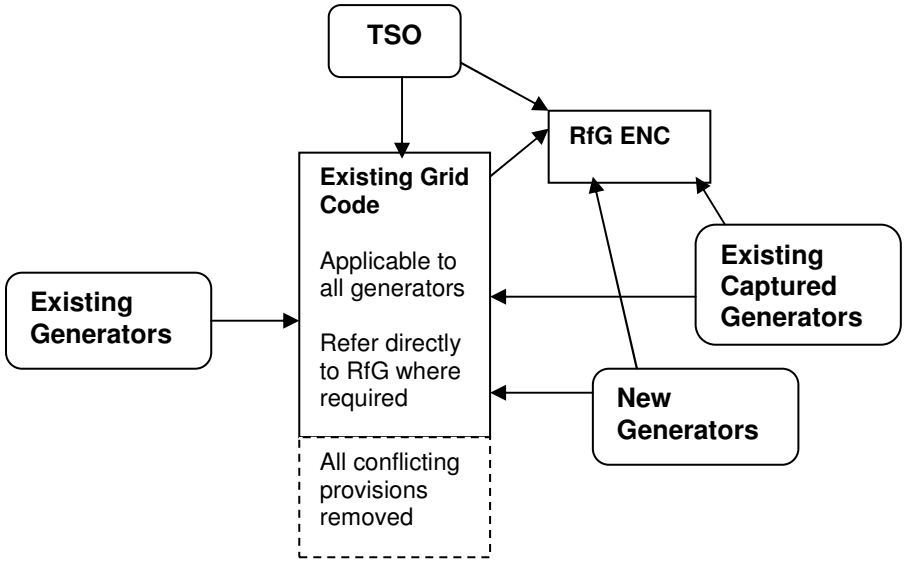
Option 5 is not to be progressed at this stage.

- Option 5 could be used in conjunction with any of the other Options presented in this paper as a final end position to be reached. It will, therefore, be considered further when a decision has been reached regarding the other Options.

Option 6 - Amend the GB Grid Code to cross-refer directly to the RfG ENC, where appropriate

1. Approach

This Option would entail removing the conflicting sections of the current GB Grid Code. These would be replaced with direct cross-references to the RfG ENC to ensure that the new and captured existing generators comply with the detailed directly applicable requirements of the RfG ENC.



2. Advantages

2.1 ***Transparency:*** This approach has the advantage of being clear cut. There would be no need to interpret the RfG ENC in order to insert it into the GB Grid Code, which eliminates the risk that attempting to do so results in provisions which are deemed to conflict with the requirements of the RfG ENC.

3. Disadvantages

3.1 ***Differences:*** There are significant differences in the content and style of drafting between the RfG ENC and the existing GB Grid Code. In particular, it is unlikely that this approach would address the issues in relation to the different generating capacity thresholds introduced by the RfG ENC. As a result, it is unlikely that simply removing the conflicting sections of the GB Grid Code in order to refer directly to the relevant ENC Regulation would produce coherent and workable requirements for generators and National Grid.

3.2 ***Interpretation:*** This approach would require generators to refer to two documents simultaneously and interpret the RfG ENC in the context of the GB regime, which would be cumbersome and potentially result in a difficult set of documents to use and cross refer. The interpretation of the ENC by individual generators could result in National Grid and generators disagreeing about the requirements of a certain provision. If this approach was adopted, this would be hardwired into the GB regime.

3.3 ***Wider application:*** These issues would be exacerbated if this approach was followed for the implementation of all the ENCs, which would require National Grid and generators to refer to 12 different Regulations.

3.4 ***Remedies:*** The references to the RfG ENC could create confusion as to where the contractual obligations and remedies are enforceable; at a GB or at European level or both. This does not sit comfortably with the approach taken under the current GB regulatory regime. Further, in some areas the drafting of the RfG ENC does not place a direct obligation on the generator, but on the Relevant TSO to ensure that a generator complies with the requirements. This could cause further issues for National Grid in terms of enforcing the directly applicable obligations of the RfG ENC.

3.5 ***Member state discretion:*** There are a number of areas, for example the provision of a synthetic inertia facility,[8] which allow for discretion at a member state level. This Option would not address this, and may require guidance documents in these areas, which would increase the documentation required once again. In addition, Article 7 of the RfG ENC allows Member States to introduce more onerous or more detailed measures which are compatible with the principles of the RfG ENC. This approach would not allow for this to occur and in some instances (e.g. voltage range) could result in less stringent obligations being introduced in GB for new and captured existing generators.

3.6 ***Maintenance:*** This approach would require the ongoing maintenance of the GB Grid Code to ensure that any new provisions in the Code do not conflict with the RfG ENC and that any amendments to the RfG ENC are accurately reflected in the GB Grid Code.

CONCLUSION

Option 6 is not to be progressed at this stage.

- This Option is not workable given the required Member State specificity contained within the ENCs.

[8] Article 16(2)(a) of the RfG ENC.