

GRID CODE CONSULTATION DOCUMENT

0. PRELIMINARIES

DOCUMENT INFORMATION

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Prepared by	BELCO Grid Operations
Approved by	TBC

1. INTRODUCTION

Public electricity in Bermuda is supplied through an existing Transmission System and Distribution System. A central power station generates the majority of electricity and supplies a Transmission System operating at voltages of 33 kilovolts [kV] and 22 kV. An extensive Distribution System operating at 4.16 kV and low-voltage [LV] supplies the majority of Customers. A limited number of Customers are connected to the Transmission System.

The Bermuda Electric Light Company Limited (BELCO) owns and operates the electricity Transmission System and Distribution System, along with the central power station in Bermuda.

The Electricity Act 2016 [Act] came in to force on Friday 28th October 2016. This Act introduced a new regulatory framework to promote increased investment and innovation in generation, transmission, distribution and retail sales of electricity for the benefit of Bermuda residents. The primary aims of the Act are to facilitate the connection of renewable energy sources, reduce emissions of greenhouse gases, improve security of supply and seek to improve the affordability of electricity supplies, whilst maintaining or improving the quality of service.

Under the Act and new regulatory framework, the Regulatory Authority [Authority] granted a Transmission, Distribution and Retail Licence (TD&R Licence) and a Bulk Generation Licence to BELCO on 27th October 2017. The TD&R licence sets out the terms and provisions under which BELCO can transmit, distribute and retail electricity within Bermuda.

The TD&R Licence conditions require BELCO, as the Licensee, to develop a Grid Code for approval by the Authority in consultation with Sectoral Participants and Sectoral Providers, who are liable to be materially affected by it. In accordance with these conditions, BELCO has developed a proposed Grid Code [see www.belco.bm/gridcode] and has launched this consultation to seek views from key stakeholders.

This Consultation Document sets out relevant information, impacts and questions concerning the Grid Code for key stakeholders to consider and respond to as part of the consultation exercise.

NOTE: A copy of the proposed Grid Code can be obtained by:

- downloading an electronic copy from www.belco.bm/gridcode.
- visiting the front reception of BELCO's Main Office and requesting a printed version.

2. PURPOSE

The purpose of this document is to consult on the proposed Grid Code with stakeholders who are liable to be materially affected by it.

The responses from stakeholders will be used to finalise the Grid Code prior to it being sent to the Authority for approval.

Further information about how to formally respond to this consultation can be found in Section 7 of this Consultation Document.

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3. WHAT IS THE GRID CODE?

The Grid Code is a technical document that is intended to cover all foreseeable technical aspects associated with operation and use of both the public electricity Transmission System and Distribution System, collectively known as the Grid System.

Conditions stated in the Grid Code are intended to be consistent with relevant provisions of the Act and the TD&R Licence, in relation to the Grid Code and connections made to it, including the following aspects.

- a) Conditions for connections to the licensed electricity Grid System.
- b) Conditions for operation and use of the Grid System.
- c) Conditions for Dispatch and scheduling of Bulk Generation connected to the Grid System.
- d) Conditions for the safe and reliable operation of the Grid System.
- e) Conditions for design of the Grid System to ensure that all Bermuda residents have access to a supply of electricity.

The development and subsequent modification of the Grid Code is the responsibility of the TD&R Licensee (BELCO) in consultation with stakeholders that are materially affected by it.

The Grid Code comprises of the following individual Codes that contain rules and provisions for that particular aspect of the Grid System.

GENERAL CONDITIONS [GC]

The General Conditions of the Grid Code contains those rules and provisions that apply across all other sections of the Grid Code. Their use should ensure that all sections of the Grid Code are applied consistently and fairly to all relevant parties.

PLANNING CODE [PC]

The Planning Code sets out the rules and provisions that apply to the planning and design aspects of the Grid System. This includes the standards for supply of electricity, e.g. frequency, voltage etc. and the provision of data requirements covering both short-term and longer-term projection of loads, demand and generation that need to be considered when planning development of the Grid System.

CONNECTIONS CODE [CC]

The Connections Code specifies the minimum technical, design and operational requirements to ensure that the basic rules for connection to the Grid System are the same for all Users of the same category and to enable the TD&R Licensee to comply with its obligations under the Act and TD&R Licence.

OPERATIONS CODE [OC]

The Operations Code sets out the arrangements for operating the Grid System safely, effectively and economically. A key objective is to set out the rules for scheduling and Dispatch of Generation Units, which is transparent and fair to all Generators, to ensure demand is met and the Grid System remains stable for foreseeable events. The Operations Code also specifies the data required from certain users, such as Generators, for the TD&R Licensee to effectively operate the Grid System. This includes notification of unavailability and generation Capacity that can be provided.

REQUIREMENTS FOR GENERATORS [RFG]

The objective of the Requirements for Generators Code is to specify the minimum technical, design and operational requirements specifically applicable to Generators to ensure that the basic rules for connection of any Generation Unit, of any type, to the Grid System are the same for all Users of the same category and to enable the TD&R Licensee to comply with its obligations. These requirements are in addition to those of the Connections Code, which also apply to Generator connections.

REQUIREMENTS FOR ENERGY STORAGE [RFES]

The Requirements for Energy Storage Code has a similar structure to the Requirements for Generator Code but addresses the connection of energy storage systems to the Grid System.

The Annexes to the Grid Code contain detailed technical information and processes that are material to understanding requirements of the Grid Code.

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4. OBJECTIVES OF THE GRID CODE

The overriding objective of the Grid Code is to set out the technical framework and technical provisions for operation of the Grid System, for connections of generation and demand to the Grid System as well as provisions for those who use the Grid System.

The Grid Code is intended:

- a) to ensure a safe, secure, sustainable and reliable electricity supply.
- b) to promote economic efficiency in the transmission and distribution of electricity.
- c) to define acceptable quality of supply standards that need to be met.
- d) to facilitate fair, reasonable and non-discriminatory connection to the network by others.

The Annexes contain detailed technical information and processes that are material to understanding requirements of the Grid Code.

Each section of the Grid Code has specific objectives, which are stated at the beginning of each code.

5. IMPACT OF THE GRID CODE

The Grid Code will impact the key stakeholders who operate and use the Grid System. A summary of the material impacts for each key stakeholder is summarised below.

BELCO

BELCO is required to comply with those provisions in the Grid Code that specifically apply to the TD&R Licensee. These provisions largely reflect current policies, processes and procedures for operation of the Grid System and for connection of User's installations to it. Notwithstanding, the Grid Code provides for more transparency and clarity of BELCO's requirements as they apply to connections and use of the Grid System, in particular considerations for the order in which available Generation Units are scheduled and dispatched.

BELCO as the TD&R Licensee is obligated to periodically review the adequacy of the Grid Code and its implementation, in terms of meeting the requirements of the TD&R Licence, in consultation with stakeholders, who are materially affected. This is of those intended consultations.

BELCO is obligated to seek approval from the Authority for any proposed revisions to the Grid Code and to implement any instructions issued by the Authority in relation to implementation of the Grid Code.

Please see below for the impacts on BELCO as a Bulk Generation Licence Holder.

BULK GENERATION LICENCE HOLDERS

Bulk Generation Licence Holders, including BELCO, are obligated to comply with the applicable provisions of the Grid Code as a condition of their Bulk Generation Licence.

As such, Bulk Generators will be scheduled and dispatched according to the merit order prescribed in the Grid Code. The criteria by which the TD&R Licensee determines the merit order for dispatching generation is clearly set-out in the Operations Code. This provides greater clarity and transparency to Bulk Generation Licence Holders concerning Dispatch rules. The Grid Code also requires Bulk Generation Licence Holders to comply with Dispatch Instructions from the TD&R Licensee.

The Grid Code provides potential Bulk Generation Licence Holders with information about the technical and operational requirements for Bulk Generation proposed to be connected to the Grid System. In turn, existing Bulk Generation Licence Holders are required to provide all relevant information at times specified in Annex A of the Grid Code to ensure the TD&R Licence Holder can schedule and Dispatch generation effectively.

Bulk Generation Licence Holders are required to adhere to relevant technical requirements specified in the Connection Code and Requirements for Generation Code when connecting new Generation Units as well as making material changes to the connection of existing units. These technical requirements impact on electrical protection, earthing, voltage control, equipment specification and communication/control requirements for Generation Units and Facilities.

The Operations Code requires the TD&R Licensee and Bulk Generation Licence Holders to put in place suitable arrangements at the interface with the Grid System to govern responsibilities, site access, safety co-ordination, operational communications and liaisons and operational planning information.

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DISTRIBUTED GENERATION

The Grid Code refers to the Standard Contract that will govern the interconnection of Distributed Generation up to the licence threshold (500 kilo watts). The requirements in the Grid Code are intended to facilitate a standard connection process and standard technical requirements for Distributed Generation. This includes provision of standard requirements for protection, control, SCADA, equipment configuration and performance requirements for distributed Generator Unit(s).

Distributed Generation will be required to submit planning data as required by the TD&R Licensee to evaluate the proposed connection of the Distributed Generation to the Grid System.

Demand Users

Under the Planning Code, large demand users will be required to provide demand forecast information to assist the TD&R Licensee to develop and operate a secure and sustainable Grid System. Small domestic and commercial users will not be required to provide demand forecast information.

Demand users that have disturbing loads in their installation, including large motors, motor drives and other large loads that are switched frequently will be required to provide more detailed information about the characteristics of this equipment to determine whether it meets the limits for voltage fluctuation, harmonic distortion and voltage unbalance specified in the Planning Code.

The Operations Code allows the TD&R Licensee to control the demand of Users, where required to ensure the stability and safety of the Grid System. This could involve large demand Users being instructed to reduce their demand and/or the TD&R Licensee disconnecting certain demand Users. The Grid Code facilitates the implementation of Demand Side Management (DSM) resources to control demand.

Customers

Arrangements for prospective Customers to obtain a supply of electricity are documented in the Connections Code. This includes the criteria for categorising connections as standard or non-standard. The intention is for standard connections to follow a simpler connection process given these connections pose a low risk to the operation of the Grid System. However, applications for non-standard connections may require Customers to provide more detailed information so that the impact on the Grid System can be properly understood and an appropriate Connection Point can be proposed. In some cases, Customers with non-standard connections will be required to pay for additional studies to be carried out.

Under the Grid Code, Customers are required to inform the TD&R Licensee of any material changes to their connection that could impact on the operation of the Grid System. This could include any significant proposed increase in load, the proposed addition of any disturbing loads, the connection of any Distributed Generation etc.

Customers are required to consider whether they require any enhanced security of supply level, which could require alternative Connection Points to be evaluated by the TD&R Licensee.

Customers are also obligated in the Grid Code to provide relevant details of any consultant or agent that they appoint in relation to a new connection.

Customers can expect their supply to meet the minimum quality of supply requirements specified in the Planning Code and that there are no unreasonable disturbances to their supply from the Grid System.

6. CONSULTATION QUESTIONS

Stakeholders are invited to respond to this consultation, expressing their views or providing any further evidence on any of the matters contained within this consultation document. Stakeholders should respond to the set questions in the attached Response Proforma together with an explanation for their responses.

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7. RESPONSES

Responses should be provided on the attached response proforma provided.

The deadline for receipt of responses is **Monday, 24th September 2018**.

Please note that any responses received after the deadline for receipt of responses or provided in another format may not receive due consideration.

Completed response proformas should be submitted to BELCO by one of the following means:

- 1) Email to gridcode@belco.bm with the subject "Grid Code Consultation".
- 2) Deliver to the front reception at BELCO's Main Office in an envelope marked:-

Grid Code Consultation
BELCO Main Office
27 Serpentine Road
Pembroke HM 07
Bermuda

Any queries on the content of this consultation document should be addressed to gridcode@belco.bm or Nadir Wade on 441-295-5111.

BELCO intend to publish their response to the consultation by 8th October 2018 via the Grid Code page www.belco.bm/gridcode

ATTACHMENTS

- Grid Code Document
- Response Proforma

GRID CODE CONSULTATION RESPONSE PROFORMA

BELCO's intends to post all relevant submissions received by the submission deadline to its website after the close of the consultation period. Responders may request anonymity and/or provide an original response along with a version redacting any sensitive information.

Stakeholders are invited to respond to this consultation, expressing their views or providing any further evidence on any of the matters contained within the consultation document. Stakeholders should respond to the set questions in this response proforma together with an explanation for their responses.

Completed response proformas should be submitted to BELCO by **Monday, 24th September 2018** by one of the following means:

- 1) Email to gridcode@belco.bm.
- 2) Deliver to the front reception at BELCO's Main Office in an envelope marked: - Grid Code Consultation, BELCO Main Office, 27 Serpentine Road, Pembroke HM 07, Bermuda

Please note that any responses received after the deadline or in any other format may not receive due consideration.

Any queries on the content of this response pro-forma should be addressed to gridcode@belco.bm or Nadir Wade on 441-295-5111.

PLEASE COMPLETE THE EDITABLE FIELDS BELOW.

Respondent (Full Name)	
Company Name (where applicable)	
Job Role (where applicable)	
Stakeholder(s) represented [Please list which stakeholder or stakeholders you are responding on behalf of (including the respondent company if relevant)]	
We intend to publish the consultation responses. Do you agree to this response being published by BELCO?	<input type="checkbox"/> YES <input type="checkbox"/> NO

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GRID CODE CONSULTATION RESPONSE PROFORMA

QUESTION	RESPONSE
<p>Q1.</p> <p>Is the Grid Code consistent with the requirement for the TD&R Licensee to provide sectoral participants and end-users with non-discriminatory interconnection to the Grid System?</p> <p>Electricity Act 6 [d], [TD&R Licence Condition 19 [a]], TD&R Licence Condition 19 [b]]</p>	
<p>Q2.</p> <p>Do you agree the Grid Code facilitates competition in generation and does not unduly bias the Licensee in the conduct of its Generation Business?</p> <p>[TD&R Licence Condition 19 [c]]</p>	
<p>Q3.</p> <p>Do you believe all material technical aspects for connection to, operation of and use of the Grid System are addressed in the Grid Code?</p> <p>[TD&R Licence Condition 22.3 [a]]</p>	

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GRID CODE CONSULTATION RESPONSE PROFORMA

QUESTION	RESPONSE
<p>Q4.</p> <p>Does the Grid Code adequately cover:</p> <p>[a] the rules and procedures for scheduling and dispatching generation taking into the various operating conditions stated in the TD&R Licence?</p> <p>[TD&R Licence Condition 22.3 (a)]</p> <p>[b] the requirement for the Merit Order proposed in the Grid Code to promote generation from Renewable Energy Sources and to optimise dispatching of generation based on economy, security, stability and reliability of the Grid System taking into account cost considerations?</p> <p>[TD&R Licence Condition 22.3 (b)]</p>	
<p>Q5.</p> <p>Are the requirements in the Grid Code consistent with providing for safe and reliable operation of the Grid System and do they adequately set out the conditions under which:</p> <p>a) the TD&R Licensee shall operate the Grid System?</p> <p>[TD&R Licence Condition 22.3 (c)]</p> <p>b) Bulk Generation Licensees shall operate their generating plant?</p> <p>[TD&R Licence Condition 22.3 (c)]</p>	

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GRID CODE CONSULTATION RESPONSE PROFORMA

QUESTION	RESPONSE
<p>Q6.</p> <p>Are the requirements in the General Conditions [of the Grid Code] for modifying the Grid Code, including consultation with Sectoral Participants and Sectoral Providers, adequate?</p>	
<p>Q7.</p> <p>Do you have any objection[s] to the proposed publication of the Grid Code for Bermuda, in its current form?</p> <p>If YES, please state the nature of your objection[s] and any proposed amendment[s] that would address your objection[s].</p>	
<p>Q8.</p> <p>Do you have any other comments to make in relation to the proposed Grid Code and/or this consultation?</p>	

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