

Review of the Feed-in Tariff Methodology Consultation Document

Consultation Document
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I. INTRODUCTION

1. The purpose of this Consultation Document is for the Regulatory Authority of Bermuda (**RA**) to:
(i) provide an overview of the current methodology in place to calculate the Feed-in Tariff (**FiT**);
(ii) present topics and considerations that are open for the review process of the FiT methodology; and (iii) invite comments on the Consultation Document to help the RA conduct a review of the methodology. At the end of the consultation process, the RA will issue a revised version of the General Determination (**GD**) which sets the FiT methodology.
2. The RA 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 RA shall determine the FiT in accordance with the methodology set by GD and in accordance with the principles set out in the EA. The EA states that the FiT shall compensate for at most “the actual cost of generation that the TD&R Licensee avoids by purchasing power from distributed generation and an estimate of any economic benefits from distributed generation.”¹
4. On 2 March 2018, the RA issued a GD mandating that the Bermuda Electric Light Company Ltd (**BELCO**), in its capacity as the TD&R licensee, should pay a FiT for electricity produced by distributed renewable energy systems in accordance with the net avoided costs of generation, as described in the GD.
5. On 27 April 2018, the RA released its first Consultation aiming to collect public views on the FiT methodology, based on the net avoided costs of generation. On 19 October 2018, the RA issued the Final Report, Decision Order and GD which describes the details and steps of the methodology to calculate the FiT rates with details around the frequency of reviews and updates, which is meant to take place every three years.
6. The review of the rate, currently at US\$0.2265/kWh, is meant to occur this year (2022), since the last rate was set in 2019. However, the RA has chosen to also review the current

¹ Electricity Act 2016, <http://www.bermulalaws.bm/laws/Consolidated%20Laws/Electricity%20Act%202016.pdf>

methodology used to ensure that distributed generation are compensated at an accurate and an appropriate level as is required by section 37 of the EA.

7. This Consultation Document presents the current methodology for assessing the level of the FiT that the Transmission, Distribution & Retail (**TD&R**) Licensee would pay to distributed generators for the purchased renewable energy and topics and considerations for the review of the methodology for the public to comment on.
8. In line with the EA, this Consultation Document applies to all technologies used by distributed generators to produce renewable energy.
9. The Consultation Document is structured as follows:
 - a. Part II outlines the consultation procedure;
 - b. Part III sets out the legislative context;
 - c. Part IV discusses the background of the FiT and the Consultation;
 - d. Part V provides topics for discussion and consideration;
 - e. Part VI lists the consultation questions;
 - f. Appendix A lists the main definitions.

II. CONSULTATION PROCEDURE

10. This consultation is being undertaken in accordance with sections 62 and 69-73 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 is set out in paragraphs 11-17 below.
11. Written comments should be submitted before 5:00 PM (Bermuda time) on 24 October 2022.
12. The RA invites comments from members of the public, electricity sectoral participants, and other interested parties. The RA requests that commenting parties' responses reference the relevant question number, as set forth in this Consultation Document. All Consultation Document questions are in Part VI below.
13. Responses to this Consultation Document should be filed electronically in MS Word or Adobe Acrobat format. Parties wishing to file comments should go to the RA's website <http://www.ra.bm> and click on the "Click Here to Respond" button on the RA's home page:

We invite you to **RESPOND TO AN OPEN PUBLIC CONSULTATION**

[Click Here to Respond](#)

14. All comments should be clearly marked "Response to Consultation Document: Review of the Feed-in Tariff Methodology" and should otherwise comply with Rules 18 and 30 of the RA's Interim Administrative Rules, which are posted on the RA's website.
15. The RA intends to make responses to this Consultation Document available on its website within 4 weeks of the close of consultation. 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 set out in section 33 of the RAA and in the manner provided for in Rule 30 of the RA's Interim Administrative Rules.
16. 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 RA regarding the matter being consulted on in this Consultation Document, other than a written submission made pursuant to this part II. Within two business days after making an *ex parte* communication, the person who made the *ex parte* communication shall submit the following to the RA: (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 RA's website, along with a notice of the *ex parte* communication.

17. The RA intends to publish its GD on this Consultation within six (6) months after the closing date of the Consultation.
18. The principal point of contact at the RA for this Consultation Document is Simon Clinton. He may be contacted by email, referencing "Comments on Review of Feed-in Tariff Methodology General Determination" at consultation@ra.bm or by mail at:

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19. 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.
20. This Consultation Document is not a binding legal document and does not contain legal, commercial, financial, technical or other advice. The RA is not bound by this Consultation Document, nor does it necessarily set out the RA's final or definitive position on particular matters. To the extent that there might be any inconsistency between the contents of this Consultation Document and the due exercise by the RA 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 RA.

III. LEGISLATIVE CONTEXT

21. 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”² according to the RAA.
22. In June 2015, the Ministry of Economic Development of Bermuda published the National Electricity Sector Policy (the **Policy Document**)³. The Policy Document set out the groundwork for the institution of the subsequent EA and the desired structure of the electricity sector of Bermuda⁴.
23. The EA established an electricity sector regulatory framework within the meaning of the RAA. The EA received Royal Assent on 27 February 2016 and came into operation on 28 October 2016 pursuant to the Electricity Act 2016 Commencement Day Notice 2016 (BR 101/2016). The EA repealed the Energy Act 2009.
24. The Minister responsible for electricity is currently the Minister of Home Affairs (the **Minister**). The Minister can issue Ministerial declarations that establish policies for the electricity sector⁵ and can also issue Ministerial directions to the RA regarding any matter within his authority with regard to the electricity sector.⁶ 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.⁷
25. The RA 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, and include:
 - “(a) to ensure the adequacy, safety, sustainability and reliability of electricity supply in Bermuda so that Bermuda continues to be well positioned to compete in the international business and global tourism markets;
 - (b) to encourage electricity conservation and the efficient use of electricity;

² Regulatory Authority Act 2011, p. 5.

³ Ministry of Economic Development (2015), ‘The National Electricity Sector Policy of Bermuda’, Bermuda.

⁴ Ministry of Economic Development (2015), ‘The National Electricity Sector Policy of Bermuda’, Bermuda, p. 4.

⁵ Electricity Act 2016, section 7(2).

⁶ Electricity Act 2016, section 8(1).

⁷ Electricity Act 2016, section 9.

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

(d) to provide sectoral participants and end-users with non-discriminatory interconnection to transmission and distribution systems;

(e) to protect the interests of end-users with respect to prices and affordability, and the adequacy, reliability and quality of electricity service;

(f) to promote economic efficiency and sustainability in the generation, transmission, distribution and sale of electricity.”

26. The principal functions of the RA, in relation to any regulated industry sector, are described in section 12 of the RAA as follows:

“(a) to promote and preserve competition;

(b) to promote the interests of the residents and consumers of Bermuda;

(c) to promote the development of the Bermudian economy, Bermudian employment and Bermudian ownership;

(d) to promote innovation; and

(e) to fulfil any additional functions specified by sectoral legislation.”

27. Section 14 of the EA gives the RA the function “generally to monitor and regulate the electricity sector” together with the detailed functions described in the RAA and elsewhere in the EA. Hence, the RA regulates the electricity sector in Bermuda.⁸

28. The Policy Document⁹ provides guidance in relation to the objectives that a FiT should achieve. In particular, the tariff structure should be set such that it:

“(a) Ensures cost recovery by reflecting the Electric Utility’s cost of providing services to distributed generators (energy, demand, and grid access services), and

⁸ Defined in the RAA as including a General Determination, order, direction, decision or other written determination by which the RA establishes the legal rights and obligations of one or more Sectoral Participants but does not include an advisory guideline (or an adjudicative decision and order. 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.

⁹ The National Electricity Sector Policy of Bermuda section 5.6

(b) Fairly compensates distributed generators for the value of any energy produced by their distributed generation system. This may be set to reflect financial value (according to avoided generation cost), as well as economic value (accounting for externalities and benefits not captured in avoided cost)."

29. Additionally, section 36 of the EA outlines that RA shall determine the FiT in accordance with the principles set out in the EA. The EA states that the FiT shall compensate for at most "the actual cost of generation that the TD&R Licensee avoids by purchasing power from distributed generation and an estimate of any economic benefits from distributed generation. The term of validity of the tariff shall be at least equal to the expected useful lifetime of the system used and maintained efficiently."¹⁰
30. On October 19, 2018, the RA published the FiT Final report and the GD setting forth the methodology to calculate and set the FiT, with updates conducted every three years.
31. To establish the approved FiT, section 37 of the EA requires the RA to conduct FiT reviews in accordance with the methodology set by GD and in accordance with the principles set in section 36 of the EA. This Consultation Document aims to invite comments on the methodology that is currently in used in Bermuda and any considerations that are to be reviewed.
32. Furthermore, the review process should be initiated by the RA publishing a consultation document, as described in section 70 of the RAA, inviting comment regarding (i) market conditions in the sector; (ii) regulations and administrative determinations applicable to the sector that should be made, modified or revoked; and (iii) any other relevant issues.
33. Pursuant to the above sections of the RAA, the RA hereby issues this Consultation Document for the 2022 review of the FiT methodology.

¹⁰ Electricity Act 2016, <http://www.bermudalaws.bm/laws/Consolidated%20Laws/Electricity%20Act%202016.pdf>

IV. BACKGROUND

34. The RA 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.
35. On 24 March 2017, the RA 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).¹¹
36. On 14 July 2017, the RA provided a discussion of responses to the initial consultation document. This was followed by a second round of consultation.¹²
37. On 2 September 2017, the RA extended the EGD until 2 March 2018. This extension allowed the RA 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.
38. On March 2, 2018, the RA issued a GD setting up a FiT and a transitional methodology based on the net avoided costs of generation that was used for tariff reviews until the completion of the FiT consultation process and issuance of the respective GD.
39. On 27 April 2018, the RA released its first Consultation aiming to collect public views on the FiT methodology, based on the net avoided costs of generation.
40. On 19 October 2018, the RA issued the Final Report, Decision Order and General Determination (GD) which describes the details and steps of the methodology to calculate the FiT rates with details around the frequency of reviews and updates, which is meant to take place every three years. The GD set forth the methodology for the FiT calculation to represent the avoided cost of generation that the TD&R Licensee avoids by purchasing power from distributed generation and economic benefits associated with distributed generation.

¹¹ 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.

¹² 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.

41. The last rate was set in 2019 at US\$0.2265/kWh, meaning the review of the rate is due to occur this year (2022). For this review, the RA has chosen to also review the current methodology used to ensure that distributed generation are compensated at an accurate level.
42. This Consultation Document will present the current methodology and considerations for the review of the methodology for public comment.

V. CURRENT METHODOLOGY, OBSERVATIONS AND CONSIDERATIONS

43. The current FiT rate is based on the avoided cost of generation that the TD&R licensee avoids by purchasing power from distributed generation (under 500kW) and any economic benefits associated with the distributed generation. The FiT calculation methodology needs to be capped at the avoided cost of generation and an estimate of any economic benefits associated with the distributed generation as per section 36 of the EA.

V.1 Basis of Calculations for FiT

V.1.1 Bermuda's Methodology-Avoided cost of generation:

44. The GD published in October 2018 details the current methodology in Bermuda which calculates the FiT based on the net avoided cost of generation (costs that the TD&R licensee avoids by purchasing power from distributed generation) and economic benefits from distribution generation. Currently, the avoided generation cost is equivalent to the fuel and lube oil costs during solar generation, plus the consideration of avoided transmission losses. The FiT rate in Bermuda is set and reviewed every three years and currently does not vary by size nor technology. A similar approach to the one used in Bermuda is used in the state of Victoria in Australia.
45. The nature of the methodology makes it very difficult to differentiate the avoided costs based on the consumer or capacity band, as the avoided cost could be argued to be the same, which leads to the rate staying the same across different consumers and sizes. Additionally, there is no need for the FiT rate to stay constant for an asset once it starts receiving FiT payments as the methodology represents the avoided cost of generation, and therefore the rates can fluctuate with updates. This can relieve some administrative burden which could arise from keeping rates fixed for an asset over a period of time.

V.1.2 Barbados' Methodology-Technology costs/LCOE and rate of return:

46. In other jurisdictions such as Barbados, the FiT is based on the combination of return on investment and Levelised Cost of Energy (LCOE)¹³. The FiT scheme in Barbados is open to assets up to 10MW and is set to provide an assumed rate of return to investors, or developers, based on the technology costs and additional market conditions over a certain period of time. Therefore, the methodology solves for a FiT that would help the investor recover an assumed rate of return. The return on investment assumed by Barbados is 14% for corporate-owned projects (projects above 10kW) and 6% for individually owned projects (projects up to 10kW). The LCOE is calculated by considering the installed costs, performance data such as capacity factor and annual degradation, operating costs, and financial inputs (interest, import duties, etc.), for each

¹³ Fait Trading Commission Decision: https://www.ftc.gov.bb/library/2020-09-29_commission_decision_blandp_feed-in-tariff_1-10MW.pdf; https://www.ftc.gov.bb/library/2019-09-16_commission_decision_final_FIT.pdf

technology and set capacity band. Therefore, the rates would vary depending on the technology and size of the asset. The information is gathered through stakeholder outreach and market research to investigate the technology levels in the country.

47. Once entering into an agreement, or FiT contract, the FiT rate for an asset is to remain fixed for the contract period of 20 years, which can be indexed to inflation if that is not considered in the LCOE calculation. The tariffs in Barbados have not yet been reviewed but are expected to be reviewed annually, however, due to current market conditions and COVID-19 impacts, there has not been a review and the rates have been extended.
48. For this methodology, it is important to retain the FiT rate flat for the contract terms to be able to provide that assumed rate of return to the investor and reflect the aim of the methodology, which is to provide financial security/stability and ensure that investors can recuperate their investment. This could be administratively intensive as there would have to be records on which assets are receiving which rates. Additionally, there could need to be updates annually to account for inflation changes to those fixed rates to ensure proper cost recovery.
49. Additionally, a lot of in-depth research and investigation would need to be considered to collect and make adequate assumptions on technology costs and in particular, the assumed rate of return.
50. This approach, however, can lead to defined capacity bands in the FiT methodology as the costs vary by capacity. Additionally, it would provide stability to investors which could make projects more attractive.
51. If adopted by Bermuda, this methodology would only apply to new assets. Any existing or legacy assets, that are currently under the existing scheme, would continue receiving the avoided cost of generation rate. Additionally, it is important to consider that if Bermuda were to adopt this methodology, with every update of the rate, there would need to be assurance of compliance with the EA, which caps the rate at the avoided cost of generation. Therefore, it adds administration and implementation burden since every asset's FiT rate would have to be checked, and changed if needed, to ensure that the EA is not breached. Depending on the frequency of the update, this could case high administration requirements due to not only calculating the tariffs for both methodologies (technology costs and avoided cost of generation approach), but also ensuring that every rate that is provided and has been contracted over the years is not in breach of the EA. If so, it would require changing the rates for the applicable assets to the calculated avoided cost of generation tariff until the next update (changing the rate to avoided cost of generation if the technology cost rate is higher than avoided costs). In addition, the rate that would be calculated with the technology cost methodology, could need annual updates to incorporate inflation for those assets that are already under the scheme/already have a contract (ensure that the FiT paid to assets under the scheme involves inflation to ensure proper recovery of investment).

52. Due to the complexity surrounding the administration of such methodology, it is important that the public has clear understanding of the potential changes in the FiT rate to ensure compliance with the EA if they are under the LCOE scheme and that legacy assets understand that they would continue with the same methodology.

V.1.3 Jamaica's Methodology-Avoided cost of generation plus premium:

53. In Jamaica, the Office of Utility Regulation (OUR) initiated a net billing program in 2012 through Jamaica Public Service Company Limited (JPS). This program provides monetary compensation to assets up to 100kW. The compensation, per kWh, is based on the short-term variable avoided-cost rate, representing the short-run marginal cost of generation, topped with 15% premium for renewable energy generation. The rate is calculated by taking the total fuel costs for a given billing month and dividing by the net system generation (kWh) for the same billing period.
54. There are difficulties that arise from this approach which are mainly related to the premium of 15%. The premium needs to be accurately and appropriately set to provide accurate compensation to distributed generation. This would mean that it needs to be able to be based off a set concept. However, it is not very clear what the 15% in Jamaica's case represents, nor on which basis it has been determined.
55. Since the premium percentage would be added on top of the avoided cost of generation in this methodology, it would be in breach of Bermuda's EA, which caps the FiT compensation at the avoided cost of generation. Therefore, to stay compliant with the EA, the RA is not considering this methodology further.

Box 1: Considerations pertaining to the FiT calculation methodology

- ❖ *Q1: Should Bermuda consider adopting an LCOE approach, similar to that used in Barbados, in addition to the existing avoided-cost methodology? Or do you think Bermuda should solely maintain the avoided cost of generation methodology?*
- ❖ *Q2: If the LCOE approach is considered, do you agree that the FiT rate would need to be fixed for the duration of the asset's time under the FiT scheme in order to ensure that the asset receives the rate of return assumed?*
- ❖ *Q3: Do you agree that the FiT rate calculated through avoided cost of generation should not be fixed (instead, would be updated with every recalculation) for the duration of the asset's time under the scheme?*
- ❖ *Q4: Do you agree that if Bermuda adopts the LCOE approach, that it should only apply to new assets, while existing or legacy assets should continue receiving the rate calculated through avoided cost of generation?*

- ❖ Q5: Do you agree that having both the GD providing for a LCOE/technology cost methodology (Barbados' methodology) and the EA capping the rate at a level underpinned by an avoided cost of generation methodology could cause confusion and high administration requirements?

V.2 Exports Caps

56. Since the current FiT compensates for exported generation to the grid, there may be situations where some customers may tend to reduce their self-consumption and increase the export of generated electricity in order to acquire compensation. This can happen in particular when the FiT rate is higher than the retail electricity rates. In order to mitigate the negative effects from too much electricity being exported and promote self-consumption, some jurisdictions such as France and the state of Victoria in Australia have introduced a cap on compensation for exports.
57. In France, once the installation reaches its annual exports cap, the FiT reduces so the asset is not able to make a profit.
- (a) For installations under 100kW: the cap is equal to the capacity (kW) multiplied by 1600 (hours). Once the asset exceeds this limit in a given year, the FiT for the rest of the year drops to €0.05/kWh (BMD\$0.053/kWh).
 - (b) For installations above 100kW: the cap is equal to the capacity (kW) multiplied by 1100 (hours). Once the asset exceeds this limit in a given year, the FiT for the rest of the year drops to €0.04/kWh (BMD\$0.043/kWh).
58. The state of Victoria in Australia has a similar cap. Each utility can set its own export cap and then once a FiT installation surpasses the export cap in a given year, the FiT rate they receive is reduced for the rest of that year.
59. Setting a cap on exports can help promote self-consumption but also mitigate additional network infrastructure needs. It could protect the grid from large amounts of electricity being injected and causing stress (which in terms needs to be mitigated by sometimes onerous network reinforcement programmes). In the absence of the cap, the grid infrastructure will need to be considered and upgraded in the future to accommodate for the increased power flowing into the grid. Another benefit from the cap is that it would incentivise those installing distributed generation to size the generators proportionately to their own level of electricity needs.

60. Without a cap, there is a risk to effectively inadvertently introduce a “trading” market of sorts for power generation owners whose system size falls underneath the license threshold. This could result in disproportionately high FiT payment costs to be recovered by all utility customers and could hinder the development of larger utility-scale projects under provisions from the IRP.
61. However, there are challenges that arise from setting an export cap. The cap could be set in a similar way to France, considering an assumed level of hours and using the capacity of installations, or a set percentage of total generation of the asset. However, the latter would require an additional meter to investigate the total value of generation from the asset, which adds additional costs and complications on the system – as well as practical challenges around data protection.
62. Additionally, setting an export cap would require close monitoring and additional administration to observe when the caps are reached and exceeded, and take action appropriately by reducing, or removing, the FiT benefit the rest of the year.

Box 2: Considerations pertaining to a cap on the exported electricity

- ❖ *Q6: Should there be an export cap for assets benefiting from the FiT scheme?*
- ❖ *Q7: If so, should the cap be a set percentage of the total generation or based on the capacity and an assumed number of hours as is done in France? The former would require an additional meter.*
- ❖ *Q8: If an export cap is explored, should the FiT be reduced or removed for the remainder of the year once an asset surpasses the cap?*

V.3 Capacity band considerations

63. Currently, Bermuda does not have any capacity bands within the FiT methodology – meaning that all installations, irrespective of their installed capacity, receive the same rate.
64. However, the unit costs of building and operating larger installations typically benefit from economies of scale. This is not reflected in the way FiT rates are currently set in Bermuda. As such, it is worth considering the merits of splitting out the capacity threshold into different capacity bands so that assets of different sizes can receive different tariffs.
65. With Bermuda’s current approach of avoided cost of generation, the rate represents the cost that the TD&R licensee avoids by purchasing generation from the distributed generation per unit injected, which one could argue would not change with the size of the installation. Therefore, introducing capacity bands in combination with the current avoided

cost methodology would not be entirely meaningful. This is also seen in the state of Victoria in Australia, which has a similar avoided cost of generation approach to Bermuda, and also does not have capacity bands in the methodology. Setting capacity bands for this approach would need to be done on an arbitrary basis or under a philosophy which would diverge from the avoided cost approach, which in the earlier case could be seen as discriminatory against some technology sizes and in the latter case would be misaligned with EA provisions.

66. The LCOE and rate of return methodology discussed previously, and used in Barbados, can be used to set the different rates for each capacity band and technology (because FiT is derived from users' costs rather than avoided costs at system level). By using different technology costs for different bands, and even different rate of returns if needed, the FiT can then be individually assessed for every band, leading to a more targeted rate for each size of installation. The FiT then helps meet the assumed, and targeted Rate of Return (ROR), during the FiT contract length (in Barbados it is set for 20 years).
67. Capacity bands are common across FiT methodologies used in other jurisdictions including Barbados, Germany and Great Britain. However, these jurisdictions that have the capacity bands applied also use an approach more similar to the LCOE and rate of return methodology, which makes capacity bands applicable.
68. Setting capacity bands would require more administrative support to ensure that the appropriate rates are paid to consumers – this complexity is linked to several fundamental principles generally attached to this approach:
 - 1) It is essential to ensure that the rate reflects prudently incurred costs, which typically implies benchmarking and detailed analysis;
 - 2) For each system, rates should be set on an asset lifetime or long term basis;
 - 3) Contract rates for new systems should be different than for existing systems if a change in prudently incurred costs is observed.
69. In practice, this could introduce a discrepancy between costs incurred to some users and FiT, and could result with a vast number of separate and different contract rates in place across systems with different commissioning years, capacity bands, and customer classes.
70. Additionally, if the LCOE approach is used in Bermuda, there would need to be alignment and a lot of clarity around how that would work with the avoided cost of generation cap set by the EA.

Box 3: Considerations pertaining to the application of capacity bands

- ❖ *Q9: Do you agree that capacity bands are not applicable to the avoided cost of generation methodology currently used in Bermuda?*
- ❖ *Q10: If Bermuda were to adopt the LCOE approach, should the RA vary the FiT rate by set capacity bands?*
- ❖ *Q11: If so (yes to Q10), do you think that the capacity bands should be based on installation size, or another approach?*

V.4 Capacity Threshold

71. Currently, the capacity threshold for FiT in Bermuda is 500 kW - this defines what is classified as distributed generation.
72. In other jurisdictions, this threshold is higher. For example, the threshold for Barbados, California, and Great Britain are 10 MW, 3 MW, and 5 MW, respectively. However, all of these jurisdictions have a larger electricity system in terms of installed capacity, with Barbados almost double the size of Bermuda. In general, a higher threshold opens up the opportunity for a wider range of non-domestic customers to apply for FiT scheme.
73. Other jurisdictions, such as the state of Victoria in Australia, have a lower capacity threshold than the one currently in place in Bermuda at 100kW. This can help monitor the sizes of installations that are incentivised and to minimise customers over sizing assets and using them for generation instead of self-consumption.
74. France has a similar capacity threshold to Bermuda, at 500kW, however still has a much larger electricity system.
75. Changing the capacity threshold would require quantitative analysis to determine an appropriate level to ensure that there is a strong justification for moving the level. Additionally, it would be important to consider the treatment of legacy assets. For example, if the threshold is reduced, it would be important to consider the assets that used to be within the threshold and benefited from the FiT, and if the threshold is increased, it would be important to consider whether the assets that are already built should be eligible for the FiT from the date of change.
76. Increasing the threshold could accelerate the renewable energy transition in Bermuda and help reduce the cost of electricity for larger users who can afford distributed generation

systems but, would likely result in higher network upgrade costs and would increase FiT payment costs to be recovered from all electricity customers.

77. Conversely, decreasing the threshold for new systems would risk slowing down the pace at which new behind-the-meter installations are commissioned in Bermuda, but would help to contain the burden of FiT payment and DG-related network upgrade costs for customers who were not planning to commission such systems.

Box 4: Considerations pertaining to a change in the capacity threshold

- ❖ *Q12: Should Bermuda increase, decrease, or keep the current capacity threshold?*
- ❖ *Q13: Do you have a preference of what the threshold should be?*
- ❖ *Q14: How should existing/legacy assets be treated if the capacity threshold is increased or decreased? (i.e. if threshold is reduced, should those assets that were receiving FiT before still continue to receive FiT payments?)*

V.5 Technology bands

78. It is a common practice to use multiple tariff bands based on size and technology of installation. For example, Barbados, France, and Great Britain vary their tariff by both size and type of technology.
79. California only varies the tariff by technology rather than by system size - this is because the methodology is based on the avoided cost of meeting the renewable portfolio standards, which is calculated by calculating the average PPA for different renewable energy technologies by specific technology.
80. Currently, Bermuda does not differentiate the FiT rate by technology. A single rate applies to all technologies and installed capacities at the moment. This is also the case in Victoria state in Australia, which uses a similar avoided cost of generation approach, and which just has one tariff that does not vary by size nor technology.
81. The current GD (paragraph 9) does consider “that setting different levels of the FiT for different distributed generation technologies is appropriate”. The GD currently states that the RA “will consider any data that is provided as part of the data-gathering process regarding differentials in avoided cost by different technology” and that the RA “will consider whether there is sufficient penetration of each technology type to make it proportionate that a differentiated FiT level is determined by technology.” Since Bermuda’s renewable distributed generation is predominantly composed of solar PV

technology, the RA believes it is not necessary to currently make a distinction in rates. However, data could be used in the future when/if different technologies such as small-scale wind turbines have larger levels of deployment.

Box 5: Considerations pertaining to setting different rates for different technologies

- ❖ *Q15: Should the RA consider differentiating the FiT rates by technology when there is sufficient data to do so and when deployment rates are high enough?*

V.6 Historical and Forward-Looking Approaches

82. At the moment, the calculation of the FiT in Bermuda is based on historical fuel and lube oil costs, on the basis that they are representative of actual values. The FiT, based on this approach, is being updated every three years.
83. Some other jurisdictions such as Barbados and California, use similar approaches in their calculation methodology, i.e. rates are derived from historical and present data. However, these jurisdictions have different basis in calculating the FiT rate (LCOE approach in Barbados and avoided cost of meeting renewable portfolio standards in California).
84. The Victoria state in Australia uses a similar calculation methodology to Bermuda at the moment, i.e. it calculates the FiT based on avoided cost of generation and additional benefits from distributed generation. However, the main difference with Bermuda is that in this state, the rate is derived from forward-looking assumptions rather than from historical data. The forecasting is conducted by taking the quarterly future swaps from the Australian Stock Exchange weighted by traded volume across the most recent 12 months¹⁴. The avoided cost of generation is then calculated by combining assumed solar exported generation curves and the forecasted wholesale price. Under this approach, the state of Victoria in Australia updates the tariff every year based on the updated set of wholesale prices and other considerations.
85. Forward-looking approach can help estimate what the avoided cost will be at the time when the FiT is being used. With little fluctuation in avoided costs (and more notably, in fuel costs), the current approach (based on historical costs) can provide a reasonable estimate of future avoided costs. But with much greater fluctuation, it fails short of “keeping up to date” with market fluctuations – unlike, for instance, the quarterly determination of the Fuel Adjustment Rate.

¹⁴ Essential Services Commission, Minimum Electricity Feed-in Tariff to Apply from 1 July 2022

86. It is worth noting, though, that the resolution of such discrepancy between historical and future avoided costs would be at the cost of introducing further uncertainty into the calculation methodology. To mitigate such discrepancy, there would be a need to consider more frequent FiT updates and/or periodic true-up adjustments.

Box 6: Considerations pertaining to forward-looking approaches

- ❖ *Q16: Do you think that Bermuda should consider a forward-looking approach for the avoided cost of generation methodology?*
- ❖ *Q17: Do you agree that a forward-looking approach is not applicable to a methodology which calculates the FiT based on technology costs at an assumed rate of return?*
- ❖ *Q18: Do you believe that the forward-looking approach, in the case of avoided cost of generation, could be factored in by the use of future fuel prices or exploring a link with the FAR or another means?*
- ❖ *Q19: If not, do you think that historical values are the most accurate way of representing close to actual values for the case of avoided cost of generation?*
- ❖ *Q20: If a forward-looking approach is adopted with the avoided cost of generation methodology, should there be consideration to carry out more frequent updates (and if so, how frequently)? To include a true-up mechanism?*

V.7 Inclusion of Other Costs

87. The GD indicates that the FiT calculation should consider additional costs incurred by DG on the system to derive the net avoided cost of generation, as detailed in paragraph 6. Paragraph 6 lists that these relevant categories include “increase in the network costs of the TD&R Licensee, increase in the cost of system balancing, increase in the cost of economic stranding of existing generation or network assets, and changes in thermal plant efficiency”.
88. The increase in the cost of system balancing touches on the potential need for “frequency response and operating reserve” services due to potential “fluctuations in electricity output from variable solar and wind conditions”. The state of Victoria in Australia includes ancillary service charges in their avoided cost of generation methodology. In setting the FiT for 2022, Victoria incorporated the ancillary service component by assuming that it would be equal to the average cost of ancillary services over the 2021 calendar year¹⁵. In Bermuda, the level of DG penetration is not currently so high that it incurs significant levels of mitigation costs

¹⁵ Essential Services Commission, Minimum Electricity Feed-in Tariff to Apply from 1 July 2022

such as ancillary services. Therefore, even if reflected accurately in the FiT, the impact of this particular component would be negligible.

89. The “increase in the network costs of the TD&R Licensee” could include “network costs associated with providing the necessary connection assets, network reinforcements and metering services”. Similar to the point above, the level of DG penetration is not so high that it incurs significant levels of network reinforcement costs. Additionally, the other costs such as costs associated with connection and metering services, could be paid by the customer when setting up the standard contract, therefore, would not be necessary to incorporate into the FiT value.
90. The other costs that paragraph 6 refer to include the “increase in the cost of economic stranding of existing generation or network assets, and changes in thermal plant efficiency”. The former aims to quantify how “significant distributed generation capacity may displace some of bulk generation licensee (s) or lead to under-utilisation of network assets.” While the latter represents the costs associated with changes in the efficiency of thermal plants due to more frequent changes in output. However, quantifying these costs could be complex and would require designing a specific approach with large assumptions.

Box 7: Considerations pertaining to quantifying other costs like balancing services

- ❖ Q21: *Do you agree that due to the current intermittent capacity levels in Bermuda, the costs of system balancing, and other mitigation costs, are not currently material and therefore do not currently need to be incorporated into FiT calculations? If not, which approach would you recommend adopting to quantify such costs?*
- ❖ Q22: *Do you agree that the increase in network costs of the TD&R licensee, associated with DG, should be omitted from the avoided cost of generation calculation since such costs can be included when establishing the standard contracts? If not, which approach would you recommend adopting to quantify such costs?*
- ❖ Q23: *Is it appropriate to retain the increase in costs associated with economic stranding of existing assets and changes in thermal plant efficiency, even though quantifying such costs would require a complex methodology with large assumptions? If so, which approach would you recommend adopting to quantify such costs?*

V.8 Inclusion of Economic Benefits

91. Bermuda’s methodology also mentions, in paragraph 7b, quantifying “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)” into the FiT value. However, the calculation of these benefits, besides the reduction in carbon costs (which is now factored into economic analysis around the world using well-established principles), would require designing a tailored approach and making large assumptions due to the complexity of quantifying indirect and external benefits associated with distributed generation. In other jurisdictions (such as the state of Victoria in Australia) the quantification of economic benefits associated with DG in the FiT calculation is restricted to the reduction in carbon costs.

Box 8: Considerations pertaining to the economic benefits

- ❖ *Q24: Do you agree that calculating increased economic activity should be omitted from the avoided cost of generation calculation due to lack of data and established methodology in the subject?*
- ❖ *Q25: Do you agree that economic benefits factored into FiT calculation should be limited to the reduction in carbon costs? If not, which approach would you suggest adopting to calculate additional benefits?*

V.9 Inclusion of Avoided Costs of Carbon

92. For the avoided cost of generation methodology currently in place, the economic benefits from DG encompass the “reduction in costs associated with meeting environmental standards”, which “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” (paragraph 7a). Additionally, it states, “inclusion of such benefits in the determination of the level of the FiT should be guided by government policy.”
93. Estimating the avoided cost of carbon is a complex process and is currently not practiced elsewhere in Bermuda since Bermuda does not currently have a carbon market or market price.
94. In other jurisdictions (such as the state of Victoria, Australia), the avoided cost of carbon is defined as “cost per kilowatt-hour (kWh) of small renewable energy generation electricity purchased by a relevant licensee”¹⁶ determined with the following formula:

$$\text{Volume factor} \times \text{Price factor}$$

¹⁶ Victoria Government Gazette, Electricity Industry Act 2000, Orders Specifying a Methodology and Factors for the Determination of the Avoided Social Cost of Carbon

The volume factor represents the kg of CO_{2e} avoided for each kWh of renewable generation. The price factor represents the average market spot price of one tonne of CO_{2e} over the specific time horizon. The market price of carbon is reflective of the price set from the market-based approach to encourage energy efficiency, the Victorian Energy Efficiency Target (VEET). This is a certificate trading scheme, which provides certificates when energy efficiency measures are implemented. Each certificate represents one tonne of carbon emissions saved over the lifetime of the implemented measure¹⁷. The certificates can be traded and sold; therefore, the program helps set a market-based cost on carbon. For the 2022 update of the FiT, the state of Victoria in Australia used an estimated volume factor of 1.27 Kilograms (Kg) of CO_{2e} per kWh, and a price factor AD\$19.63 per tonne of CO₂¹⁸.

95. In order for Bermuda to be able to accurately incorporate the cost of carbon in the avoided cost of generation methodology it will be essential to make provisions for the “price factor”. Two types of methodologies could apply:

- 1) Market-based (i.e. “top-down” approach). Since there is no carbon market in Bermuda at present, this would involve either linking the approach to potential future establishment of such market in Bermuda or linking Bermuda’s carbon price to the market price observed in another designated jurisdiction.
- 2) Social cost (i.e. “bottom-up” approach extending to indirect impacts of carbon emissions). This would either need to be underpinned by a national policy or secondary legislation on setting a social cost of carbon in Bermuda (which would need to be derived from detailed economic analysis) or linking Bermuda’s carbon cost to the social cost of carbon last updated in another designated jurisdiction.

Box 9: Considerations pertaining to quantifying the costs of carbon in the avoided cost of generation methodology

- ❖ Q26: Do you agree that the FiT should aim to factor in the avoided cost of carbon emissions, assuming a detailed methodology is established to support the calculations?
- ❖ Q27: Do you believe that the “price factor” for carbon should be market-based? If so, should Bermuda’s price be linked to the market price established in another designated jurisdiction? Which one(s)?

¹⁷ Setting future Victorian energy Efficiency Targets, https://www.energy.vic.gov.au/__data/assets/pdf_file/0023/75164/VEET-consultation-document.pdf

¹⁸ Essential Services Commission, Minimum Electricity Feed-in Tariff to Apply from 1 July 2022

- ❖ Q28: Do you believe that the “price factor” for carbon should be derived from “social cost of carbon” calculations? If so, should Bermuda’s cost be linked to a social cost of carbon value established in another designated jurisdiction? Which one(s)?

V.10 Avoided Cost of Generation Calculated Based on Exports or Generation

96. The current approach in Bermuda, set by the General Determination paragraph 10, outlines the calculation of the FiT based on the equation below, which calculates the avoided cost (numerator) and distributed generation (denominator) based on total generation from DG assets.

$$\text{FIT}(\$/\text{kWh}) = \frac{\text{avoided cost of generation} (\$/\text{Period}) + \text{economic and/or other benefits} (\$/\text{Period})}{\text{forecast system production by distributed generators} (\text{kWh}/\text{Period})}$$

97. This calculation shows that the avoided cost and economic benefits related to the **total** production of distributed generation are calculated over a certain period of time and divided by the **total** production of distributed generation over this same period of time. However, FiT payments due to individual distributed generation owners equate the product between FiT and electricity metered to be **exported** to the grid.
98. In Victoria state in Australia, the FiT is calculated based on a similar approach as is done in Bermuda, but both avoided costs in the numerator and production factored into the denominator are restricted to the amount of electricity **exported** to the grid. FiT payments due to individual distributed generation owners also equate the product between FiT and electricity metered to be **exported** to the grid.
99. It is worth considering whether Bermuda’s approach should also use exported generation in both the numerator and denominator of FiT calculations instead of total generation. Switching to a strictly export-based calculation approach would introduce more fairness amongst electricity customers in that it ensures FiT payments reflect costs avoided to **other** customers – since individual DG users already receive the benefits of avoided costs to them individually by having their electricity bill offset by self-generation.

Box 10: Considerations pertaining to using exported generation or total generation for the calculation of avoided costs

- ❖ Q29: Do you think using exported generation in the calculation instead of total generation is more appropriate since the scheme is compensating for exported generation?

V.11 Period Duration of FiT Rate

100. Currently, the FiT applicable to a specific standard contract changes with every FiT review to match the newly calculated and approved value. The current methodology allows the tariff to vary with the updates because it is intended to be representative of the avoided costs of generation. This is similar to schemes implemented in Australia or Jamaica.
101. However, other methodologies and other jurisdictions have different approaches. Jurisdictions including Barbados, California, Great Britain, and Germany provide a fixed FiT to an asset once it joins the scheme for an average of ~20 years. However, the reason behind the constant rate in these jurisdictions comes down to the methodology. As discussed earlier, Barbados, Great Britain and Germany have methodologies more closely resembling the LCOE/technology cost approach, which require a fixed rate in order for the investor to reach the assumed rate of return. California's approach calculates the FiT by averaging PPAs for the respective technologies. California also offers a fixed rate since the rate is based on PPAs, which are usually contractual and do not vary.
102. Such approach consisting of "freezing" the FiT rate for a longer period of time than the FiT review period itself would induce more certainty for new DG users but would encounter several challenges in the current Bermuda context:
 - 1) The approach is most meaningful when combined with a cost-based/LCOE type of approach (whereas Bermuda is currently using an avoided cost approach). Under such circumstances keeping the applicable FiT constant is mirroring the fact that most costs incurred to the user are upfront capital costs. However, since costs are avoided together with fuel prices, energy mix, and other considerations – "freezing" FiT rates for any given system at present could be seen as non-cost-reflective over time.
 - 2) This would require amendments to standard contracts and would need to be reconciled with the EA provision for a FiT cap derived from the avoided costs approach.
 - 3) Two different systems set after two different iterations of FiT review would be eligible to two different FiT rates. Over time and with scale, this could incur onerous administrative costs.

Box 11: Considerations pertaining to the duration of the FiT rate for an asset

- ❖ *Q30: Assuming that the FiT calculation approach remains based on avoided costs, do you believe that FiT rates should be maintained constant for any given period of time when a standard contract is established and why? For how long?*
- ❖ *Q31: Assuming that the FiT calculation approach evolves into a LCOE/technology cost approach, do you believe that FiT rates should be maintained constant for any given period of time when a standard contract is established and why? For how long?*

V.12 Review and Update of FiT

103. The current FiT rate in Bermuda is updated every three years with the last update occurring in 2019. However, a number of jurisdictions have more frequent reviews: Barbados (expected), California, France, Great Britain, Victoria state in Australia. Barbados is meant to have annual reviews but has not actually performed any since setting the FiT rates due to complications from the current market conditions and impacts from the COVID-19 pandemic. Other jurisdictions such as California and the state of Victoria in Australia update the rates annually, while France and Great Britain provide (provided in terms of Great Britain) updates quarterly.
104. More frequent updates can lead to more accurate and representative values (especially in the context of high fuel price fluctuations), which could mitigate the risk of over or under compensating assets. However, more frequent updates would result in higher administration costs.
105. The Fuel Adjustment Rate (FAR) is updated every quarter, on a forward-looking basis and including some true-up adjustment mechanisms to ensure cost-reflectivity. Since FiT rates are most sensitive to fuel price fluctuations, there might be a benefit in introducing quarterly indexation provisions between FiT and FAR.

Box 12: Observation pertaining to the frequency of updating the FiT rates and methodology

- ❖ *Q32: Do you believe that the FiT rates should be updated/indexed more frequently than they currently are regardless of the FiT methodology? If so, how often do you think they should be updated?*
- ❖ *Q33: Should the FiT rate be indexed on the FAR and – by extension – be updated every quarter?*
- ❖ *Q34: Do you agree that the larger reviews focusing on other components of the methodology (i.e. other than avoided fuel costs) should still occur every three years? If not, then how frequently?*

VI. SUMMARY OF CONSULTATION QUESTIONS

106. Interested parties are invited to comment on the proposals set forth in this Consultation Document, in particular in relation to the following questions.

107. Considerations pertaining to the FiT calculation methodology

- **Q1:** Should Bermuda consider adopting an LCOE approach, similar to that used in Barbados, in addition to the existing avoided-cost methodology? Or do you think Bermuda should solely maintain the avoided cost of generation methodology?
- **Q2:** If the LCOE approach is considered, do you agree that the FiT rate would need to be fixed for the duration of the asset's time under the FiT scheme in order to ensure that the asset receives the rate of return assumed?
- **Q3:** Do you agree that the FiT rate calculated through avoided cost of generation should not be fixed (instead, would be updated with every recalculation) for the duration of the asset's time under the scheme?
- **Q4:** Do you agree that if Bermuda adopts the LCOE approach, that it should only apply to new assets, while existing or legacy assets should continue receiving the rate calculated through avoided cost of generation?
- **Q5:** Do you agree that having both the GD providing for a LCOE/technology cost methodology (Barbados' methodology) and the EA capping the rate at a level underpinned by an avoided cost of generation methodology could cause confusion and high administration requirements?

108. Considerations pertaining to a cap on the exported electricity

- **Q6:** Should there be an export cap for assets benefiting from the FiT scheme?
- **Q7:** If so, should the cap be a set percentage of the total generation or based on the capacity and an assumed number of hours as is done in France? The former would require an additional meter.
- **Q8:** If an export cap is explored, should the FiT be reduced or removed for the remainder of the year once an asset surpasses the cap?

109. Considerations pertaining to the application of capacity bands

- **Q9:** Do you agree that capacity bands are not applicable to the avoided cost of generation methodology currently used in Bermuda?
- **Q10:** If Bermuda were to adopt the LCOE approach, should the RA vary the FiT rate by set capacity bands?
- **Q11:** If so (yes to Q10), do you think that the capacity bands should be based on installation size, or another approach?

110. Considerations pertaining to a change in capacity threshold

- **Q12:** Should Bermuda increase, decrease, or keep the current capacity threshold?
- **Q13:** Do you have a preference of what the threshold should be?
- **Q14:** How should existing/legacy assets be treated if the capacity threshold is increased or decreased? (i.e. if threshold is reduced, should those assets that were receiving FiT before still continue to receive FiT payments?)

111. Considerations pertaining to setting different rates for different technologies

- **Q15:** Should the RA consider differentiating the FiT rates by technology when there is sufficient data to do so and when deployment rates are high enough?

112. Considerations pertaining to forward-looking approaches

- **Q16:** Do you think that Bermuda should consider a forward-looking approach for the avoided cost of generation methodology?
- **Q17:** Do you agree that a forward-looking approach is not applicable to a methodology which calculates the FiT based on technology costs and an assumed rate of return?
- **Q18:** Do you believe that the forward-looking approach, in the case of avoided cost of generation, could be factored in by the use of future fuel prices or exploring a link with the FAR or another means?
- **Q19:** If not, do you think that historical values are the most accurate way of representing close to actual values for the case of avoided cost of generation?
- **Q20:** If a forward-looking approach is adopted with the avoided cost of generation methodology, should there be consideration to carry out more frequent updates (and if so, how frequently)? To include a true-up mechanism?

113. Considerations pertaining to quantifying other costs like balancing services

- **Q21:** Do you agree that due to the current intermittent capacity levels in Bermuda, the costs of system balancing, and other mitigation costs, are not currently material and therefore do not currently need to be incorporated into FiT calculations? If not, which approach would you recommend adopting to quantify such costs?
- **Q22:** Do you agree that the increase in network costs of the TD&R licensee, associated with DG, should be omitted from the avoided cost of generation calculation since such costs can be included when establishing the standard contracts? If not, which approach would you recommend adopting to quantify such costs?
- **Q23:** Is it appropriate to retain the increase in costs associated with economic stranding of existing assets and changes in thermal plant efficiency, even though quantifying such costs

would require a complex methodology with large assumptions? If so, which approach would you recommend adopting to quantify such costs?

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- **Q24:** Do you agree that calculating increased economic activity should be omitted from the avoided cost of generation calculation due to lack of data and established methodology in the subject?
- **Q25:** Do you agree that economic benefits factored into FiT calculation should be limited to the reduction in carbon costs? If not, which approach would you suggest adopting to calculate additional benefits?

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- **Q27:** Do you believe that the “price factor” for carbon should be market-based? If so, should Bermuda’s price be linked to the market price established in another designated jurisdiction? Which one(s)?
- **Q28:** Do you believe that the “price factor” for carbon should be derived from “social cost of carbon” calculations? If so, should Bermuda’s cost be linked to a social cost of carbon value established in another designated jurisdiction? Which one(s)?

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- **Q30:** Assuming that the FiT calculation approach remains based on avoided costs, do you believe that FiT rates should be maintained constant for any given period time when a standard contract is established and why? For how long?
- **Q31:** Assuming that the FiT calculation approach evolves into a LCOE/technology cost approach, do you believe that FiT rates should be maintained constant for any given period of time when a standard contract is established and why? For how long?

118. Considerations pertaining to the frequency of updating the FiT rates and methodology

- **Q32:** Do you believe that the FiT rates should be updated/indexed more frequently than they currently are regardless of the FiT methodology? If so, how often do you think they should be updated?
- **Q33:** Should the FiT rate be indexed on the FAR and – by extension – be updated every quarter?
- **Q34:** Do you agree that the larger reviews focusing on other components of the methodology (i.e. other than avoided fuel costs) should still occur every three years? If not, then how frequently?

APPENDIX A: DEFINITIONS

Allowed revenue: means the amount of money an entity is allowed to earn in undertaking its regulated business activities, typically on an annual basis.

Authority: means the Regulatory Authority of Bermuda established under the Regulatory Authority Act 2011 (as defined by the Electricity Act 2016).

BELCO: means Bermuda Electric Light Company Limited

Bulk generation: means generation using a system with an installed capacity at or above the license threshold (as defined by the Electricity Act 2016).

Bulk generation licensee: means granting license for a licensee under section 25 of the Electricity Act 2016.

Bulk Supply Tariff: means the electricity price of bulk supply when the cost of generation and transmission is recovered.

CAPEX: means capital expenditure, i.e. expenditure related to the acquisition or upgrade of fixed assets.

Capital structure: means the proportion of debt and equity that an entity uses to finance its activities.

Competitive market: means an idealised market in which a large number of firms compete to provide goods and services for a large number of customers.

Cost of debt: means the return on investment required by an entity's debt holders.

Cost of equity: means the return on investment required by an entity's equity holders.

Cost pass-through allowance: means a cost allowance within regulated tariff setting, such that there is no deviation between allowed costs and costs actually borne by an entity.

Country Risk Premium: means investors demand an additional return for investing in foreign countries compare with domestic market as higher risk is associated with their investment.

Demand side response: means the reduced demand for electricity resulting from demand side management by allocating incentives for consumers by changing their consumption pattern to help keep the grid balanced at peak time.

Distributed generation: means generation using a system with an installed capacity below the licence threshold (as defined by the Electricity Act 2016).

Distributed generator: means a person that has a standard contract (as defined by the Electricity Act 2016).

Distribution: means conveying electric power below 22 kilovolts (kV) (as defined by the Electricity Act 2016).

EA: means the Electricity Act 2016.

Economic lifetime: means the estimated lifespan over which an asset is expected to be able to serve its intended purpose.

Efficiency: means achieving maximum benefits with minimum resources.

Electricity sector: means the regulated industry sector involving the supply, transmission, distribution and consumption of electricity (as defined by the Electricity Act 2016).

End user: means a person or entity that uses electric power provided by the TD&R licensee on a retail basis (as defined by the Electricity Act 2016).

ERRA: stands for Energy Regulators Regional Association

EV: stands for Electric Vehicle

Ex ante: means before the event, i.e. this refers to items that are defined before actual results are known.

Ex post: means after the event, i.e. this refers to items that are based on actual rather than forecast data.

Facility: means a site where electrical equipment is located to provide some form of electrical service (as defined by the Electricity Act 2016).

FAR mechanism: means the fuel adjustment rate mechanism designed to recover the cost of fuel used to produce electricity.

Feed-in tariff: means the pre-determined rate at which renewable energy is purchased by the TD&R licensee from a distributed generator, for a pre-determined period, and under pre-determined conditions

FiT: stands for Feed-in Tariff, defined above

Fixed Assets: means tangible assets that are not readily convertible to cash (as opposed to liquid assets); this typically refers to plant, property and equipment, which is in service.

GD: stands for general determination.

Gearing: is a measure of the extent of debt that an entity has raised; within this report, gearing refers to the ratio of an entity's net debt to the rate base.

Generation: means the process of producing electric power. This includes generation of renewable energy (as defined by the Electricity Act 2016).

Generation capacity: means the maximum electrical output that an electricity plant can produce (typically measured in megawatts).

GWh: means gigawatt hours, a standard unit of electrical power equal to 1 billion watt hours.

IPP: means an independent power producer. This is an entity that provides energy, capacity, and ancillary services for commercial purposes at a bulk scale to the electric utility under long-term contracts.

IRP: means integrated resource plan, an energy plan for the supply of electricity in Bermuda approved by the RA in accordance with, and set out in the matters required by, Part 8 of the Electricity Act 2016.

kW: means kilowatt, a standard unit of electrical power equal to 1,000 watts.

kWh: means kilowatt-hour, a unit of electrical energy equal to one kilowatt of power expended for one hour; the standard unit of measure used for electrical billing.

LCOE: means Levelised Cost of Energy which is the average net present cost of energy generation over a period of time

Licence: means a valid licence granted by the RA under the Electricity Act 2016.

Licensee: means a person that holds a valid licence in accordance with the Electricity Act 2016.

Liquified Natural Gas: is a natural gas changed into liquid by making it very cold for ease of shipping and storage.

Marginal Cost: means an increase or decrease in the total cost of production or producing one more unit.

Market Risk Premium: means an additional return on investment by holding a risky portfolio instead of risk-free assets.

MWh: means megawatt hour, a standard unit of electrical power equal to one million watts, or one thousand kilowatts hour.

NDC Fund: means National Disaster Contingency Fund, of which the amount is to be determined by the RA and which must be available at any time during the term of the TD&R licence.

OPEX: means operating expenditure. This is expenditure incurred in the day to day running of a business.

PPA: means power purchase agreement. This is an agreement entered into under section 48 of the Electricity Act 2016 between the TD&R licensee and a bulk generation licensee, approved by the RA, whereby the TD&R licensee contracts to purchase or acquire electricity generated by the bulk generation licensee as specified in the agreement (as defined by the Electricity Act 2016).

Price-cap regime: is a type of incentives-based regime where no adjustments to prices due to deviations from volume forecasts are allowed, i.e. volume risk is borne by the regulated entity.

RAA: means the Regulatory Authority Act (2011).

Rate base: means the total value of assets on which a utility is permitted to earn a return.

Rate-of-return (RoR): means a net loss or profit on an investment over specific time period.

Regulatory Asset Base: means assets of service provider or utility company which are used and useful in the provision of regulated service to the customers.

Re-opener: means a mechanism which facilitates a change in allowed revenues before the next review period.

Return on capital or return on rate base means: a cost allowance determined to allow a company to recover its cost of capital, as a component of regulatory allowed revenue.

Review period: means a period for which retail tariffs are determined by the RA.

Risk-free rate: is a return required by an investor for an investment in a risk-free asset.

SSEG: stands for small scale embedded generation

TD&R: means transmission, distribution and retail.

TD&R licence: means a licence granted under section 25 of the Electricity Act 2016.

ToU: means time of use pricing or billing, whereby charges are based on how much energy is used and when the usage occurs.

Transfer pricing arrangement: refers to an arrangement pursuant to which the TD&R business unit of a vertically integrated utility procures power from the generation business unit of a vertically integrated utility.

True-up mechanism: means a mechanism which adjusts the cost allowances such that they align with the actual costs borne by a company.

Vanilla WACC: means the weighted average cost of capital using a pre-tax cost of debt and a post-tax cost of equity, as set forth in paragraph 55 of the Retail Tariff Methodology.

Vertically integrated utility: means a company that engages in bulk generation and transmission, distribution, and sale (retailing) of electricity.

Volume risk: means the risk that sold units of electricity deviate from the forecast.

WACC: means weighted average cost of capital.

Watt: means the unit of electrical power equal to one ampere under a pressure of one volt. A Watt is equal to 1/746 horse power.¹⁹

¹⁹ U.S. Energy Information Administration Glossary