FAIR TRADING COMMISSION

CONSULTATION PAPER

Feed-in-Tariffs for Renewable Energy Technologies Above 1 MW and up to 10 MW

Document No.: FTCUR/CONS/FIT1-10MW/2023-02 **Date of Issue: October 13, 2023**

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DOCUMENT TITLE: Feed in Tariffs for Renewable Energy Technologies Above 1 MW and up to 10 MW

ANTECEDENT DOCUMENTS

Document Number	Description	Issue Date
FTC/URD/CONFIT -2019-03	Consultation Paper on Feed-in-Tariffs for Renewable Energy Sources	May 29th, 2019
FTCUR/DECFIT/2019-04	Decision on Feed in Tariffs for Renewable Energy Technologies up to and Including 1MW	September 24th, 2019
FITCUR/DECFIT/2020-01	Decision on Feed in Tariffs for Renewable Energy Technologies above 1 MW and up to 10 MW	September 30th, 2020
FTCUR/CONS/FIT1- 10MW/2022-07	Consultation Paper on Feed-in-Tariffs for Renewable Energy Technologies Above 1 MW and up to 10 MW	July 13th, 2022
FTCUR/DECFIT1-10MW/2022-14	Decision on Feed-in-Tariffs for Renewable Energy Technologies above 1MW and up to 10 MW	December 31st , 2022

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LIST OF ABBREVIATIONS

BLPC	Barbados Light & Power Company Limited
BNEP	Barbados National Energy Policy
CIA	Connection Impact Assessment
CO_2	Carbon-dioxide
COD	Commercial Operation Date
ELPA	Electric Light and Power Act, 2013-21
FIT	Feed-in-Tariff
FTCA	The Fair Trading Commission Act, CAP. 326B
FTCA 2020	The Fair Trading Commission (Amendment) Act, 2020
GoB	Government of Barbados
IDC	Interest During Construction
IPPs	Independent Power Producers
NDC	National Determined Contribution
NGOs	Non-governmental Organisations
O&M	Operation and Maintenance
PV	Photovoltaic
RE	Renewable Energy
RER	Renewable Energy Rider
SCADA	Supervisory Control and Data Aquisition
The Commission	The Fair Trading Commission
URA	Utilities Regulation Act CAP. 282
URA 2020	Utilities Regulation (Amendment) Act, 2020
W_p	Watt peak

PURPOSE OF DOCUMENT

Introduction

This document outlines the Fair Trading Commission's (the Commission) review of the December 31, 2022 Decision on Feed-in Tariffs (FIT) for renewable energy (RE) technologies above 1 MW and up to 10 MW.

Rates and conditions as set out in the 2023 FIT programme became effective from 1st January – 31st December, 2023. This one-year duration of the programme was determined as an interim measure to (1) provide further opportunities for investors to participate at the utility scale, (2) facilitate the integration of utility scale RE projects, (3) communicate and disseminate adequate information to potential investors and (4) instill and maintain confidence in the RE market, despite the negative impact of supply chain disruption which was observed during the period 2021 - 2022.

During the 2023 FIT programme concerns were raised by stakeholders with regard to the allocation of cost for interconnection, sharing of such cost, responsibility, and recovery of cost by IPPs. Further clarity on these issues from the Commission is expected to advance the uptake of RE at this scale.

Given the aforementioned issues, the intent of this review is to solicit and assess comments, views and proposals from stakeholders to inform the development of fair and reasonable market rates, terms and conditions which would be applicable to new eligible RE generators under the revised programme expected to be effective January 2024.

Public participation remains a crucial feature of the decision-making process and the Commission therefore invites written submissions from the general public, the Barbados Light and Power Company (BLPC) Limited, renewable energy producers, Government agencies, the business community, public consumer bodies or advocates, Non-governmental Organisations (NGOs), educational institutions, and any other interested party.

Structure of Paper

The sections of this paper are presented as follows.

- Section 1 introduces the relevance of the FIT programme to the energy transition.
- Section 2 outlines and explains the legal and regulatory authority of the Commission.
- Section 3 presents an appraisal of the FIT programmes.
- Section 4 discusses issues facing the RE sector.
- Section 5 provides clarity on interconnection costs.
- Section 6 presents a list of questions for stakeholders.

Responding to this Document

In order to assist the Commission in expediting the assessment of submissions, responses to this paper should relate to the specific question posed, and provide a clear, concise response and rationale. Responses can also include any other related issues you consider to be important but not addressed herein.

A copy of this document may be accessed on the Commission's website at, http://www.ftc.gov.bb.

Submissions

This consultation period will commence on Friday, October 13th, 2023 and end on Monday, November 13th, 2023 at 4:00 p.m.

Electronic submissions in the form of a Microsoft Word format or Portable Document format ('.PDF') should be accompanied by a cover letter and be sent to info@ftc.gov.bb and copied to Mr. Kevin Webster, General Legal Counsel and Commission Secretary at kwebster@ftc.gov.bb.

Alternatively, responses may be faxed to the Commission at (246) 424-0300. Mailed or hand delivered responses should be addressed to the Commission Secretary at:

Fair Trading Commission
Good Hope
Green Hill
St. Michael
BB12003
BARBADOS

All responses to this paper must be submitted within the allocated timelines above. No extensions will be granted. The Commission is unable to accept or consider submissions made after 4:00 p.m. on November 13th, 2023.

TREATMENT OF SUBMITTED COMMENTS

Staff will review, analyse and discuss with stakeholders the responses to this consultation paper where appropriate. Subsequently, staff will consider the outcome of this consultative process and make recommendations towards a final determination.

SUBMISSION OF CONFIDENTIAL INFORMATION

The Commission advises that an email disclaimer which appends a standard confidentiality statement at the end of an email will not be accepted as a formal request for confidentiality. If a respondent classifies submitted information as commercially sensitive[1], a formal request should be made to the Commission pursuant to Section 11 of the FTCA. The Commission in discharge of its functions under this review will exercise discretion with regard to the request for confidentiality.

[1] Commercially sensitive information can be described as information that, if disclosed publicly or otherwise, could potentially prejudice a supplier's commercial interests and cause irreparable harm. Examples of this type of information includes but is not limited to: content and design of a tender, trade secrets and 'know-how' new ideas, material and equipment quotes for products and services.

SECTION 1 ENERGY TRANSITION

1.1 Background

The Government of Barbados (GoB) envisions a fully carbon neutral economy by 2030; this expected outcome is predicated on the aggressive climate adaptation goal of 100% RE being fully implemented in the medium term. This RE vision is further premised by Government's support for climate adaptation through its revised National Determined Contributions (NDC[2]) in compliance with the Paris Agreement of 2015[3]. As a result of the RE vision, there is currently a total RE capacity of approximately 95 MW-AC online, of which 85 MW-AC is customer owned and 10 MW-AC is utility owned. FIT programmes remain an integral link to achieving the 2030 target articulated in the Barbados National Energy Policy (BNEP). Barbados also ranks 84/166 countries with regard to achieving sustainability targets. Target 7 (Affordable and Clean Energy) reflects an upward trend for Barbados which is encouraging. The thrust towards RE is also recognised as a key pillar towards local enfranchisement for investment in the RE market. However, the transition to a net-zero carbon economy with appropriate built-in resilience by 2030 is expected to entail significant capital outlay. Based on current estimates, this amount is likely to be in the order of BDS $2 billion.[4]

Government's Integrated Resource and Resiliency Plant (IRRP) 2021 outlines the RE technology, generation mix and annual capacity additions and retirements and mitigation expected in order to advance the 2030 goal. Capacity requirement according to the IRRP ascribes 20 MW-AC each for solar PV and land-based wind technologies.[5] These stipulated values were therefore the basis for the capacities allocated under the 2023 FIT programme.

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[2] National Determined Contributions is an action plan which is targeted towards the reduction of Greenhouse Gas emissions. This report can be viewed here
Government of Barbados. 2022. "NDC Registry (Interim)." NDC Registry. January 12. Accessed January 12, 2022.
https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Barbados%20First/2021%20Barbados%20NDC%20update%20-%2021%20July%202021.pdf.

[3] The Paris Agreement is an international treaty on climate change which was ratified by 196 countries in December 2015. This concordat was effectuated in November 2016.

[4] Scenario 3 of the IRRP estimates an undiscounted billed cost of BDS $2.6 billion through 2030. Also see International Monetary Fund, IMF Country Report No. 23/241, July 2023 https://www.imf.org/en/Search#sort=relevancy&f:type=[PUBS,COUNTRYREPS]

[5] See Table G.11, page 212 of the IRRP.

The rate of depletion of this capacity under the FIT programme provides an indication of investor interest in the RE market. Collectively, other operational issues can evolve during the tenure of the programme.

1.2 Review Objectives

This review of the 2023 FIT programme will re-examine the structures enshrined in its design such as energy affordability, market competitiveness, and opportunities for local participation; these being major tenets of the BNEP. Adjustments or modifications to the FIT programme will be dependent on feedback on the issues experienced since the launch of this programme on 1st January, 2023. Following this review process, the Commission will (1) examine the uptake of RE thus far, (2) determine the extent of adjustments required, (3) analyse data received to determine the new rates and (4) make reasonable judgments based on research and the feedback received.

1.3 Data Collection Process

The Commission aims to collect accurate and reliable data to develop and determine rates that are reflective of the local RE market. Key attributes of this rate setting are that rates must be set at an adequate level to allow the IPP to cover its operating and investment costs, provide an opportunity to realise a reasonable return on investment, and meet policy objectives. This ratemaking process requires that a delicate balance be struck between the interest of the investor, the electricity consumer, and attainment of policy objectives. Given these considerations, emphasis must be placed on the validity and veracity of RE project data, in-order to arrive at an appropriate determination.

SECTION 2 LEGISLATIVE FRAMEWORK

2.1 Introduction

The Commission, as the economic regulator of utility services, has jurisdiction under the Fair Trading Commission Act ('FTCA') of the Laws of Barbados to "safeguard the interests of consumers, to regulate utility services supplied by service providers, to monitor and investigate the conduct of service providers, renewable energy producers and business enterprises, to promote and maintain effective competition in the economy, and for related matters."

""Principles" means the formula, methodology or framework for determining a rate for a utility service".

By virtue of the **Section 2** of the FTCA and the URA:
""Rates", include:

(a) every rate, fare, toll, charge, rental or other compensation of a service provider or renewable energy producer;

(b) a rule, practice, measurement, classification or contract of a service provider or renewable energy producer relating to a rate; and

(c) a schedule or tariff respecting a rate;".

Additionally**, Section 2** of the FTCA states that, *""Independent power producer" means a commercial entity other than an electric utility, which;*

(a) produces or stores; and

(b) supplies

electricity using renewable energy resources for sale to the public grid;

"public grid" means the grid to which the public has access for the supply of electricity;

"renewable energy producer"includes a generator, distributor or person who stores and supplies electricity generated from a renewable energy resource for sale to the public grid;"".

Pursuant to **Section 4(3)** of the FTCA the Commission has the regulatory authority to:

(a) establish principles for arriving at rates to be charged by service providers and renewable energy producers;

(b) set the maximum rates to be charged by service providers and renewable energy producers;

(c) monitor the rates charged by service providers and renewable energy providers to ensure compliance;

(d) …………;

(e) ………..;

(f) carry out periodic reviews of the rates and principles for setting rates of service providers and renewable energy producers;".

The Commission's duty to consult with the public on the aforementioned is stipulated under subsection (4) which states that:

"*The Commission shall, in performing its functions under subsection (3)(a), (b), (d), (f) and (g), consult with service providers, renewable energy producers, representatives of consumer interest groups and other parties that have an interest in the matter before it.*"

2.2 Information Gathering

Subsection (4A) of the FTCA empowers the Commission to request data in the performance of its functions:

"*The Commission shall, in performing its functions under subsections (3)(a),(b), (c) ,(d), (e), (f) and (g), request*

(a) a service provider;

(b) a renewable energy producer; or

(c) a licensee under the Telecommunication Act, 282B or the Electric Light and Power Act (2013-21)

to provide the Commission with information relating to its operations, finances or such other information as the Commission may consider necessary to perform its functions."

Similarly, under section 3 (2A) of the URA the Commission can request data from a service provider. This section states that, *"In performing it functions under subsection (1), the Commission may request a service provider to provide the Commission with information relating to its operations, finances or such other information as the Commission may consider necessary to perform its functions."*

Section 24B (1) of the URA stipulates that, "The functions of the Commission, in relation to a renewable energy producer entering into an interconnection agreement or other agreement to supply electricity to the public grid, are to

(a) establish principles for arriving at the rates to be charged;

(b) set the terms and conditions of the agreements;

(c) set the maximum rates to be charged under the agreements; and

(d) direct renewable energy producers to submit the proposals for the rates and terms and conditions relating to their agreements."

2.3 Duty to Consult

Section 24B (2) states that:

"the Commission shall consult with renewable energy producers, representatives of consumer interest groups and other interested parties and shall have regard to:

(a) the national energy policy;

(b) the national environmental policy;

(c) *the requirement to promote renewable energy and to enhance the security, affordability, safety and reliability of the supply of electricity."*

Additionally, subsection (3) outlines what the Commission is required to consider as it executes its functions set out in subsection (1) (a); subsection (3) provides that "the Commission shall have regard to:

(a) the promotion of efficiency on the part of renewable energy producers;

(b) ensuring that an efficient renewable energy producer will be able to finance its functions by earning a reasonable return on capital;

(c) such other matters as the Commission may consider appropriate."

SECTION 3 OVERVIEW OF FEED-IN TARIFF PROGRAMMES

3.1 Background

The first FIT programme was launched on 1st October, 2019 for RE technologies up to 1 MW-AC capacity. Prior to this programme, the Renewable Energy Rider ('RER') scheme, a Commission approved initiative of the BLPC, had about 9.0 MW-AC[6] of grid connected, customer-owned RE generation. By the end of December 2019, the aggregate RE capacity online reached approximately 22.0 MW-AC. In recognition of the potential benefits to be derived from utility scale RE projects[7], a second FIT programme was introduced in October 2020 and this targeted solar PV and land-based wind technologies above 1 MW and up to 10 MW in capacity. By the end December 2020, grid connected RE capacity stood at 37 MW-AC, an increase of 15 MW-AC[8]. For the next two (2) years, grid connected RE capacity climbed to about 73 MW-AC. As of 30th June, 2023, the cumulative RE capacity on the grid increased by an additional 12 MW-AC. The FIT programme has been the catalyst for RE deployment and continues to be the catalyst for the expansion of the RE sector.

Interest and participation remain strong since the FIT programmes were instituted. At the end of December 2019 the level of participation was about 1,300. However, this figure increased to about 3,200 participants as of June 2023, which represents an increase of about 147.5%. This rapid growth trend in participation and RE capacity growth is depicted in Figure 1 following.

In addition to stimulating growth in the local RE sector, the upward movement of grid connected RE capacity onlined has resulted in direct economic and environmental benefits. These include but are not limited to, the displacement of legacy/conventional thermal power plant capacity and energy required to meet peak demand, a reduction in the annual quantum of fossil fuel imported and used for power generation, savings in foreign exchange for fossil fuel purchases, and a diminution in the level of air pollutants by conventional power generation (see Table 1). Furthermore, due to the distribution of RE systems in

[6] Adjustment based on revisions from the BLPC RE register.
[7] Utility scale RE projects in the Barbados context refers to RE generators larger than 1 MW-AC in size. At this scale, these projects are known for economy of scale attributes, thus reducing the cost of energy. These project types also provided another layer of participation in the RE market for locals.
[8] Note statistics were revised due to more recent dataset of actual RE capacity online.

relation to the centralized generation centres, less system losses occur, resulting in a more efficient power system, as energy is consumed close to the RE generating sources.[9]

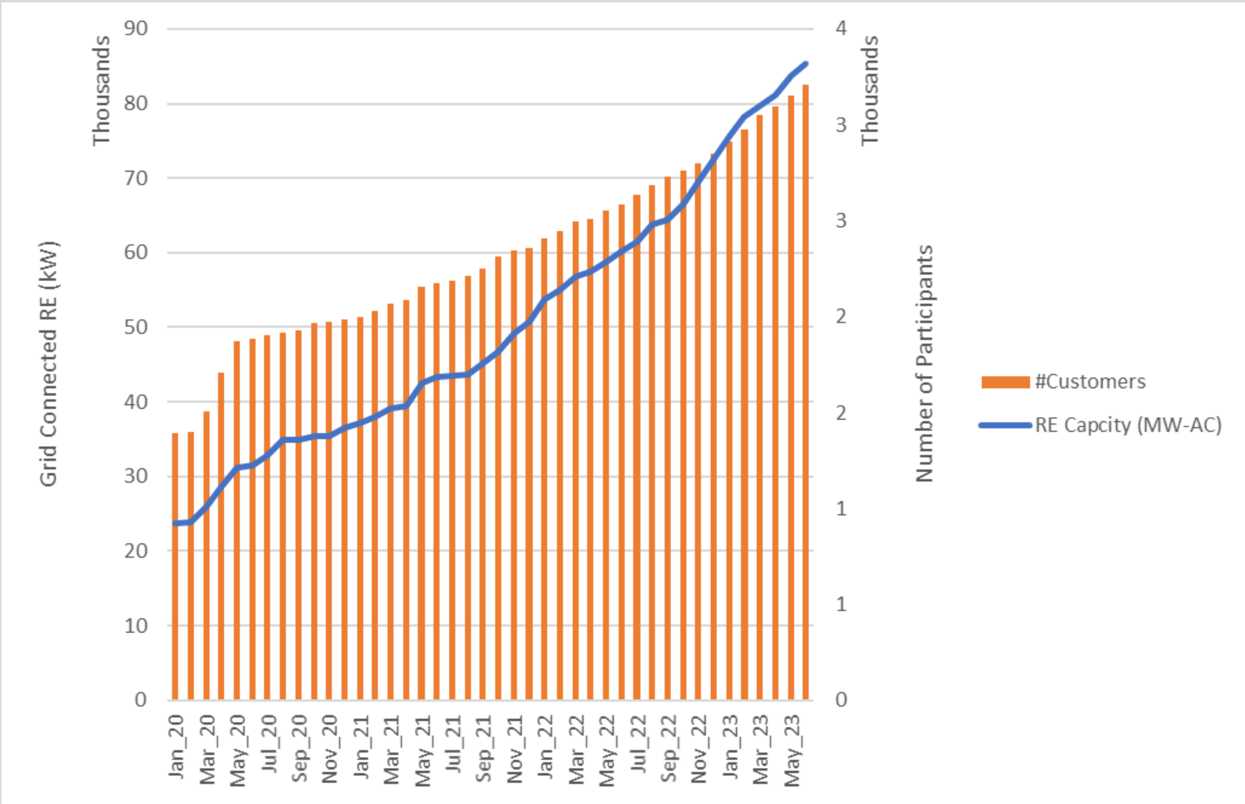

Figure 1- Capacity and Participation Growth

3.2 Annual Energy Savings

In Barbados, the different RE mix consists of 1 MW of wind energy, 84 MW of distributed solar PV, and 10 MW of utility scale solar PV. These RE sources are mainly harnessed through customer owned generating facilities and it was observed that over the period 2020 to 2022, fossil fuel related savings increased in concert with RE deployment. The economic benefit in terms of fuel savings can be higher but depends on the volatility in fuel prices at the time. Following is a summary of the estimated annual energy savings (Table 1), which accrue from customer sited RE generators during the above period. The current fuel savings for 2023 are also displayed.

[9] Hamzaoglu, Ahmet, Ali Erduman, and Mustafa Alci. 2021. "Reduction of Distribution System Losses using Solar Energy Cooperativity by Home User." Ain Shams Engineering Journal 3737-3745.

Table 1- Estimated Fuel Savings under the FIT Programme

Year	Estimates		
	Fuel Quantity (Tonnes)	Fuel Costs (BDS $ million)	CO_2 Emissions (Tonnes)
2020	15,000	14	49,000
2021	20,000	29	66,000
2022	28,000	70	89,000
2023[10]	18,500	38	57,000

Based on the statistics (Table 1), the contribution by customer-owned RE generation displaced in 2022 was an estimated 15,000 tonnes of fuel valued at approximately BDS $14 million. This quantity of unconsumed fuel implies that 49,000 tonnes of CO_2 emissions was avoided.

Similarly, an estimated 20,000 tonnes of fossil fuel used were avoided by customer-owned RE generation in 2021, representing an increase of 25% above the 2020 figure. The estimated value of the tonnage is approximately BDS $29 million, reflected a 107.14% savings in fuel expenditure compared to the 2020 figure. This avoided fuel use correlates to 66,000 tonnes of CO_2 emissions reduction. Significant savings in avoided fuel costs were observed in 2022. The 28,000 tonnes of fuel avoided returned a value of BDS $70 million, an increase of 141.4% over the previous 2021 year. This notable increase was a consequence of the volatility in fuel prices at that time.

As of June 2023, the avoided fuel cost savings reached BDS $38 million. This figure is expected to increase as the RE footprint increases. These realised savings are strong indicators of the need to further exploit the RE potential in Barbados. The RE penetration based on 2022 statistics reached 10.28%.

[10] Current estimates as of June 2023.

3.3 Description of Utility Scale FIT Programme

The 2023 FIT programme comprises two (2) capacity tiers (Table 2), solar PV and land-based wind technologies for systems above 1 MW and up to 5 MW and above 5 MW and up to 10 MW, respectively. The first tier expires on 31st December, 2023 and the second on 31st July, 2023. The expiration date of the second tier depends on the Ministry with responsibility for competitive procurement framework. This second tier was considered an interim measure to promote RE deployment at that scale pending the conclusion of the procurement framework. This expected procurement framework is still being developed by the Ministry with responsibility for energy. However, in consideration of the fluidity of the RE market, the Commission is of the view that a comprehensive review of the FIT 2023 programme would be prudent at this time given the instability in RE technology prices which arose from the COVID-19 impacts in 2022. Based on the two tier capacity and RE technology system (Table 2) a total system capacity of 40 MW-AC was allocated to the programme. The rates therein are also ascribed per technology and capacity tier.

Tariff Assignment and Compensation of RE Generators

Each eligible prospective generator, that is, new applicants to the FIT 2023 programme, who submitted a complete licence application form on or after the effective date (1st January, 2023), shall be assigned the applicable rate at the time when the said application form is verified by the Ministry with responsibility for energy.

Licensed RE generators that enter into a FIT Agreement and Interconnection Agreement and are connected to the utility grid will be compensated for each unit of energy (kWh) the generator exports to the grid. The rate structure of each FIT encapsulates the total installed cost of the project, inclusive of a fixed interconnection cost component.

Table 2 - Capacity Allocation and Rate Structure

Technology, Size Category	(BDS cents/kWh)	(MW-AC)
Solar PV, above 1 MW and up to 5 MW	26.75	
Land-based Wind, above 1 MW and up to 5 MW	26.25	
Solar PV, above 5 MW and up to 10 MW	25.25	
Land-based Wind, above 5 MW and up to 10 MW	24.25	
Total Allocation		**40[11]**

3.4 Capacity Utilisation Under the 2023 FIT Programme

An assessment of the number of approved projects provides a quick prognosis about the level and rate of achievement over the duration of the programme. To date, a total of 14 MW-AC was assigned to new RE licence applications, namely, three (3) projects. This leaves a total available capacity of 26 MW-AC provided these projects are accredited.

It must be emphasised here, that the rates ascribed in Table 2 above were developed from the most recent, and reliable information that was available at the time. The Commission continues to track the price movements of RE technology from 1st January, 2023 to the present to understand how changes in the supply chain affect domestic energy prices in Barbados. Through local investigation and research, price discovery will assist in determining the most realistic pricing for our local RE context. The setting of rates will be influenced by local pricing of RE systems from suppliers, pricing from IPPs, the utility and pricing as observed in other international markets where appropriate.

As mentioned previously, ratemaking entails balancing the interests of stakeholders with policy objectives. Inputs utilised to model rates for new entrants into the power market are many and the process requires careful thought and foresight in order to achieve an outcome which will stimulate the level of economic expansion with regard to RE deployment. The following section highlights some of the inputs that are considered central for modelling FITs.

[11] See Table G.11 of the Barbados Integrated Resource and Resiliency Plan (IRRP). This indicates 20 MW of solar PV and 20 MW of wind for 2023.

SECTION 4 KEY 2023 FIT PROGRAMME ISSUES

4.1 Background

No programme is immune from operational and implementation errors. The impact of the COVID-19 pandemic on supply chain issues resulted in some imbalances in RE technology prices. Rates for RE technologies under the 2023 FIT programme were set to stimulate a level of RE deployment despite the noticeable disruption in RE technology prices. During the first half of 2023 some of the main issues which arose relate to FIT assignment, metering, and interconnection cost. The latter will be addressed in a Section 5.

4.2 Assignment of FIT

It was clarified through a public notice dated 11th May, 2023 jointly by the Commission and the Ministry with responsibility for energy that the rate to be assigned to new RE generators under the FIT programme should be the rate that is available at the time when a complete licence application was verified by the Ministry with responsibility for energy.

Additionally, the notice stated that the issuance of new rates should only apply to the new RE projects entering the market. It has been observed that near the end of a FIT programme there is usually an increase in the number of customer applications in anticipation that the new rates may be less favorable than that the existing rate. Given the established tariff eligibility principle above, the assignment of the applicable rate will be determined when the complete application is verified. The exercise of this principle also seeks to manage the expectations of applicants with regard to the assignment of new rates and existing rates.

4.3 Metering and Billing Mechanism

All energy exported to the utility grid from RE generators is expected to be metered accurately for revenue generation and verification purposes. The option to implement the "buy all sell all" or "sale of excess" billing mechanism was stipulated for projects under the 2023 FIT programme. While flexibility was considered based on these options, a main concern relates to the energy purchased at the utility scale and its use in the electricity grid. Revenue metering should conform to applicable industry standards and best practices where appropriate. This concern about dependable purchase power is based on the reality that utility scale projects are connected for parallel operation[12] with the grid, is considered an integral part of the utility grid and as such, all of the exported energy is directly purchased by the off-taker (the BLPC). This exported energy excludes self-consumption and the quantum purchased is expected to comply with the quota mutually agreed in the FIT Agreement. Non-compliance with the applicable clause in the agreement may result in penalties being imposed on the generator. Given this requirement, the implementation of metering mechanisms which strictly adhere to the principles of "sale of excess" type meter appears to be more applicable for projects of this nature. Since the "buy all sell all" regime requires additional equipment unlike the "sale of excess" metering principle, and therefore imposes additional cost on the generator, and by extension the power system and consumers. The "sale of excess" application referenced herein does not imply that excess energy is purchased. With "sale of excess" a single bi-directional meter is utilised unlike "buy-all-sell-all" which requires an additional meter and other equipment. As indicated, this additional meter and equipment brings unnecessary costs into focus.

1. **What is the most economical method of utility-scale metering? Please support your response with a reason.**

4.4 Review of FIT Model Inputs

The FIT Model 2019 rate setting tool was utilised to determine the rates as set out in the following reference tables. These inputs represent the various parameters which were used in modelling rates for the FIT 2023 programme.

The total installed cost for solar PV and land-based wind technologies includes an interconnection cost component and were based on aggregated data, compiled to reflect the average cost for the capacity bands assigned. The installed costs units quoted in ($) per kilowatt (KW-AC) represent the aggregated cost with respect to AC rated power of the RE system. Notably, in other jurisdictions, the installed cost for solar PV is expressed in ($) per Kilowatt (KW-DC) or peak which is the dollar value per unit of the total system module size.

[12] This is the operation of the interconnected generator such that its output terminals are directly connected to or through an intermediary system to the utility's power system.

In the United States (US), the installed cost for land-based wind turbine projects saw a 1.81% rise to BDS $2,924/KW (2020) from BDS $2,872/KW (2019)[13]. However, some utility scale projects returned an average installed cost of BDS $3000/KW in 2021[14]. Based on data sets on utility scale projects in the US, the total installed cost at the utility scale is expected to trend downwards. The total installed cost for these systems during 2023 is about BDS $2,894/KW and is projected to fall around BDS $2,584/KW in 2024.

The average solar PV module price in Chinese supply markets, moved to BDS $0. $0.3375/$W_p$ in September 2023 from BDS $0.5780/$W_p$ in July 2022. This represents a significant shift in the average price for solar modules of about 41.60%. This indicates that there has been a decrease in RE technology.

In Table 3, Installed Cost, Capacity Factor, Annual Degradation, and Period of Analysis are shown.

Table 3 - Installed Costs[15]

Technology, Size Category	Installed Cost BDS ($/kW)	Capacity Factor (%)	Annual Degradation (%)	Period of Analysis (Years)
Solar PV, above 1 MW, and up to 5 MW	2,598.00	20.00	0.50	20
Solar PV, above 5 MW, and up to 10 MW	2,459.00	20.00	0.50	20
Land-based Wind, above 1 MW, and up to 5 MW	3,849.00	30.00	0.50	20
Land-based Wind, above 5 MW, and up to 10 MW	3,508.00	30.00	0.50	20

VAT & Import Duties

Currently, no import duties are applied to RE projects.

2. **Based on the input cost categories stated above in Table 3, which inputs do you consider should be adjusted? Please give a reason for your response.**

[13] Stehly, Tyler, and Patrick Duffy. 2022. 2020 Cost of Wind Energy Review. Technical Report, Golden, CO 80401: National Renewable Energy Laboratory (NREL).
[14] US Department of Energy, Office of Energy Efficiency and Renewable Energy, Land Based Wind Market Report, 2022.
[15] The Fair Trading Commission, Decision on Feed-in Tariffs for Renewable Energy Technologies Above 1 MW and up to 10 MW, the Commission. FTCUR/DECFIT1-10MW/2022-14, Barbados: the Commission, 2022 online, https://www.ftc.gov.bb/library/2022-12-31_fit_final_decision_1-10MW.pdf, 19.

Interest during Construction (IDC)[16]

IDC is the amount of interest that is required on a construction loan to facilitate the RE project. The IDC is intended to support the construction of RE projects for a prescribed time and mitigates against construction risk. During the construction phase of the project, interest is accumulated on the debt since the borrower is not able to generate revenue; this continues until the project is able to generate revenue for debt service. An IDC value of 7.75% was used in the modelling of the rates for 2023 FIT programme.

3. **Has there been any significant change in the level of the IDC figure based on existing market conditions? Please explain your response.**

4.5 Operating Cost Assumptions

Utility scale RE projects are part of the overall national power system; it is therefore important to ensure that they function efficiently and reliably. Periodic maintenance plays a pertinent role in offering a dependable service. Generators of this type and magnitude incur operational and maintenance (O&M) costs, site lease, insurance, project management and land tax. These expense items are the responsibility of the RE generator and are essential for operability of the RE system. Table 4 shows the operation cost inputs which were used in the modelling of RE rates.

Table 4 – Operation Cost Inputs[17]

Technology, Size Category	Fixed O&M (BDS $/kW/Yr)	Site Lease (BDS $/kW/Yr)	Insurance (BDS$/mille)	Project Management (BDS $/kW/Yr)	Land Tax (% of net Income)
Solar PV, above 1 MW, and up to 5 MW	32.00	25.00	10/mille	12.00	0.95
Solar PV, above 5 MW, and up to 10 MW	32.00	25.00	10/mille	6.00	0.95
Land-based Wind, above 1 MW, and up to 5 MW	70.00	25.00	10/mille	6.00	0.95
Land-based Wind, above 5 MW, and up to 10 MW	70.00	25.00	10/mille	6.00	0.95

4. **Based on the categories showed in Table 4 for the operation cost inputs, which inputs do you consider should be adjusted? Please give a reason for your response.**

[16] Ibid, 20.
[17] Ibid, 21.

Inflation Estimate[18]

The FIT calculation also considers an inflation adjustment of 3% for the full contract period of the RE project. This adjustment was determined based on local data and reflects what was expected for the 2023 period.

Site Lease[19]

A 2.0 % escalation rate was assumed over the contract period for the site lease. This estimate is based on the rent for land for RE projects.

5. **What is the current estimate for site lease for RE related projects? Please explain the value of the estimate given.**

6. **Based on the value given, is the escalation rate above still reasonable? Please state why.**

4.6 Financing Input Assumptions

The FIT 2023 programme presents a unique investment opportunity. Usually, projects of this scale require financial support. The financing assumptions (Table 5) depict the categories of costs used in the FIT 2019 model tool.

Table 5 – Financing Cost Inputs [20]

Technology, Size Category	Debt (%)	Debt Term (Years)	Interest Rate (%)	Cost of Equity (%)
Solar PV, above 1 MW, and up to 5 MW	60.00	15	6.25	14.00
Solar PV, above 5 MW, and up to 10 MW	60.00	15	6.25	14.00
Land-based Wind, above 1 MW and up to 5 MW	70.00	15	6.25	14.00
Land-based Wind, above 5 MW and up to 10 MW	70.00	15	6.25	14.00

7. **Which of the financing assumptions shown in Table 5, should be amended? Please give a reason for your response.**

[18] Ibid, 20.
[19] Ibid.
[20] Ibid, 22.

Lender or Commitment Fee[21]

The lender fee or commitment fee is a one-time cost charged by the lender upon approval of a lending facility. A rate of 1.25% of the value of the lending facility was considered under the existing FIT structure for lender or commitment fees.

8. **Do you consider this level of interest to be still applicable? Please give a reason for your response.**

4.7 Other Inputs

Decommissioning

The FIT model tool includes a reserve fund facility to address the decommissioning of the RE project. The fund accumulates cash over the first ten (10) years of the project. In accounting for the full life cycle of the project decommissioning costs must be considered.

9. **In your estimation, is 10 years an appropriate timeframe for the accumulation of reserves?**

[21] Ibid.

SECTION 5 TRANSMISSION INTERCONNECTION

5.1 Introduction

The interconnection of the RE generator to the physical grid is a necessary activity in order for the generator to meet the commercial operation date which is mutually agreed between the parties (IPP and utility) in the FIT Agreement.

All the necessary milestones agreed by the parties as outlined in the FIT Agreement and obligations as per the Interconnection Agreement must be achieved in order to meet the Commercial Operation Date (COD) of the project. These activities include but are not limited to[22]:

- Approval of infrastructural siting on lands.
- Approval of design for interconnection facilities;
- Estimating Costs associated with network upgrades;
- Establishing expected payment for upgrades to facilitate generator interconnection;
- Establishing upgrades required to facilitate interconnection;
- Constructing substation building according to design requirements;
- Installing protection and control equipment;
- Completion of Supervisory Control and Data Acquisition (SCADA) facilities;
- Installing telemetry equipment;
- Completion of energy metering facilities;
- Installation of storage or auxiliary facilities as per Grid Code stipulations;
- Installation of medium voltage switchgear; and

The list and cost of items can vary for the RE generator based on the type, size, and nuances associated with the specific interconnection which may be location specific. It is a generally accepted principle in the power generation industry that the generator which initiates the upgrade pays for the system modifications associated with that interconnection.[23]

[22] Please note that the list may not reflect the actual order of completion for events.
[23] According to the cost causation principle, costs for upgrades are borne by the generator requiring the interconnection.

These upgrade costs are primarily driven by the appropriate feasibility, impact, and facility studies which are executed so that the RE generator to be interconnected does not pose safety, stability and reliability issues to the 24.9 KV transmission network.

However, while an upgrade may be warranted to facilitate a utility scale project, the costs associated with these modifications can be significant and can disincentivise investment decisions. Given the multi-criteria approach adopted in the BNEP, the Commission determined that these upgrade costs be shared between the IPP and the utility in a 25%/75% split as stipulated at item IX of 31st December, 2022 Decision. This strategy was considered as reasonable and essential in order to minimise the immediate burden of upgrade costs by the IPP. Additionally, the concept of burden sharing was considered given the Commission's role in RE integration , as well as promoting local participation in the RE sector through this FIT programme.

5.2 Statutory Obligation to Interconnect RE Generators

Under section 13 (1) of the ELPA, the BLPC is required to provide interconnection services to a licensed RE system. Given the inherent characteristics and function of the 24.9 KV as it pertains to power and energy flows, all interconnecting RE generators must comply with the stipulations outlined in the BLPC's Grid Code 2017.

As set out at section 1.7.1 (b) of this Grid Code, the total capacity that is allocated to a feeder or 24.9 KV transmission line is 25 MW-AC. This cap ensures that the thermal limit of a feeder or transmission line is not exceeded. The Grid Code also indicates at section 3.6[24] that connection of the generator will be guided by the outcome of a Connection Impact Assessment (CIA) to be undertaken by the BLPC. The applicable technical requirements for the generator class under the FIT programme are detailed under section 5.2 of the Code.

Interconnection Cost Allocation Strategy

An interconnection cost estimate of $90/KW-AC[25] was included in the FIT modelling. The estimate was based on the average costs taken across the capacity bands to account for costs of interconnecting equipment, transformers, concrete pads, and riser pole, etc.

[24] A CIA identifies requirements and or impediments specific to the RE system connection.
[25] Ibid, 19.

Standardization of the interconnection cost estimate requires all cost from the transformer of the RE generator, up to the boundary[26] is to be considered, inclusive of the riser pole in the case overhead connections or the termination point with respect to an underground connection. This is the fixed cost of interconnection. Since the FIT captured these cost items, all future and existing RE generators connecting to the 24.9 KV transmission system shall pay the full interconnection costs estimated in the FIT and the variable costs to be incurred pursuant to the interconnection agreement.

10. **Do you agree with the principle used to compute the fixed interconnection cost estimate? Please explain your response.**

11. **What is your view on the adequacy of the cost estimate value? Give a reason for your answer.**

Interconnection costs beyond the boundary is considered variable interconnection cost given the nuances associated with localization of the RE generators to the nearest feeder or BLPC's substations. This cost includes the substation[27], poles, wiring, metering and communication infrastructure required to integrate the RE generator. The BLPC's Grid Code 2017 requires utility scale RE projects[28] to be connected to the 24.9 KV network. This connection process will be implemented via an appropriate electrical configuration system (protection interface) which is expected to be housed in an indoor substation. The cost of the substation along with other costs items were identified as part of the 25%/75% cost split. However, it must be clarified that the cost of the substation collectively includes the cost of the building, switchgear, disconnect switches, cabling, and any other applicable costs associated with that facility. The cost of utility poles, lines, stay-wires, lightning arresters, excavations, or any applicable costs are also expected to be included as part of the total cost to be shared between the utility and IPP(s).

As it relates to the construction of the substation building, it is the Commission's view that this responsibility be borne by the IPP whether or not the land is owned or leased. The cost

[26] Boundary here refers to the typical ownership boundary of the RE generator, that is up to the output jaws of the disconnect switch. This demarcation point may change depending on whether the transmission line extension is owned by the customer or the utility.

[27] The substation in this sense refers to the full outlay associated with the facility. That constructed building, switchgear, etc.

[28] Class 2 LDG are sized above 1500 KW and less than or equals to 10,000 KW

however, of the substation is dependent on demand, equipment sizing and the timing of projects to be built near the specific generation site of interest. Based on these parameters, the overall cost of the substation may differ from project to project. Ideally, the cost of the substation building can be a cost item included in the 25%. This particular scenario is considered here given that it is possible that the substation building may be designed to facilitate a maximum of up to 25 MW based on future demand.

The concept of utilising substation facilities as a conduit to interconnect future RE generators to be built near the generation site was considered a cost minimisation strategy. This cost mitigation approach appears to be the best option to execute instead of requiring each generator to build a separate substation.

12. **Do you have concerns with the proposed sharing of the substation facility at a generator site to interconnect RE generators located at other sites? If so, please elaborate.**

Based on the cost minimisation strategy aforementioned, the issue of cost recovery, cost allocation, and cost sharing arose as it relates to the IPP(s) at the substation site. Cost recovery here may be best understood through the scenario as given by the process diagram, Figure 2. In this scenario, it is assumed that the substation design, size, and cost are based on the generation site which is intended to facilitate interconnection of more than one generator nearby[29]. The total variable cost of interconnection includes the substation building cost, the costs required to interconnect IPP-A to the grid and the additional generators owned by IPP-B and IPP-C at different locations from the substation site. The success of interconnection of the IPPs depends on their state of readiness for interconnection, on a infrastructural and financial basis. It is also assumed that based on this, there is sufficient interest to fund and build the substation at the site of interest. In this sense, all milestones (activities) related to the RE project and the obligations of the utility must be completed as stipulated in the FIT Agreement.

Consider a site X where the maximum capacity of 25 MW is being facilitated at a central substation to be constructed by IPP-A based on the interconnection agreement with the

[29] The distance here implies that the generator to be connected is at a predetermined distance and therefore eligible.

utility. It is also assumed here that the interconnection agreement reflects interconnection cost sharing between the IPP and the utility. A total cost estimate of $ 10,000,000[30] is assumed for the substation based on future demand, namely, IPP-B and IPP-C. These two (2) IPPs are also expected to have signed FIT Agreements and Interconnection Agreements with the utility and demonstrate commitment to the milestones and obligations therein. Taking these key events into account, establishes a good level of certainty for the utility and the IPPs. Since the utility will be depending on the purchased power from the proposed IPPs' generators, and the IPPs expect to be connected to the grid, both entities must coordinate their planning to realise a fruitful outcome. This is a critical step towards meeting the COD of the RE generators and the energy transition goal of 100% RE by 2030.

If 25% of this cost is assigned to IPP-A, by the causation principle[31], IPP-A is required to pay the full 25% associated with the upgrade initially, namely, $2,500,000. It is also assumed that the interconnection agreements for IPP-B and IPP-C facilitates the cost minimization strategy, namely, the sharing of cost for interconnection. Following is a summary of the sequence of events (Figure 2) as it pertains to the cost sharing methodology proposed, while Table 6 shows the specific computations of equitable costs ascribed to each IPP:

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[30] This figure was assumed for ease of computation and does not reflect the actual costs of interconnection.
[31] The development of equitable rates depends on the causation principle. This implies that any entity who imposes additional cost to the power system should pay for the impact.

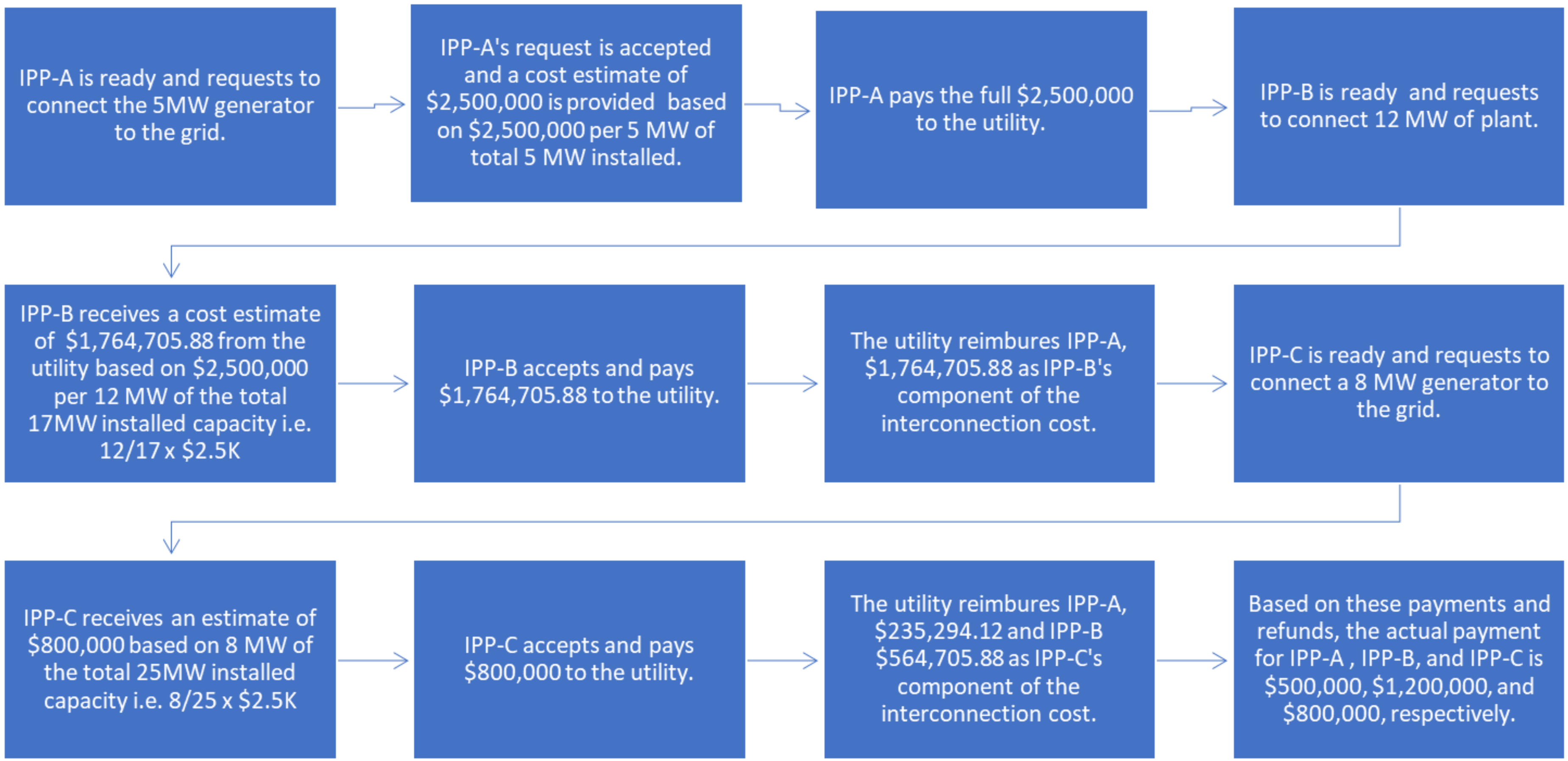

Figure 2 – Process Diagram

Table 6 - IPP Cost Recovery Scenario at Site X[32]

Queue Position	1	2	3
Project	**IPP-A**	**IPP-B**	**IPP-C**
Size (MW)[33]	5.0	12.0[34]	8.0
Estimate ($)	**$ 10,000,000.00**		
Ratio (25/75)	25%		
Total ($)	**$ 2,500,000.00**		
Cost/MW ($/MW)[35]	**$ 500,000.00**	**$ 147,058.82**	**$ 100,000.00**
Actual Payment ($)	$ 2,500,000.00		
Actual Payment ($)[36]	$ 735,294.12	$ 1,764,705.88	
Refund ($)[37]	($ 1,764,705.88)		
Actual Payment ($)	**$ 500,000.00**	**$ 1,200,000.00**	**$ 800,000.00**
Refund ($)	**($ 235,294.12)**	**($ 564,705.88)**	

13. What are your views about the refunding model applied to the variable interconnection cost where the substation site is required to connect multiple generators? Please explain your response.

14. Are there alternative cost-sharing approaches which may be applicable to the variable interconnection costs above? Please provide an explanation.

15. Are there any other issues to consider as it relates to interconnection cost and cost recovery? Please provide a response.

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[32] Site X is the location of the proposed substation to be built on IPP-A's land.
[33] An individual licence is assumed for the name plate capacity of the generator.
[34] The capacity here relates to two (2) 6 MW-AC generators owned by IPP-B at different sites.
[35] This is the specific value in $/MW at the queue position and is the ratio of the total costs ($2,500,000) and the aggregate capacity of plant in (MW) at that point in time.
[36] Actual Payment = $/MW x capacity (MW) of each existing plant; this amount reflects the current payment at the point in time with respect to the queue position. Note that a new calculation for the actual payment is triggered when additional capacity is considered at the queue position.
[37] This is the difference between the current actual payment ($) at the queue position and the initial actual payment ($) at the previous queue position.

SECTION 6 CATALOGUE OF QUESTIONS

As part of the consultation, the following questions must be addressed by stakeholders. These generally summarise the main issues requiring comments.

1. **What is the most economical method of utility-scale metering? Please support your response with a reason.**

2. **Based on the input cost categories stated above in Table 3, which inputs do you consider should be adjusted? Please give a reason for your response.**

3. **Has there been any significant change in the level of the IDC figure based on existing market conditions? Please explain your response.**

4. **Based on the categories shown in Table 4 for the operation cost inputs, which inputs do you consider should be adjusted? Please give a reason for your response.**

5. **What is the current estimate for site lease for RE related projects? Please explain the value of the estimate given.**

6. **Based on the value given, is the escalation rate above still reasonable? Please state why.**

7. **Which of the financing assumptions shown in Table 5, should be amended? Please give a reason for your response.**

8. **Do you consider this level of interest to be still applicable? Please give a reason for your response.**

9. **In your estimation, is 10 years an appropriate timeframe for the accumulation of reserves?**

10. **Do you agree with the principle used to compute the fixed interconnection cost estimate? Please explain your response.**

11. **What is your view on the adequacy of the cost estimate value? Give a reason for your answer.**

12. **Do you have concerns with the proposed sharing of the substation facility at a generator site to interconnect RE generators located at other sites? If so, please elaborate.**

13. **What are your views about the refunding model applied to the variable interconnection cost where the substation site is required to connect multiple generators? Please explain your response.**

14. **Are there alternative cost-sharing approaches which may be applicable to the variable interconnection costs above? Please provide an explanation.**

15. **Are there any other issues to be considered as it relates to interconnection cost and cost recovery? Please provide a response.**