BERMUDA

Regulatory Authority (Feed-in Tariff Methodology) General Determination

BR/2018

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The Regulatory Authority of Bermuda, in the exercise of the power conferred by section 62 of the Regulatory Authority Act 2011, as read with sections 12 and 13 of that Act and sections 6, 14, 17 and 36 of the Electricity Act 2016, makes the following General Determination:

Citation

1 This General Determination may be cited as the Regulatory Authority (Feed-In Tariff Methodology) General Determination.

Interpretation

2 In this General Determination, unless the context otherwise requires, terms shall have the meaning given in the Regulatory Authority Act 2011, the Electricity Act 2016, and the Schedule to this General Determination.

General Purpose

3 This General Determination establishes the methodology for calculating the feed-in tariff for the Transmission Distribution and Retail licensee's purchase of power from distributed generators.

Determination

4 (1) This General Determination is made pursuant to the Consultation entitled "Feed-in Tariff Methodology for Electricity Sector" dated 27 April 2018 and the Regulatory Authority's Decision on it.

(2) Taking into account the responses received to the Consultation and for the reasons given in the Decision, the Regulatory Authority determines that the feed-in tariff methodology set forth in the Schedule is consistent with the purposes of the Electricity Act 2016, including to seek to: (a) ensure the adequacy, safety, sustainability and reliability of electricity supply in Bermuda; (b) encourage electricity conservation and the efficient use of electricity; (c) promote the use of cleaner energy solutions and technologies; (d) provide sectoral participants and end-users with non-discriminatory interconnection to transmission and distribution systems; (e) protect the interests of end-users with respect to prices and affordability, and the adequacy, reliability and quality of electricity service; and (f) promote economic efficiency and sustainability in the generation, transmission, distribution and sale of electricity.

Terms and conditions of General Determination

5 (1) The Schedule to this General Determination has effect.

(2) The Schedule is also published on the Regulatory Authority's website (www.rab.bm), and is also available for inspection at the offices of the Regulatory Authority (1st Floor, Craig Appin House, 8 Wesley Street, Hamilton HM 11) during ordinary business hours.

Effective Date of General Determination

6 This General Determination shall become effective on the day it is published in the Official Gazette.

REGULATORY AUTHORITY

Bermuda

Schedule to [Regulatory Authority (Feed-in Tariff Methodology) General Determination 2018

General Determination

Date: 19 October 2018

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This General Determination is made by the Regulatory Authority of Bermuda pursuant to Section 62(1) of the Regulatory Authority Act 2011 ("**RAA**") and in accordance with Sections 6, 14, 17 and 36 of the Electricity Act 2016 ("**EA**") and establishes the methodology for calculating the Feed-In Tariff for the electricity sector.

1 Definitions

The "Authority" means the Regulatory Authority of Bermuda established under the Regulatory Authority Act 2011.

"Avoided cost of generation" means a component of a feed-in tariff defined in the Electricity Act 2016 as the cost of generation that the TD&R Licensee avoids by purchasing power from distributed generation.

"Bulk generation licence" means a licence granted under section 25 of the Electricity Act 2016.

"Bulk generation" means generation using a system with an installed capacity at or above the licence threshold (as defined in section 2(i) of the Electricity Act 2016).

"Carbon price" means the monetary value associated with offsetting one unit of CO_2 emissions.

"Connection assets" means assets required to connect an additional generating unit, including distributed generating units, to the network.

"Conventional generation" means electricity generated by fossil fuels.

"Conversion efficiency" means the portion of input energy that can be converted into usable electricity.

"Cost of economic stranding" refers to the cost associated with an investment that cannot be recovered because the assets, in which the investment was made, are under-utilised or no longer used.

"Demand-side management" means all activities or programs undertaken by any person to influence the amount of electricity or timing of electricity they use.

"Demand-side resources" means the reduced demand for electricity resulting from demand side management (as defined in section 2(i) of the Electricity Act 2016).

"Dispatchable generation capacity" means the total generation capacity available in the system for dispatch on demand.

"Distributed generator" means a person that has a Standard Contract 2016 (as defined in section 2(i) of the Electricity Act 2016).

"Distributed generation" means generation using a system with an installed capacity below the licence threshold (as defined in section 2(i) of the Electricity Act 2016).

"Distributed generation penetration" refers to the amount of distributed generation in the system as a ratio of distributed generation to total generation.

"Distribution" means conveying electric power below 22 kilovolts (kV) (as defined in section 2(i) of the Electricity Act 2016).

“EA” means the Electricity Act 2016.

“Economic benefits” refers to the quantifiable benefits less quantifiable costs associated with distributed generation that apply to the general public and other stakeholders, and that are not included in a feed-in tariff as avoided cost of generation.

“Electricity sector” means the regulated industry sector involving the supply, transmission, distribution and consumption of electricity (as defined in section 2(i) of the Electricity Act 2016).

“FIT” means a Feed-in Tariff. This is 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 (as defined in section 2(i) of the Electricity Act 2016).

“Frequency response” means a continuous service provided in order to ensure that the electricity output is changing in line with continuous changes in demand.

“Generation” means the process of producing electric power. This includes generation of renewable energy.

“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 Authority (as defined in section 2(i) of the Electricity Act 2016).

“Licence” means a valid licence granted by the Authority under the Electricity Act 2016 (as defined in section 2(i) of the Electricity Act 2016).

“Licence threshold” means the installed capacity prescribed by regulation from which a licence is required for generation (as defined in section 2(i) of the Electricity Act 2016).

“Licensee” means a person that holds a valid licence in accordance with the Electricity Act 2016 (as defined in section 2(i) in of the Electricity Act 2016).

“Load-following plant” means a power plant that can change its power output to meet fluctuating electricity demand.

“Network costs” means the costs associated with providing the necessary connection assets, network reinforcements etc.

“Network loss” means a loss of energy as it is transferred through the transmission and distribution system mainly in the form of heat.

“Network reinforcement costs” refer to network expenditures associated with accommodating changes in the amount and pattern of electricity demand and supply while ensuring that the network delivers a safe and reliable supply of electricity.

“Operating reserves” means the additional generating capacity available to continue to meet demand, e.g. in the event of a disruption to supply due to the failure of a generating unit.

“Particulate pollution” means pollution caused by small particles and liquid droplets that are suspended in the air.

“Peak” means a time period when the electric system experiences relatively high demand. These periods often occur in daily, weekly and seasonal patterns.

“Renewable energy” means energy that is obtained from naturally occurring sources that are replenished. This includes, but is not limited to, solar, wind, ocean wave, ocean thermal, geothermal, hydropower, and tidal energy (as defined in section 2(i) of the Electricity Act 2016).

“Required capacity margin” means a measure of available capacity over and above the capacity required to meet expected demand.

“Retail” means the sale of electric power at the designated tariff rate by the TD&R Licensee to the end-user (as defined in section 2(i) of the Electricity Act 2016).

“Solar photovoltaic (PV) technology” means a renewable energy technology that converts solar radiation into direct current electrical energy.

“Standard Contract” means a contract between the TD&R licensee and a distributed generator for distributed generation, as referred to in section 49 of the Electricity Act 2016.

“System balancing” refers to services associated with ensuring that electricity supply is sufficient to meet electricity demand.

“TD&R” means transmission, distribution and retail.

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

“Thermal plant” means a power plant that uses heat energy to generate electric power.

“Transmission” means conveying power at or above 22 kilovolts (kV) (as defined in section 2(i) of the Electricity Act 2016).

“Variable operating costs of generation” means costs to the generator that vary as the amount of electricity generated changes.

2 Interpretation

(1) For purposes of interpreting this General Determination:

(a) unless the context otherwise requires, words or expressions shall have the meaning assigned to them by the RAA and the EA;

(b) where there is any conflict between the provisions of this General Determination and the EA or RAA, the provisions of the EA or RAA, as the case may be (and subject to sections 3(2) and 3(3) of the EA), shall prevail;

(c) terms defined herein and in the EA and RAA have been capitalised;

(d) headings and titles used herein are for reference only and shall not affect the interpretation or construction of this General Determination;

(e) references to any law or statutory instrument include any modification, re-enactment or legislative provisions substituted for the same;

(f) a document referred to herein shall be incorporated into and form part of this General Determination and a reference to such document is to the document as modified from time to time;

(g) expressions cognate with those used herein shall be construed accordingly;

(h) use of the word "include" or "including" is to be construed as being without limitation; and

(i) words importing the singular shall include the plural and vice versa, and words importing the whole shall be treated as including a reference to any part unless explicitly limited.

3 Legislative and Procedural Background

(1) This General Determination has been undertaken in accordance with section 62 of the RAA and the exercise by the Authority of its powers under sections 6, 14, 17 and 36 of the EA.

(2) The Authority initiated a consultation by publishing a Consultation Document on 27 April 2018 that invited responses from members of the public, including electricity sectoral participants and sectoral providers, as well as other interested parties. The purpose of the Authority's Consultation Document was to consult on the proposed Feed-In Tariff Methodology.

(3) The Consultation Document invited respondents to comment on the proposed methodology for assessing the Feed-In Tariff for distributed generation.

(4) Responses to the Consultation Document were solicited from the public electronically through the Authority's website at www.rab.bm.

(5) The response period commenced on 27 April 2018 and concluded on 4 June 2018.

(6) The Authority received six responses from the public to the Consultation Document.

(7) The Authority issued a Preliminary Report, Preliminary Decision and Order on 12 September 2018 that invited responses from members of the public, including electricity sectoral participants and sectoral providers, as well as other interested parties.

(8) The Authority received one response from the public for the Preliminary Report, Preliminary Decision and Order.

4 Final Determination

(1) Pursuant to section 62 of the RAA and in accordance with sections 6, 14, 17 and 36 of the EA using the general powers granted to the Authority under section 13 of the RAA and in accordance with the procedures established for this purpose in section 62 of the RAA, the Authority hereby determines that:

(2) The adoption and implementation of the Feed-in Tariff Methodology as set forth in Annex 1 of this Schedule below is consistent with the purposes of the Electricity Act 2016, including to seek to: (a) ensure the adequacy, safety, sustainability and reliability of electricity supply in Bermuda; (b) encourage electricity conservation and the efficient use of electricity; (c) promote the use of cleaner energy solutions and technologies; (d) provide sectoral participants and end-users with non-discriminatory interconnection to transmission and distribution systems; (e) protect the interests of end-users with respect to prices and affordability, and the adequacy, reliability and quality of electricity service; and (f) promote economic efficiency and sustainability in the generation, transmission, distribution and sale of electricity.

ANNEX 1 – FEED-IN TARIFF METHODOLOGY

I. METHODOLOGY

1. This methodology focuses on the determination of the Feed-in-Tariff ("FIT") level, in relation to the overall system costs and benefits that arise from higher levels of distributed generation penetration. In line with the Electricity Act 2016 ("EA"), this General Determination applies to all forms of renewable energy generation technologies.

2. Currently, the EA requires that the FIT will, at most, allow only compensation arising from the following sources.[1]

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

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

3. 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.[2] 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.

1.1 Costs and benefits affecting FIT

4. The FIT will be based on the avoided cost of generation and economic benefits and such other benefits that may from time to time be established by the EA and/or the relevant guidance from the government.

1.1.1 Avoided cost of generation

5. 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 bulk generation licensee. Consequently, the conventional Bulk Generation licensee reduces its fuel and lubricating oil costs and other variable operating costs.[3] 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

[1] Electricity Act 2016, section 36.
[2] Ministry of Economic Development (2015), 'The National Electricity Sector Policy of Bermuda', Bermuda.
[3] 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.

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.[4]

(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.

6. 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.[5]

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

(d) **Changes in thermal plant efficiency (cost to the system)**.[6] 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.

1.1.2 Economic benefits

7. There are a number of economic benefits and costs that could deliver 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 and may include the following:

[4] System reliability refers to the ability of the electricity system as a whole to meet all connected load requirements.
[5] 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.
[6] 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.

(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. The inclusion of such benefits in the determination 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 value 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 value of these benefits from the wider economy to the distributed generators.

8. 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.

9. Therefore, the Authority considers that setting different levels of the FIT for different distributed generation technologies is appropriate, and it will consider any data that is provided as part of the data-gathering process regarding differentials in avoided cost by different technology. The Authority will consider whether there is sufficient penetration of each technology type to make it proportionate that a differentiated FIT level is determined by technology.

1.2 Calculation of the FIT based on avoided costs and economic benefits

10. The FIT shall be calculated as the sum of the avoided cost of generation and any net economic and/or other benefits, divided by forecast system total kWh produced by distributed generators.[7] It will be important to consider avoided cost of generation, net economic benefits and production over the same period (the "Period"), e.g. on an annual basis. As a formula, the FIT is calculated as follows:

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

11. 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

[7] The Authority notes that this may also include any other benefits that may from time to time be included pursuant to legislative amendment and/or the relevant guidance from the government.

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.

12. Finally, the Authority takes the view that the FIT cannot be fixed for the duration of the investment and shall be updated with the periodicity of three years.