BERMUDA REGULATORY AUTHORITY

1st Round Consultation Document:

Feed-in Tariff Methodology for Electricity Sector

Consultation Document
Matter: [ ]
Date: April 27, 2018
Responses Due: June 4, 2018 (Extended Deadline)

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I. INTRODUCTION

1. The purpose of this Consultation Document is for the Regulatory Authority of Bermuda (the "Authority") to: (i) present a methodology for assessing the level of the FIT ("FIT"); and (ii) invite comments on the Consultation Document. At the end of the consultation process the Authority will issue a General Determination ("GD") setting the FIT methodology.

2. The Authority is responsible for the regulation of the electricity sector in Bermuda and its overarching responsibilities are to:

    - regulate tariffs and the quality of service provision to end-users;
    - ensure that access to electricity infrastructure by current and prospective generators in Bermuda is transparent, fair, reasonable, and non-discriminatory;
    - investigate and respond to complaints from end-users as regards the provision of electricity.

3. Section 36 of the Electricity Act 2016 ("EA") provides that the Authority shall determine the FIT in accordance with the methodology set by general determination and in accordance with the principles set out in the EA.

4. On 2 March 2018, the Authority issued a GD mandating that the Bermuda Electric Light Company Ltd ("BELCO")[1] should pay a FIT for electricity produced by distributed renewable energy systems in accordance with the net avoided costs of generation methodology described in the GD ("Transitional Methodology").

5. This Consultation Document presents a full methodology for assessing the level of the FIT that the Transmission, Distribution & Retail (the "TD&R") Licensee would pay to distributed generators for the purchased renewable energy.

6. In line with the EA, this Consultation Document applies to all technologies used by distributed generators to produce renewable energy.[2]

[1] That is, the Transmission, Distribution & Retail ("TD&R") licensee in Bermuda.
[2] Electricity Act 2016, p. 5.

II. CONSULTATION PROCEDURE

7. This consultation is being undertaken in accordance with sections 62 and 69 to 73 of the Regulatory Authority Act 2011 ("RAA") and section 36 of the EA. The procedure and accompanying timelines (as set out in section 70 of the RAA), under which this consultation is taking place has been set out in Part 1 below.

8. Written comments should be submitted before 5:00 PM (Bermuda time) on June 4, 2018.

9. The Authority invites comments from members of the public, electricity sector participants and sectoral providers, and other interested parties. The Authority requests that commenting parties, in their responses, reference the numbers of the relevant questions to which they are responding, as set forth in this Consultation Document. A complete list of questions presented by this Consultation Document appears in section VII.

10. Responses to this Consultation Document should be filed electronically in MS Word or portable document format (pdf). Parties filing comments should go to the Authority's website, www.rab.bm, follow the link to the Consultations and Response page, and click the "Click here to submit a response" icon, which appears at the top of the page. All comments should be clearly marked "Response to Consultation Document: Comments on FIT General Determination" and should otherwise comply with Rules 18 and 30 of the Authority's Interim Administrative Rules, which are posted on the Authority's website.

11. The Authority intends to make responses to this Consultation Document available on its website. If a commenting party's response contains any information that is confidential in nature, a clearly marked "Non-Confidential Version", redacted to delete the confidential information, should be provided together with a complete version that is clearly marked as the "Confidential Version". Redactions should be strictly limited to "confidential information", meaning a trade secret, information whose commercial value would be diminished or destroyed by public disclosure, information whose disclosure would have an adverse effect on the commercial interests of the commenting party, or information that is legally subject to confidential treatment. The "Confidential Version" should highlight the information that has been redacted. Any person claiming confidentiality in respect of the information submitted must provide a full justification for the claim. Requests for confidentiality will be treated in the manner provided for in Rule 30 of the Authority's Interim Administrative Rules.

12. In accordance with section 73 of the RAA, any interested person may make an *ex parte* communication during this consultation process, subject to the requirements set forth in this paragraph 13. An *ex parte* communication is defined as any communication to a Commissioner or member of staff of the Authority regarding the matter being consulted on in this Consultation Document, other than a written submission made pursuant to this Section 2. Within 2 business days after making an *ex parte* communication, the person who made the *ex parte* communication shall submit the following to the Authority: (i) a written description of the issues discussed and positions espoused; and (ii) a copy of any written materials provided. This will be posted on the Authority's website, along with a notice of the *ex parte* communication.

13. The principal point of contact at the Authority for interested persons for this Consultation Document is Jozelle Escolastica, Head of Regulatory Finance. She may be contacted by email, referencing “Comments on FIT General Determination” at electricity@RAB.bm or by mail at:

Jozelle Escolastica
Regulatory Authority
1st Floor, Craig Appin House
8 Wesley Street
Hamilton, Bermuda

14. In this Consultation Document, except insofar as the context otherwise requires, words or expressions shall have the meaning assigned to them by the EA, the RAA and the Interpretation Act 1951.

15. This Consultation Document is not a binding legal document and does not contain legal, commercial, financial, technical or other advice. The Authority is not bound by this Consultation Document, nor does it necessarily set out the Authority’s final or definitive position on particular matters. To the extent that there might be any inconsistency between the contents of this Consultation Document, the due exercise by the Authority of its functions and powers, and the carrying out of its duties and the achievement of relevant objectives under law, such contents are without prejudice to the legal position of the Authority.

III. LEGISLATIVE CONTEXT

16. The RAA established a cross-sectoral independent and accountable regulatory body "to protect the rights of consumers, encourage the deployment of innovative and affordable services, promote sustainable competition, foster investment, promote Bermudian ownership and employment and enhance Bermuda's position in the global market".[3]

17. In June 2015, the Ministry of Economic Development of Bermuda published the National Electricity Sector Policy (the "Policy Document"). The Policy Document set out the groundwork for the institution of the subsequent EA and the desired structure of the electricity sector of Bermuda.

18. The EA received Royal Assent on 27th February 2016 and came into operation on 28th October 2016 pursuant to the Electricity Act 2016 Commencement Day Notice 2016 (BR 101/2016). The EA repealed the Energy Act 2009.

19. The Minister responsible for electricity is currently the Minister of Transport and Regulatory Affairs (the "Minister"). The Minster can issue Ministerial declarations that establish policies for the electricity sector[4] and can also issue Ministerial directions to the Authority regarding any matter within his authority as regards the electricity sector.[5] In formulating Ministerial directions, the Minister shall set priorities and resolve trade-offs or conflicts that arise from the purposes of the EA in a way that he thinks best serves the public interest.[6]

20. The Authority has the powers to supervise, monitor and regulate the electricity sector in Bermuda in accordance with the purposes of the EA. Such purposes, as set forth in section 6 of the EA, include:

    (a) "to promote the use of cleaner energy sources and technologies, including alternative energy sources and renewable energy sources", section 6(c); and

    (b) "to provide sectoral participants and end-users with non-discriminatory interconnection to transmission and distribution systems", section 6(d).

21. The principal functions of the Authority set forth in section 12 of the RAA include:

    (a) "to promote and preserve competition", section 12(a); and

    (b) "to promote the interests of the residents and consumers of Bermuda", section 12(b); and

    (c) "to promote the development of the Bermudian economy, Bermudian employment and Bermudian ownership", section 12 (c).

[3] Regulatory Authority Act 2011, p. 5.
[4] Electricity Act 2016, section 7(2).
[5] Electricity Act 2016, section 8(3).
[6] Electricity Act 2016, section 9.

22. Section 14 (2) (c)(ii) of the EA states that the functions of the Authority shall include, among other things, the making of administrative determinations[7] to provide for the control and conduct of the provision of electricity services including notice requirements relating to the rates, charges and other terms and conditions for the provision of electricity services for the benefit of end-users.

23. To establish the approved FIT, section 37 of the EA requires the Authority to conduct FIT reviews in accordance with the methodology set by general determination and in accordance with the principles set in section 36 of the EA. This Consultation Document aims to invite comments on the methodology that the Authority proposes to use to conduct FIT reviews.

[7] Defined in the RAA as including a General Determination, order, direction, decision or other written determination by which the Authority establishes the legal rights and obligations of one or more Sectoral Participants (i.e. person who provides, uses or seeks to use a good or service in the energy sector but does not include the Authority) but does not include an advisory guideline (i.e. written statement issued by Authority that provides Authority's views regarding a specific matter but is not legally binding) or an adjudicative decision and order (which means a decision or order following an adjudication conducted in accordance with Sections 74 to 83 of the RAA). General Determination is defined as a statutory instrument made pursuant to Section 62 of the RAA that is applicable to all Sectoral Participants or categories of Sectoral Participants as fall within the scope of the Statutory Instrument.

IV. BACKGROUND

24. The Authority issued an Emergency General Determination ("EGD") on 2 March 2017, mandating that BELCO should pay a FIT for electricity produced by distributed renewable energy systems. The issuance of an EGD reflected the urgent nature of the issue and its potential impact on the economy of Bermuda.

25. On 24 March 2017, the Authority issued a Consultation Document inviting interested parties to comment on the proposed transitional solar metering scheme set forth in the EGD (the "first round" of consultation).[8]

26. On 14 July 2017, the Authority provided a discussion of responses to the initial consultation document. This was followed by a second round of consultation.[9]

27. On 2 September 2017, the Authority extended the EGD until 2 March 2018. This extension allowed the Authority to thoroughly review the analysis and assessment, as well as to respond to a request for information from the Minister, pursuant to section 6 of the RAA, for information in relation to the EGD.

28. On 2 March 2018, the Authority issued a GD setting up a FIT and a transitional methodology based on the net avoided costs of generation that will be used for tariff reviews until a GD with the proposed full methodology is issued at the end of this consultation process.

29. The transitional FIT set in the EGD on 2 March 2017 and in the GD on 2 March 2018 is determined based on the net avoided cost of generation. The Authority considers that the transitional measures strike an appropriate balance between the Authority's duties under the EA to regulate the electricity sector in a manner that lowers the overall costs to consumers, and promotes renewable energy generation, while also ensuring reliable electricity services.

30. In this Consultation Document, the Authority consults on a full methodology to be used to determine a FIT during tariff reviews. The full methodology builds on the responses to the first and the second rounds of the EGD consultation and invites public comment.

[8] A summary of the responses to the first round of consultation is provided in the second round of consultation. See Regulatory Authority of Bermuda (2017), 'Consultation on the Regulatory Authority (Renewable Energy Metering Scheme) General Determination', 14 July, http://www.rab.bm/index.php/ele-consultations/emergency-general-determination-solar-net-metering/1543-17-07-14-renewable-energy-metering-consultation-document-final/file, accessed 2 March 2018.

[9] A summary of the responses to the second round of consultation is provided in the GD issued on 2 March 2018. See Regulatory Authority of Bermuda (2018), 'Regulatory Authority (Renewable Energy Metering Scheme) General Determination', 28 February, www.rab.bm/index.php/ele-admin-determinations/1645-2018-02-28-renewable-energy-metering-final-decision-order-report-final/file, accessed 2 March 2018.

V. METHODOLOGY

31. This section outlines the methodology that the Authority has developed for assessing the FIT, reflecting responses received to the prior EGD consultation from 2017.

32. In line with the EA, this Consultation Document applies to all forms of renewable energy generation technologies.[10] This methodology focuses primarily on the calibration of the Feed-in-Tariff level in relation to the overall system costs and benefits that arise from higher levels of distributed generation penetration.

33. The EA requires that the FIT will, at most, allow only compensation arising from the following sources.[11]

    (a) **Avoided cost of generation**. This is the cost of generation that the TD&R Licensee avoids by purchasing power from distributed generation.

    (b) **Economic benefits**. Any economic benefits associated with distributed generation.

34. This requirement is consistent with the National Electricity Sector Policy, which states that the reformed electricity sector in Bermuda will introduce competition between existing generation facilities, prospective third-party bulk generators (independent power producers ("IPPs")), distributed generators, and other demand-side resources.[12] In order to ensure that the benefits of such competition are realised, it is necessary for all electricity resources to have access to the electricity network on fair, reasonable, and non-discriminatory terms. In turn, this requires that the FIT for distributed generation systems reflects the system-wide costs and benefits of this technology.

A. Costs and benefits affecting FIT

35. As required by the EA, the FIT should be based on both the avoided cost of generation and economic benefits while also considering the functions of the Authority under the RAA to promote the development of the Bermudian economy and the interests of the residents and consumers of Bermuda.

1. Avoided cost of generation

36. Firstly, the following categories are directly relevant in estimating the net avoided cost of generation which would constitute a benefit from the deployment of distributed generation of renewable energy (section 36(a)(i) of the EA).

    (a) **Reduction in fuel costs and other variable operating costs of generation**. Distributed generation of renewable energy may permit the avoidance of some variable operating costs of overall system generation that would otherwise be incurred. For example, since distributed generators supply renewable energy to the network, the TD&R Licensee can then purchase less energy from a conventional

[10] Electricity Act 2016, p.5. We note that most stakeholder responses received by the Authority have been in relation to feed-in-tariffs for distributed solar PV generation.
[11] Electricity Act 2016, section 36.
[12] Ministry of Economic Development (2015), 'The National Electricity Sector Policy of Bermuda', Bermuda.

bulk generation licensee. Consequently, the conventional Bulk Generation licensee reduces its fuel and lubricating oil costs and other variable operating costs.[13] The reduction in fuel and lubricating oil costs and other variable costs does not have to be estimated based on the costs of conventional bulk generators currently connected to the network. For example, where data is available, it would be appropriate to consider the reduction in costs that would arise in a projected least-cost scenario within an integrated resource planning ("IRP") process.

(b) **Reduction in further generation capacity requirements**. Distributed generation may mitigate the need for further investment in conventional bulk generation capacity. For example, if, according to the IRP, the existing bulk generation licensees' capacity is not sufficient to meet total demand, or is not able to maintain the required level of system reliability, a significant amount of distributed generation capacity could allow the avoidance of some additional fixed costs of installing further conventional bulk generation capacity.[14]

(c) **Reduction in the TD&R Licensee's network losses**. Where there is a high correlation between a customer's demand and on-site generation, the energy losses associated with transmission and distribution may decrease with connecting distributed generators to the network.

37. In addition, the following categories are indirectly relevant in estimating the net avoided cost of generation, resultant from the deployment of distributed generation of renewable energy (section 36(a)(i) of the EA).

(a) **Increase in the network costs of the TD&R Licensee (cost to the system)**. Integration of distributed generation facilities to the existing grid may increase the TD&R Licensee's network costs associated with providing the necessary connection assets, network reinforcements and metering services.[15]

(b) **Increase in the cost of system balancing (cost to the system)** and associated services such as frequency response and operating reserves, especially arising from intermittent distributed generation such as solar photovoltaic ("solar PV") generation. Introducing distributed generation to an electricity system may be expected to increase the amount of dispatchable generation capacity that must be held in reserve, to cope with short-term fluctuations in electricity output resulting from variable solar or wind conditions.

(c) **Increase in the cost of economic stranding of existing generation or network assets (cost to the system)**. Significant distributed generation capacity may displace some capacity of bulk generation licensee(s) or lead to under-utilisation of

[13] Where distributed generation capacity is not large enough to make any discrete units of planned bulk generation capacity redundant, it is unlikely that a bulk generation licensee will avoid its fixed operating costs. The bulk generation licensee will also not avoid the capital costs that have already been incurred. However, even if a part of the bulk generation capacity becomes redundant due to the distributed generation, the extent to which the fixed operating costs and capital cost of the bulk generation licensee are avoided would depend on the agreement between the TD&R and the bulk generation licensees.

[14] System reliability refers to the ability of the electricity system as a whole to meet all connected load requirements.

[15] Network reinforcement costs are unlikely to arise at low levels of distributed generation (e.g. solar PV) penetration. However, higher levels of distributed generation penetration would be more likely to involve costs of integrating the distributed generation into the existing grid.

network assets. This could imply a system cost in the form of economic stranding of existing generation and network assets.

(a) **Changes in thermal plant efficiency (cost to the system)**.[16] Adding variable distributed generation to a grid may result in a reduction in the conversion efficiency of thermal plants, due to (among other things) more frequent changes in the output of load-following plant assets, greater use of more flexible but potentially less efficient plants, and more frequent plant 'start-up' and 'shutdown' measures.

Consultation questions

1. Do you agree that the reduction in fuel costs and other variable operating costs of generation should be considered in estimating the avoided costs of generation?
2. Do you agree that the reduction in further generation capacity requirement should be considered in estimating the avoided costs of generation?
3. Do you agree that the reduction in network losses should be considered in estimating the avoided costs of generation?
4. Do you agree that estimates of the avoided cost of generation should be based on the difference between the increases and decreases in the costs for the TD&R Licensee related to distributed generation?
5. Do you agree that the overall system costs imposed by distributed generation (i.e. increase in (i) network costs, (ii) cost of system balancing and (ii) cost of economic stranding of existing generation or network assets) should be used in estimating the economic costs from distributed generation?
6. Do you consider that reduction in thermal plant efficiency should be taken into account when deriving the appropriate FIT for distributed generation?

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2. Economic benefits

38. There are a number of economic benefits and costs that are closely related to the delivery of wider government policy objectives (section 36(a)(ii) of the EA). The magnitude of such benefits would depend on the relevant guidance from the government. We note that the following list may not be exhaustive.

(a) **Reduction in costs associated with meeting environmental standards (economic benefit)**. Distributed generation of renewable energy is likely to provide environmental benefits relative to existing and planned conventional generation. A higher degree of distributed generation of renewable energy would therefore help in achieving the environmental objectives of the government of Bermuda. If the TD&R Licensee is subject to, or will be subject to, explicit environmental performance targets, the environmental benefits of distributed generation can be measured as the reduction in the cost to the TD&R Licensee of meeting its environmental performance targets. In the absence of any explicit environmental performance targets or incentive schemes, environmental benefits may be approximated using metrics such as traded carbon prices to value the reduction in carbon emissions.

[16] Costs such as this could conceivably be taken into account when quantifying the FIT if the availability of data permits robust estimation in the electricity sector of Bermuda.

The inclusion of such benefits in the calibration of the level of the FIT should be guided by government policy.

(b) **Increased economic activity (economic benefit)**. The distribution of the benefits from increased economic activity (such as gross value added from direct employment, or taxes generated from economic activity in relation to the installation of solar PV in Bermuda) should also be subject to guidance from the government. Based on government policy, the impact of the increase in distributed generation on wider economic activity may be reflected in the FIT. Including the benefit from increased economic activity in the calculation of the FIT would shift the incidence of these benefits from the wider economy to the distributed generators.

Consultation questions

7. Do you agree that the magnitude of (i) reduction in costs associated with meeting environmental standards and (ii) increased economic activity should be consistent with the relevant government policy?

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39. The estimation of the level of the FIT may vary for different distributed generation technologies. The methodology outlined above would reflect the idiosyncrasies of the different technologies for which the FIT is proposed (e.g. solar PV and wind). The net system costs and benefits associated with increased penetration of different distributed generation technologies are likely to differ. Also depending on the maturity and existing penetration of the different technologies, there may be differences in the degree to which government chooses to subsidise further deployment of particular technologies. Therefore, there is a policy decision to be taken into consideration in relation to whether the FIT should be estimated as a single estimate across all distributed generation technologies or whether it should be differentiated (but still subject to the same underlying methodology), and whether any differentiated renewable subsidy should apply for one or more of the relevant technologies.

Consultation questions

8. Do you agree that the FIT should vary for different distributed generation technologies?
9. Do you think that any additional categories of benefits and costs should be included in the assessment of the FIT?

B. Calculation of the FIT based on avoided costs and economic benefits

40. It is proposed that the FIT is calculated as the sum of the avoided cost of generation and net economic benefits detailed in paragraphs 36–38, divided by forecast system total kWh produced by distributed generators. It will be important to consider avoided cost of generation, net economic benefits and production over the same period, e.g. on an annual basis. As a formula, the FIT is calculated as follows:

$$\text{FIT(\$/KWh)} = \frac{\text{avoided cost of generation (\$/p.a.)} + \text{economic benefits (\$/p.a.)}}{\text{forecast system production by distributed generators (kWh/p.a.)}}$$

41. It should be noted that there are general limitations to the calculation of individual components of net avoided cost of generation and net economic benefits. In particular, cost categories are likely to overlap. For example, an increased system reserve requirement for short-term balancing may interact with the required capacity margin needed to meet peak demand. Therefore, it is important to ensure that the avoided system costs and other net economic benefits are not double counted. A system-wide modelling approach would ideally be used to calculate overall net avoided cost of generation and net economic benefits.

42. Further, it is necessary to consider whether the FIT should be revised periodically.

    (a) If the proposed FIT is revised periodically, then it would ensure that the FIT reflects the average system avoided costs for all kWh produced at a given point in time.

    (b) If the FIT is fixed for the duration of the investment, then it would provide higher certainty to the investors, but would become less cost-reflective, as costs change over time.

43. The Authority takes the view that the FIT cannot be fixed for the duration of the investment and has to be updated periodically, in order to ensure consistency with the EA. In particular, this would satisfy the EA in the following respects:

    (a) as required by section 37(1)(b) of the EA, the Authority will conduct tariff reviews every five years or less;

    (a) as required by section 36(b) of the EA, the validity of the methodology will last for at least the expected useful lifetime of the system;

    (b) at any point in time, all distributed generators will be provided with the same level of the FIT, which will reflect the actual avoided cost of generation, as required by section 36(a)(i) of the EA, and will ensure the non-discriminatory access to the system, as required by section 6(d) of the EA.

Consultation questions

10. Do you agree with the approach outlined above for the conversion of avoided costs and wider economic benefits into a FIT?
11. Do you agree that it would be appropriate to revise the FIT periodically so that all distributed generators are provided with the same level of the FIT, and if so, how frequently should the tariff be revised?

C. Next steps

44. The determination of an appropriate FIT is an inherently complex issue, and depends on, among other things, an empirical assessment of the net benefits of relevant distributed generation technologies, as well as full consideration of the relevant policy priorities as determined by government.

45. The Authority initiates the following process to establish the full methodology and the level for the FIT:

(a) engage with relevant stakeholders, including the government, the public, the TD&R Licensee and bulk generation licensee(s), to agree on the implementation of the methodology for the estimation of the FIT given that this can have significant impacts on retail tariffs more generally;

(b) engage with the government and other stakeholders on the broader distributional and consumer welfare implications of the proposed methodology—different levels of FIT imply different levels of wealth transfers across society;

(c) implement the appropriate methodology based on a comprehensive analysis of the available data.

46. The Authority will be mindful of consistency with the wider package of interdependent reform processes in relation to the regulation of the electricity sector in Bermuda, including redesign of the retail tariff methodology and IRP development, which is currently ongoing.

VI. PROPOSED DECISION

47. The Authority proposes to issue a General Determination enacting the FIT methodology described in section V of this Consultation Document.

VII. CONSULTATION QUESTIONS

48. Interested parties are invited to comment on the methodology for assessing the FIT for distributed generation.

Consultation questions

1. Do you agree that the reduction in fuel costs and other variable operating costs of generation should be considered in estimating the avoided costs of generation?
2. Do you agree that the reduction in further generation capacity requirement should be considered in estimating the avoided costs of generation?
3. Do you agree that the reduction in network losses should be considered in estimating the avoided costs of generation?
4. Do you agree that the estimate of other net economic benefits from distributed generation should be based on the difference between the benefits and costs that distributed generation imposes on the system?
5. Do you agree that the overall system costs imposed by distributed generation (i.e. increase in (i) network costs, (ii) cost of system balancing and (ii) cost of economic stranding of existing generation or network assets) should be used in estimating the economic costs from distributed generation?
6. Do you consider that changes in thermal plant efficiency should be considered when deriving the appropriate FIT for distributed generation?
7. Do you agree that the magnitude of (i) reduction in costs associated with meeting environmental standards and (ii) increased economic activity should be consistent with the relevant government policy?
8. Do you agree that the FIT should vary for different distributed generation technologies?
9. Do you think that any additional categories of benefits and costs should be included in the assessment of the FIT?
10. Do you agree with the approach outlined above for the conversion of avoided costs and wider economic benefits into a FIT?
11. Do you agree that it would be appropriate to revise the FIT periodically so that all distributed generators are provided with the same level of the FIT, and if so, how frequently should the tariff be revised?
