FAIR TRADING COMMISSION

CONSULTATION PAPER

REVIEW OF THE FUEL CLAUSE ADJUSTMENT

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ANTECEDENT DOCUMENTS

Document Number	Description	Date
FTC/CONS/04/04	Consultation Paper on Fuel Adjustment Charge	September 13, 2004
FTC/URD/FACREP/0107	Fuel Adjustment Charge Findings Report	January 19, 2007

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PURPOSE OF THIS CONSULTATION

The Fair Trading Commission (Commission) was established by the Fair Trading Commission Act Cap. 326B (FTCA) as the independent regulator of the supply of electricity. The Commission also regulates domestic and international telecommunications services by the dominant telecommunications provider. The Commission in undertaking its mandate under Section 4 (3) of the FTCA conducted a rate review of the Barbados Light & Power Company Limited (BL&P) in 2009. In so doing the BL&P was allowed to continue to pass through its fluctuating fuel cost to customers under a mechanism known as the Fuel Clause Adjustment (FCA). The FCA was approved by the Public Utilities Board in the 1983 decision and audited by the Commission in 2006.

The Commission has issued this consultation paper to re-examine the FCA to ensure its applicability to present circumstances, particularly given the current high level of volatility within the international oil sector. This re-examination is part of the Commission's ongoing mandate to monitor the rates of regulated utility providers.

In April 2012, the Commission hired consultants to review the method of application of the FCA administered by the BL&P. The objective of this consultation paper is to obtain feedback from the public on the findings of this review in order to assist the Commission's decision on any future amendments to the FCA. The paper will also assist the public in understanding the FCA.

Section 1 of this paper deals with the substantive issues of the FCA, while Section 2 addresses the consultation process. The public consultation will run from **October 8, 2012** to **November 16, 2012** and responses may be written or oral. A town hall meeting will be convened and members of the public are encouraged to participate. This consultation paper includes a series of specific questions on which the Commission is seeking comments. The public is not limited to responding to these questions but may comment on any of the issues raised herein.

SECTION 1 – FUEL CLAUSE ADJUSTMENT

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1. BACKGROUND

The Barbados Light & Power Company Limited (BL&P) is a vertically integrated company that generates, transmits and distributes electricity. It is the sole licensed provider of electricity on the island and is therefore regulated by the Commission.

The Commission regulates utility rates under the Utilities Regulation Act, CAP 282. In this legislation the Commission has a mandate to establish principles for arriving at rates to be charged and to monitor the rates as prescribed below.

> *Sec. 3. (1) the functions of the Commission under this Act are in relation to service providers, to:*
>
> *(a) establish principles for arriving at rates to be charged;*
>
> *(b) set the maximum rates to be charged;*
>
> *(c) monitor the rates charged to ensure compliance; and*
>
> *(f) carry out periodic reviews of the rates and principles for setting rates and standards of service.*

The Commission is also responsible for ensuring rates are reasonable through the following section:

> *Sec. 10. Every rate made by the Commission shall:*
>
> *(a) be fair and reasonable.*

1.1 What is the FCA?

The FCA is used by electric utilities to respond to fuel cost uncertainties. It is a direct pass through charge whereby the customers are required to pay for the portion of fuel related to their consumption. Customers will notice a fluctuation in the per unit charge of the FCA on their bills from month to month reflective of changes in the cost of fuel. The intent of the FCA is to eliminate the need for costly, time consuming rate hearings to be conducted every time there is a change in the cost of fuel.

The FCA is intended to recover only the fuel cost incurred in generating electricity as the Company is not permitted to make a profit from the tariff. Since the cost of fuel is the single largest input cost in the production of electricity in Barbados, the volatility of international oil prices can have the effect of creating considerable uncertainty over the price of electricity.

1.2 Regulatory Framework

The BL&P is the only entity currently permitted to commercially provide electricity in Barbados. The rates charged are designed to recover the cost of providing the service to customers. The system of regulation currently applied to the electricity sector in Barbados is rate of return whereby the Commission has approved rates which give the company the opportunity to earn a reasonable return on its prudent investment. The Commission approved a 10% rate of return in its 2010 rate decision.

The Commission is responsible for ensuring that all expenditures which are reflected in the rates are prudent. It is in this context that the FCA, which relates specifically to fuel costs, must be periodically reviewed.

As noted above, the rates that the BL&P is allowed to charge are determined by the cost of service. These cost components include allowable operating expenses such as operation and maintenance costs, depreciation and all taxes as well as the rate base (for example the generation plant) which is the net amount of investment that is prudently incurred.

If the company wishes to increase any rate which is currently in place it is required to make an application to the Commission. The FCA, however, is designed to vary with changes in the cost of fuel. Any changes to the construct or manner in which the FCA is currently calculated will therefore require a hearing, be it written or oral.

1.3 Composition of Tariffs

The current customer classes are shown below.

Classes

1. **Domestic** - Residential customers
2. **General Service -** Customers using electricity in commercial business activity
3. **Employee –** Present and past employees of the BL&P
4. **Secondary Voltage Power -** Industrial customers with supply provided through secondary voltage (lower voltage) of transformer
5. **Large Power -** Industrial customers with supply provided through primary voltage (higher voltage) of transformers.

The BL&P's tariff is comprised of:

i. **Customer charge -** A fixed charge which is applied to domestic, general service, secondary voltage power and large power classes. This charge covers administrative and billing costs as well as costs for access to service. A customer charge is not applicable to the employee class.

ii. **Base energy charge -** This is a charge per Kilowatt hour (KWh) which is applicable to all customer classes. The charge per KWh is based on an ascending block structure for domestic, general service and employee classes. This means that within the ascending block structure the cost per KWh is higher for greater usage; this is designed to promote efficiency of use. Secondary voltage power and large power are charged at a constant rate per KWh.

iii. **Demand charge -** This is a fixed charge per Kilovolt Ampere (KVA) which is applicable to secondary voltage power and large power customers only. It refers to the peak power recorded each month. It is intended to cover the standby requirements and costs associated with the generating facilities, transmission and distribution lines, substations, transformers and other facilities required to meet individual and combined customer peak demand.

iv. **Fuel clause adjustment -** The FCA is computed by dividing the projected cost of fuel by the projected sales/KWh. The resultant charge is multiplied by the customer's KWh usage to determine the cost of fuel to be charged.

1.4 Review

The Commission as part of its review of the FCA engaged consultants to:

(i) Assess the method of application of the FCA used by the BL&P; and

(ii) Assess and provide recommendations for improving fuel efficiency of the BL&P

The Consultant was required to:

(iii) Evaluate the BL&P's present method of determining the FCA including the method used to project sales and cost;

(iv) Assess whether the current method of determining the FCA provides adequate revenue to cover fuel costs without allowing the Company to earn additional revenue from the aspect of the tariff;

(v) Assess the impact of the current FCA volatility on both the BL&P and consumers. Compare this impact with that anticipated through suggested alternative methods including the method used to project sales and costs;

(vi) Suggest alternative formulae or methods which may incorporate efficiency factors and do not result in an over or under recovery of fuel revenue over an extended period;

(vii) Assess the impact of implementing a system where the FCA is maintained at a constant level over consecutive months i.e. quarterly, bi-annually or annually;

(viii) Evaluate the efficiency of the BL&P's historic dispatching of generation plant and make recommendations for improvement where applicable; and

(ix) Review heat rates and determine if they are within design specifications. Also, propose an incentive mechanism to meet a targeted overall heat rate.

The draft Consultant's report was shared with the BL&P. Subsequently, additional information was provided by them. This Consultation Paper incorporates the findings of the Consultant's report as well as information submitted by the BL&P.

The Executive Summary of the Consultant's Report is provided in Appendix I.

2. PRESENT METHOD OF FCA APPLICATION BY BL&P

2.1 Current Formula

The current FCA is measured in cents per kWh and aims to recover the overall fuel cost incurred in generating electricity. The FCA calculation is forward looking being based on projections of fuel cost and electricity sales for one month ahead. Under or over recovery occurs when the revenue collected is less than or more than the actual cost of fuel used. The following formula is applied:

$$FCA = \frac{\text{Projected Cost of Fuel + or – previous months under or over recovery}}{\text{Projected sales kWh}}$$

For example if the projected fuel cost for the month was $31,523,600, the previous month's under-recovery was $7,002,100 and the projected sales was 77,119,000 kWh, the calculated FCA for a given month would be $0.4996.

$$FCA = \frac{\$31,523,600 + \$7,002,100}{77,119,000 \text{ kWh}}$$

$$= \$0.4996¢/\text{kWh}$$

The BL&P's management uses recognised oil trader information such as the Brent Crude price or the Platts Index to project fuel costs and the company's past sales history to project expected sales. A disadvantage of this approach is that these forecasted values would vary from those realised values in each month thus resulting in over/under recovery of the fuel cost.

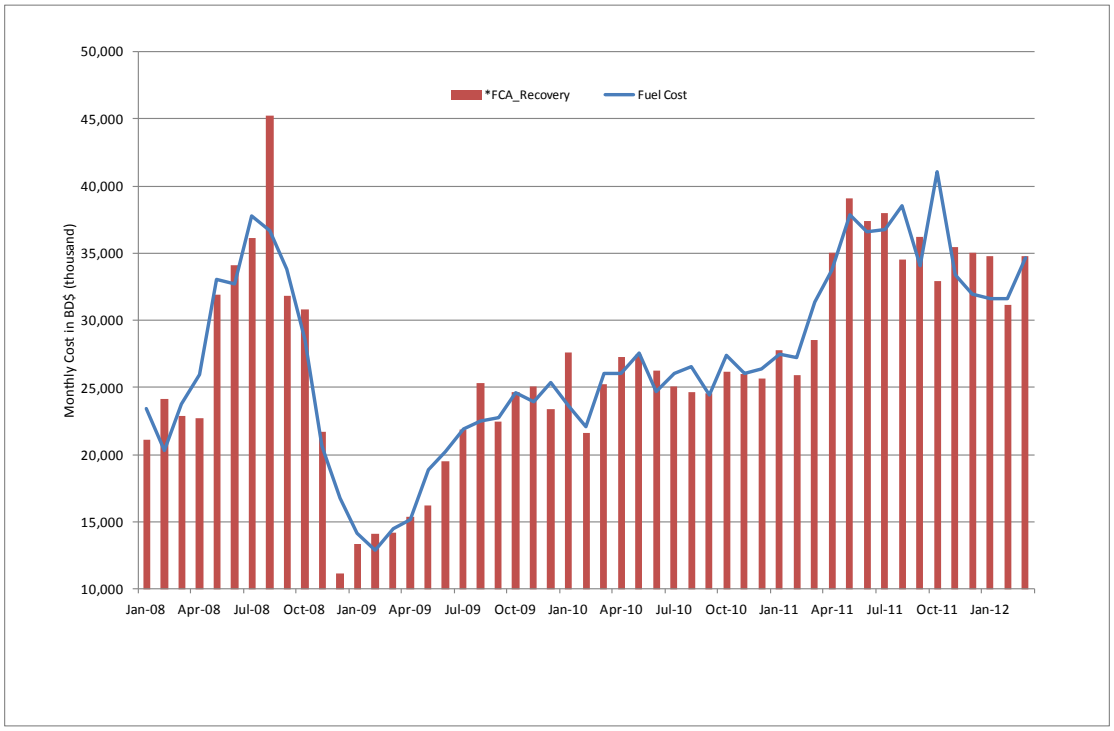
The BL&P has also introduced a measure of smoothing in the calculation to reduce the fluctuation in fuel charges on a monthly basis. This creates an element of subjectivity in arriving at the total amount to be collected in a given month through consideration of what customers are willing to bear and the company's cash flow. In essence, if the BL&P recognises that the change in fuel costs in a given period is high, part of what is eligible for

collection is deferred and recouped in the following month(s). This therefore has the effect of reducing the volatility as seen by customers. Smoothing as undertaken by the BL&P also takes account of market conditions such as current oil prices and local economic conditions at the time of application of the FCA.

2.2 FCA Revenue vs. Actual Fuel Costs

As forecast data is used, there is sometimes a difference between the monthly fuel costs incurred by the BL&P and the amount which is recovered through the FCA as shown in Fig. 2.1.

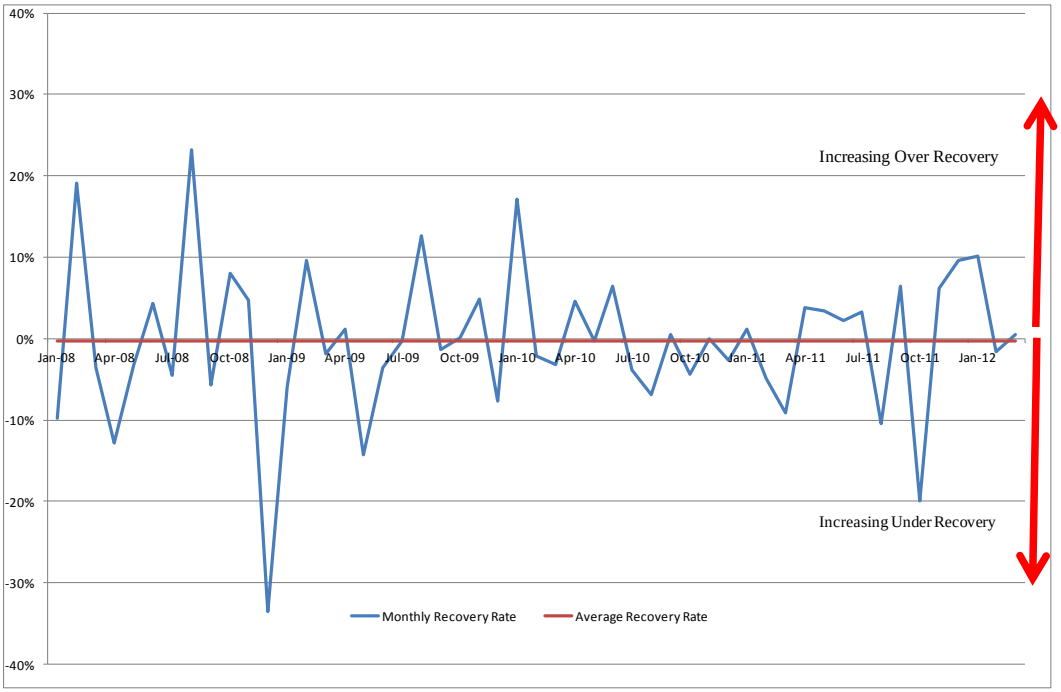
Figure 2.1 - FCA Revenue and Fuel Costs



Source: BL&P

The under/over recovery is shown in more detail in Figure 2.2 which shows the monthly under/over recovery as a percentage of actual fuel costs.

Figure 2.2 - Fuel Cost Recovery Rate



Source: PPA Energy calculations based on BL&P data

The BL&P is, on average, recovering the total cost of fuel through the FCA. The company tends to recover between 80% and 120% of the fuel cost every month (representing between an under recovery of 20% to an over recovery of 20%). Over the entire period this averages to an under recovery per month of BDS$21,000.00.

The cumulative over/under cost recovery was also determined, building upon historic data from 2008 until early 2012. This showed that the BL&P has a net under recovery of $633,700.

The table below shows the relevant values.

Table No. 2.1

Description	**BDS $**
Maximum Cumulative Over Recovery	5,756,110
Maximum Cumulative Under Recovery	9,782,960
Net Recovery	633,700 Under/recovery

Source: PPA Energy calculations based on BL&P data

Based on the foregoing the arithmetic average of the over/under recovery of BDS$5.7 million and BDS$9.8 million is BDS$7.5 million. It is suggested that a new FCA structure could be designed such that the BL&P's over/under recovery position should not be more than BDS$7.5 million in any month.

2.3. Issues with FCA

The main areas of concern with regard to the current structure of the FCA are as follows:

- **Forecasting -** Although the FCA is easy to calculate, the forward-looking approach currently used makes it difficult to audit as it is based on estimations of future fuel prices as well as sales.

- **Smoothing -** The smoothing process involved in the determination of the FCA is subjective. The Commission recognises that the method of smoothing adopted by the BL&P reduces the fluctuations and thus reduces the effect of large monthly changes in the customer bills.

To enhance transparency a method may be adopted whereby the charge is precisely calculated rather than determined based on projections and smoothing.

<u>Question 1</u>: Should the FCA be calculated on the basis of actual data or projections? Please indicate why.

<u>Question 2</u>: What are your views on the method currently used by the BL&P to set the fuel clause adjustment? Can you suggest an alternative method to determine the FCA?

3. ASSESSMENT OF POSSIBLE ALTERNATIVES TO THE PRESENT ARRANGEMENTS

3.1 Proposed FCA Structure

It is proposed that the FCA be calculated using the following parameters from the previous calendar month:

- Energy generation (kWh);
- Fuel costs (BDS$);
- Auxiliary consumption[1] (% of total generation); and
- System losses[2] (% of total generation).

The proposed formula is as follows:

$$FCA_n = \frac{FuelCost_{n-1}}{EnergyGeneration_{n-1} \cdot (1 - Aux_{n-1}) \cdot (1 - losses)} \left[\frac{BDS\$}{kWh} \right] \rightarrow (1)$$

Where the FCA_n factor would be applied to electricity bills in month n

The FCA would therefore be based on actual figures of the immediate past month's energy generated and fuel cost. In this manner the electricity (KWh) that is used by the customers is derived from actual energy generation adjusted by auxiliary consumption and system losses.

If the change in fuel cost from one month to the next is very large it may still result in the FCA for a particular month being much higher than the FCA for the preceding month. So the BL&P may want to continue their process of smoothing the FCA by spreading the fuel cost over to the next month There would then be an under recovery of fuel costs.

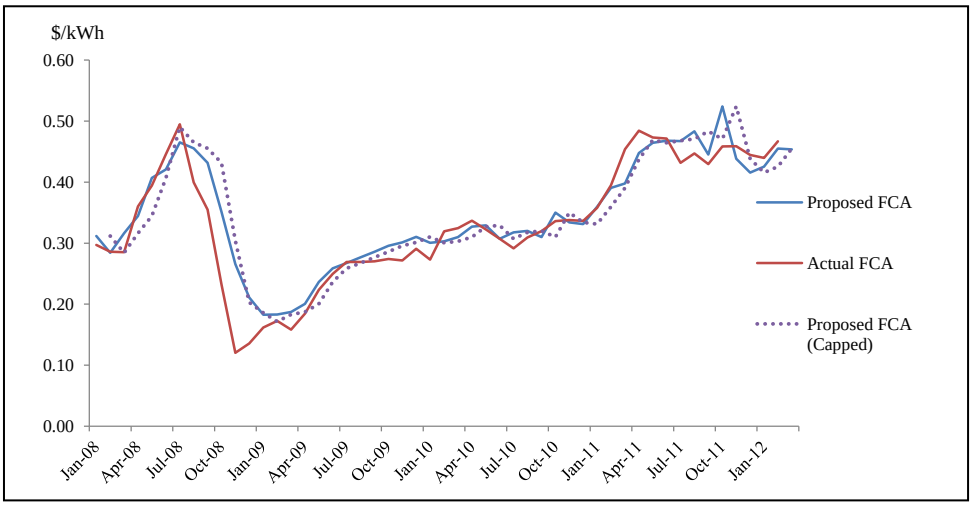
[1] Auxiliary consumption relates to the electricity consumed by the generating unit auxiliary system for initiating start up and running and it is dependent on its configuration, age and related technical parameters. Auxiliary power is required for equipment such as feed pumps, cooling water pumps, air fans, coal grinding mills, common auxiliaries etc. of the generating station.

[2] Technical losses occur naturally and consist mainly of power dissipation in electricity system components such as transmission and distribution lines, transformers, and measurement systems. System losses are estimated from the discrepancy between energy produced (as reported by power plants) and energy sold to end customers; the difference between what is produced and what is consumed constitute transmission and distribution losses.

Cumulative over/under cost recovery may still therefore be an important factor to consider when restructuring the FCA, since this could be a major driver of the BL&P's financials. As was previously stated, according to historic data the BL&P has had a maximum and minimum over and under cost recovery of BDS$9,782,960 and BDS$5,756,110, respectively. Given this, an adjustment factor has been included in the proposed FCA calculation such that the cumulative over/under fuel cost recovery is capped at BDS$7,500,000. This will minimise the financial strain on consumers and risk to the company.

The following figure plots the actual FCA and proposed FCA for the period January 2008 through March 2012. In addition, the graph below shows the FCA (1) using formula 1 and (ii) using formula (1) adjusted by a capped cumulative over/under fuel cost recovery.

Figure 3.1 - Proposed FCA



Source: PPA Energy calculations

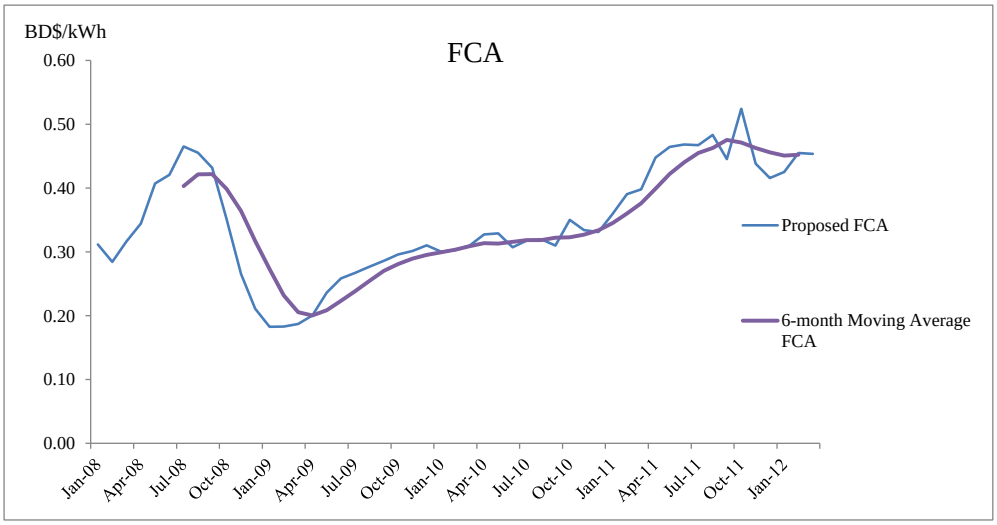
It can be seen that in both cases the proposed FCA results in less volatility in fuel charges to the customer than the current FCA.

<u>Question 3</u>: Should the BL&P be allowed to continue its process of smoothing the FCA?

3.2 Six-Month FCA

A further variation of the proposed FCA structure, using a six-month moving average of the past figures of fuel cost, results in a "smoothed FCA" as shown in the following Fig. 3.2:

Figure 3.2 - Proposed FCA vs. Six-Month Moving Average FCA



Although, at first glance, this variation of the proposed FCA could be efficient in stabilising customer billing, the potential financial exposure to the BL&P through its implementation would have to be controlled. Controlling the BL&P's exposure would mean capping the over and under cumulative recovery of the "smoothed FCA". If a cap of BDS$7,500,000 was approved, Fig. 3.3 demonstrates the resulting FCA.

Figure 3.3 - Proposed FCA vs. Six-Month Moving Average Capped FCA

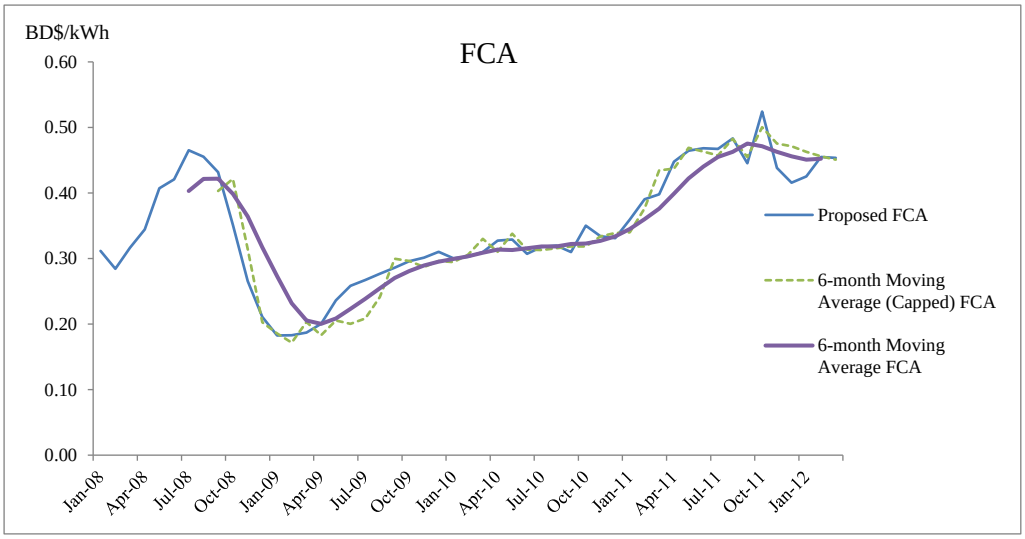


Figure 3.4 - Actual FCA vs. FCA Options

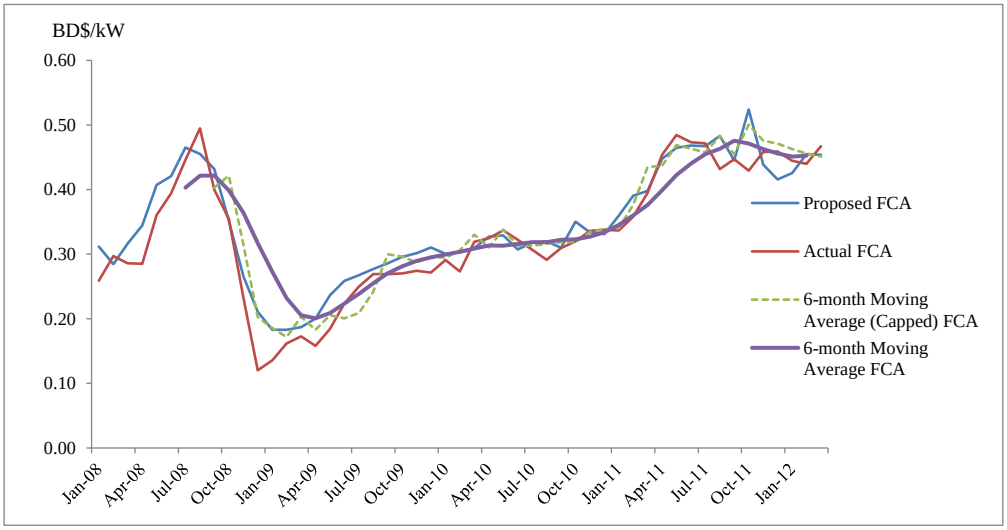


Fig. 3.4 shows that the financial effect of the "Six-Month Moving Average FCA" is capped, tends to strongly correlate with the Proposed FCA.

Alternate FCA recovery methods are utilised by other jurisdictions. Appendix II provides examples of some of these.

<u>Question 4</u>: Of the FCA application options presented, including the current method, what is your preference? Do you have any suggestions that you may wish the Commission to consider?

<u>Question 5</u>: What are your views on capping any over/under recovery? Should it be applied and why?

<u>Question 6</u>: Would you prefer to receive a bill that fluctuates from month to month and is directly reflective of the cost of fuel or should the smoothing component that reduces the fluctuations in your bill continue?

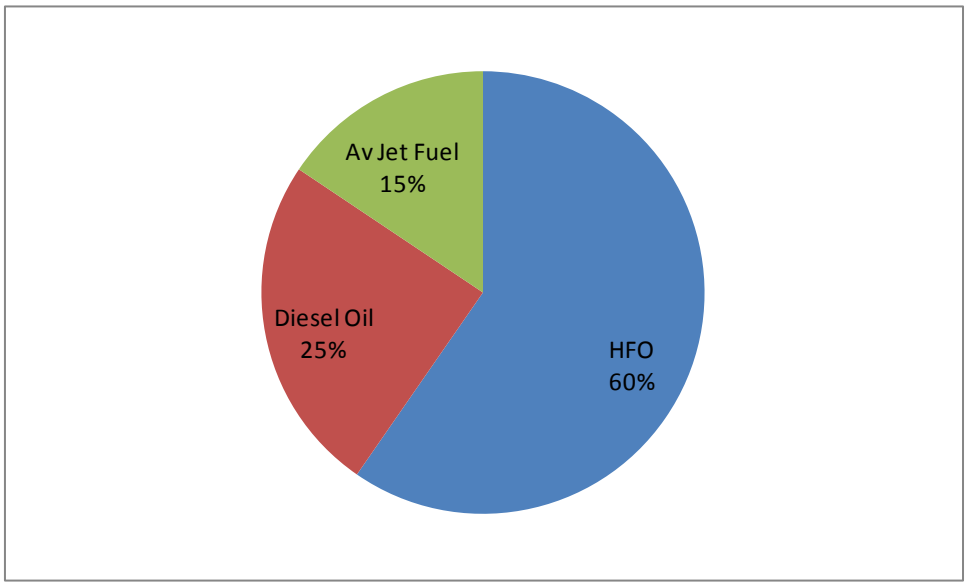
4. REVIEW OF FUEL COST INCURRED AND PLANT EFFICIENCIES

The level of the FCA is also influenced by the order in which the BL&P's generation plant is utilised, plant efficiencies, the type of fuel used, and the actual cost of fuel. This section discusses these factors.

4.1 Plant Details

The BL&P has approximately 239 MW of installed capacity[3], of which 149.2 MW is fuelled using Heavy Fuel Oil (HFO)/Bunker C. The remaining capacity is diesel and jet fuel fired, as illustrated in the graph below. The Barbados National Oil Company Limited (BNOCL) supplies Bunker C (Heavy Fuel Oil) to BL&P. Diesel and Aviation jet fuel (Av Jet) is currently supplied by Esso.

Figure 4.1 – The BL&P Generation Mix by Fuel Usage



Source: BL&P

The BL&P currently has in use three types of plants: i) Steam turbine, ii) Gas turbines and iii) Low Speed Diesel engine. The majority of the BL&P's plant is located at the Spring Garden Power Station. The steam units (S1 and S2) are over 35 years old. The maximum design life of a steam plant is typically 30 years, unless significant and costly retrofitting is undertaken.

[3] The Company also has a 17.5 MW gas turbine unit, GT01, which was officially retired in 2005, but which has been retained for emergency situations.

The BL&P's 2008 rate application articulated plans to replace these units. However, in 2011 the BL&P provided the Commission with an update of its capital expansion plan which included extending the operating life of the steam plant by retrofitting.

The Company has to date conducted an evaluation of the boilers, turbines and transformers which are considered the more critical components that could influence the future availability of the steam plants. Tests conducted indicated that there was no degradation of note on the boilers and that the useful life of the transformers extends beyond 2015. Additionally the BL&P confirmed that overhauls of the steam turbines conducted by the Company in 2010 and 2011 were designed to extend the useful life of the steam plants beyond the scheduled retirement.

The BL&P is currently in the process of developing an integrated resource plan (IRP) which will outline the expected demand growth, fuel resources and plant types that should be used to satisfy that demand. Additionally, the BL&P in its IRP will consider the impending National Sustainable Energy Policy (NSEP) which seeks to establish certain requirements pertaining to renewable energy utilisation.

There are two groups of diesel engines at Spring Garden. The more recently installed (2005) are the Hyundai/B&W 30 MW units. The units are connected to a waste heat recovery unit (CG02) with a capacity of 2.2 MW. These low speed diesel engines (D14 and D15) are the most modern and efficient, with a fuel cost (based on March 2012 fuel prices) of approximately BDS$ 0.30¢/kWh. The other group consists of four low speed diesel engines (D10 to D13 inclusive) which are marginally less efficient than the D14 and D15. These units are also connected to a waste heat recovery unit (CG01), which produces an additional 1.5 MW. All of the above units (with the exception of CG01) are fuelled using HFO.

There is also a single gas turbine located at Spring Garden (GT01), which burns diesel oil. Commissioned in 1973, this is the least efficient and highest marginal cost plant on the system and as with the steam plants is now beyond its designed economic life and is only used in emergencies. A single gas turbine (GT02) is located at the Garrison Power Station. This is operated on diesel fuel oil. The Seawell power station houses the four other gas

turbines which make up the total generation capacity of the BL&P. Two of these units have been converted from aviation jet fuel to less expensive diesel fuel oil.

Energy sales have remained relatively steady since 2007 as is reflected in the minimum and maximum demands of 162.4 MW in 2007 and 167.5 MW in 2010, respectively. With an installed capacity of 239 MW and given these sales figures, the BL&P has a reserve margin of 43%. A 2010 World Bank study[4] suggests that planned reserve margins should vary with the size of the systems such that systems with a peak of 150 MW warrant reserve margins of 35%; systems up to 600 MW, a 30% reserve margin; and a 25% reserve margin for larger systems. These are the minimum acceptable reserve margins and the report noted that they compare well with the planning reserve margins used by the utilities in the region. A sample of eleven regional utilities, inclusive of Barbados, showed an average regional reserve margin of 47% in 2010, which is higher than the 43% noted for the BL&P when GT01 is not included. At the end of 2010, countries in the region had actual reserve margins ranging between 28% and 104.7%. Antigua and Barbuda peak load 57 MW, reserve margin 58%; Grenada peak load 33 MW, reserve margin 49%; Haiti peak load 237 MW, reserve margin 33%; Jamaica peak load 707 MW, reserve margin 32%; St. Lucia peak load 58 MW, reserve margin 65% and St. Vincent and the Grenadines peak load 28 MW, reserve margin 104.7%.

As articulated in the 2008 Caribbean Electric Utility Services Corporation (CARILEC) Position Paper on Energy Policy, it is imperative that isolated islands have enough dependable capacity available to meet their needs. CARILEC has reported that most island utilities use the n-2 criterion as a minimum requirement for the installed capacity which translates to the utility having enough installed capacity such that it is able to meet its peak demand even when its two largest units are out of service. Applying the n-2 criterion to the BL&P would mean that the installed capacity should be at least 227.5 MW.

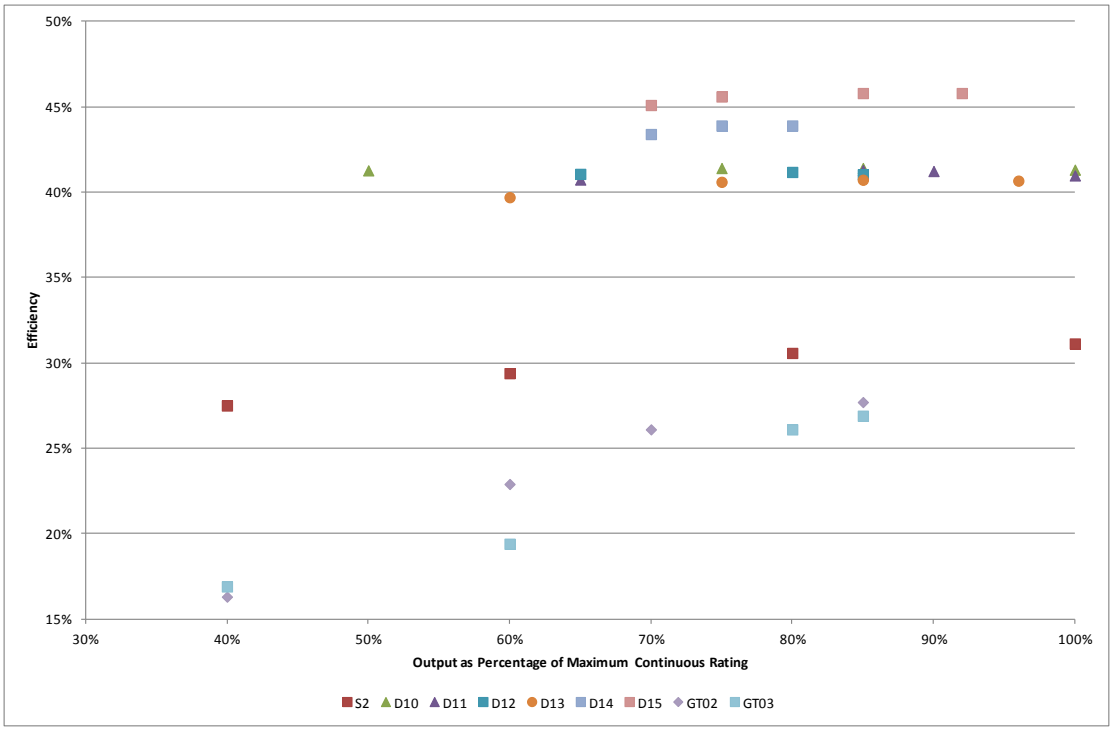
4.2 Heat Rate / Efficiency

The efficiency of electricity generating plant is a measure of the ability to convert energy stored in the fuel to energy generated. Efficiencies normally vary with the output (KW) and

[4] World Bank, 2010, Caribbean Regional Electricity Generation, Interconnection, and Fuel Supply Strategy.

age of the generator. The overall efficiencies for the generating plant in Barbados are shown in Figure 4.2.

Figure 4.2 - Generating Unit Efficiencies



Source: BL&P

The maximum theoretical efficiency which can be achieved with the most sophisticated large modern steam plant approaches 40%, so the efficiencies of around 30% which were recorded for S2 are not unusual for plant of this age and vintage.

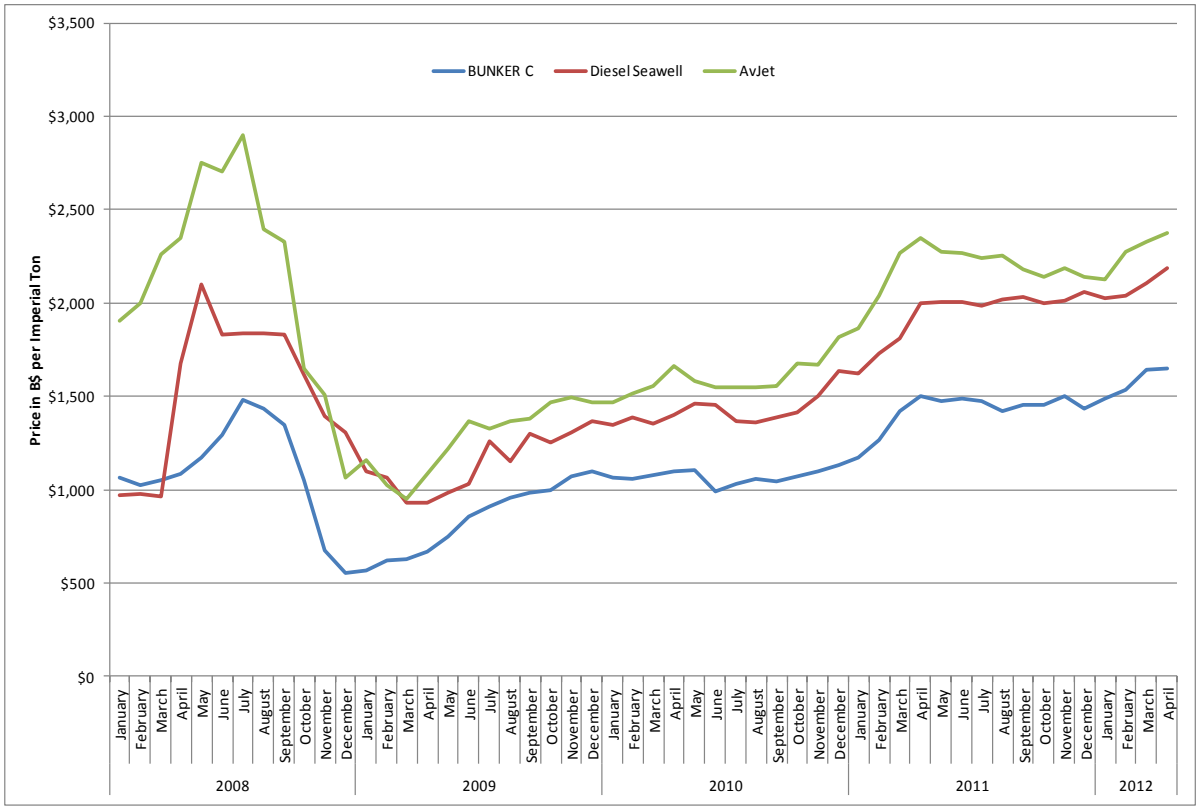
Efficiencies in diesel engines are normally much higher than for steam plants, and the data from the BL&P indicates that all of the diesel generators show values of between 40% (D10 to D13) and 45% (D14 and D15). The efficiencies of these plants will vary dependent upon the maintenance levels and age of the plants, but the values which are indicated are in line with normal expectations.

Gas turbines in open cycle mode (i.e. without heat recovery from the exhaust gases) tend to have lower efficiencies than diesel engines. This is particularly true of smaller, older units similar to those in Barbados. In respect of units GT02 and GT03, at part load (40% of maximum continuous rating) the units had efficiencies of between 16% and 17%, rising to 27%/28% at high load. This is typical.

4.3 Fuel Prices

The BL&P is highly exposed to the price fluctuation of delivered fuels. Figure 4.3, shows that these prices have been very volatile and have followed an upward trend since 2008. As the FCA is a direct pass through charge, this means that customers have experienced sustained increases in their electricity bills.

Figure 4.3 - Fuel Prices



Source: BL&P

4.4 Dispatch

The BL&P puts into operation (dispatches) its generation plant on a merit order basis that is, on the basis of matching supply to demand using plant with the lowest cost of generation first. However, for stability and reliability reasons the BL&P operates the steam turbines S1 and S2 for base load, in preference to the low speed diesel units which are less expensive to run. The minimum practical output of the steam units is understood to be about 13 MW and at night the two units are dispatched at low load - between 13 and 15 MW. The BL&P's rationale for this dispatch regime is that the steam plants become less reliable as the start and stop frequency increases. The steam units are therefore run continuously.

During the study an optimised dispatch model was developed using the assumption that both of the steam units are kept on hot standby[5] overnight, with plant dispatched in strict merit order (i.e. diesels first, followed by steam plant and then gas turbines based on cost). This was compared to actual dispatch.

This referenced model was also used to estimate the daily energy generation of the BL&P plants, assuming optimised dispatch. This allowed an estimate to be made as to the fuel costs associated with energy production under a variety of alternative scenarios.

The scenarios which were considered are detailed in Table 4.1:

Table 4.1 - Different Dispatch Scenarios

Scenario	Description
1	Base case as per actual BL&P operational information
2	Steam plant dispatched first, with reduction in output between 23:00 hrs./11 p.m. and 07:00 hrs./7 a.m. inclusive for both units to 13 MW each
3	Steam plant dispatched first, with reduction in output between 23:00 and 07:00 and assumption one unit can be kept on hot standby
4	Diesel plant dispatched first (with both steam units on hot standby overnight)
5	As scenario 4 but with maximum continuous rating factor[6] increased from 0.85 to 0.9

[5] Hot standby means that the boilers are fired at minimum levels so that when called upon electricity can be generated at short notice

[6] Maximum Continuous Rating is defined as the maximum output (MW) that a generating station is capable of producing continuously under normal conditions over a year. Under ideal conditions, the actual output could be higher than the MCR. http://www.theimo.com/imoweb/marketdata/genDisclosure.asp

The results of the simulations for the dispatch were as follows:

Table 4.2 - Estimated Potential Costs Savings in Dispatch

Scenario	Cost in BDS$ thousand	Saving relative to Base Case (Scenario 1) BDS$ thousand
1	941.8	-
2	925.6	16.2
3	913.5	28.3
4	898.5	43.3
5	878.5	63.3

It is recognised that it will not always be possible to achieve these savings due to scheduled and forced outages of generating plant.

Also influencing the level of the fuel cost being used to determine optional dispatch fuel is stock valuation. Fuel is currently valued at each power station on a monthly basis building upon a weighted average of the cost of the balance at the beginning of the month and the cost of the deliveries received over that month. Deliveries are costed based on prices for supply from BNOCL (Bunker C) and commercial suppliers (Diesel and Aviation Jet Oil). The BL&P applies the resulting fuel price to each power station.

Each power station has its own fuel storage facilities. The amount of fuel stored and burnt in each power plant is specific and therefore fuel stock is different among them. Considering this together with transportation costs, fuel prices should be different at the Spring Garden, Garrison and Seawell plants. If this method is used it would lead to an enhanced dispatch of the generation plant.

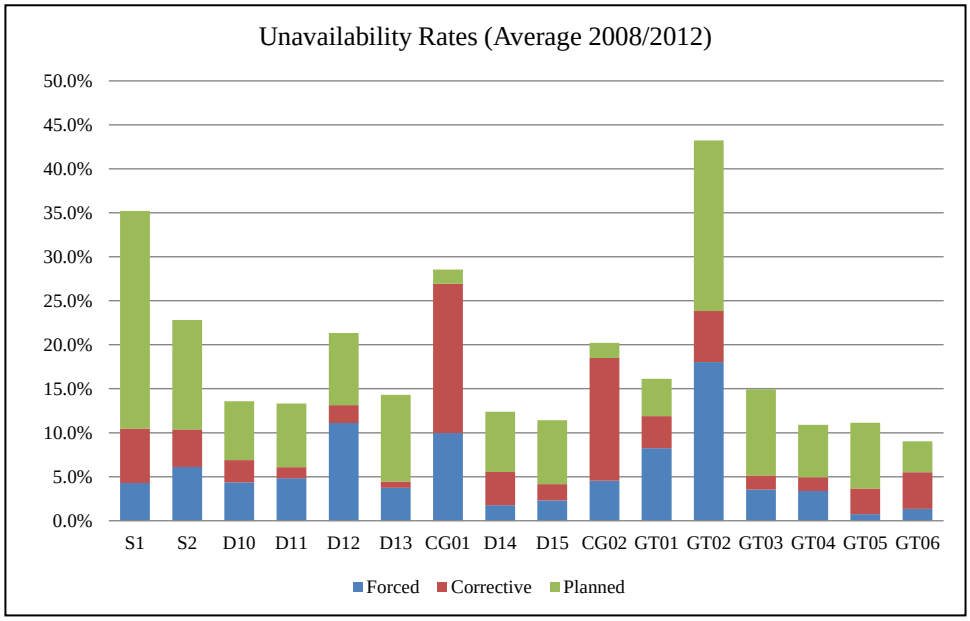
4.5 Plant Unavailability

The BL&P's plant unavailability ranges from around 10% in the case of the best units (D14/D15/GT06) to as high as 43%[7] for GT02 (see Figure 4.4). Some of the values can be explained by particular events – in the case of S1, for example, a fire caused a long-term outage from January to July 2010, distorting the average figure.

[7] Availability rates are calculated with data for the period 2008-2012, provided by the BL&P

Figure 4.4 shows unit unavailability rates, split between forced outage, corrective and planned. Corrective outages address particular problems which have arisen but which are not immediately prejudicial to the operation of the plants. These nonetheless need to be addressed prior to the next planned maintenance.

Figure 4.4 - Plant Unavailability Rates



Source: PPA Energy Calculations

The average unavailability for the diesel engines is 14.7%, which falls to 13.3% if D12 is excluded. The average from a 2009 survey across 31 two-stroke diesel engines, which included those used by the BL&P, indicated that unavailability rates averaged 14%, only marginally better than that ascribed to the BL&P average unavailable of its diesel engines.

In the case of the gas turbines, GT01 and GT02 appear to have suffered from high levels of unavailability. GT01, which is used only in emergencies, is the most inefficient generator but because of its low usage, there should not be a significant impact on the overall fuel cost. GT02 was unavailable from July 2010 to July 2011 due to a damaged rotor. It is noteworthy that, the average figure of around 5% unavailability as reported in a 2004 Report from Energy and Environment Analysis Inc.[8] for comparable gas turbines of similar size to those in Barbados is substantially better than the BL&P's average of 11.4%, if GT01 and GT02 are excluded from the analysis. However, the 2009 Operational Report of the Power Engineer

[8] http://www.eere.energy.gov/manufacturing/distributedenergy/pdfs/dg_operational_final_report.pdf

Journal of the IDGTE having surveyed 39 simple cycle gas turbines reported an average unavailability of 21%, a comparatively poorer performance than that recorded by the BL&P.

The relatively high unavailability values for the steam units underpin the BL&P's concern in making any changes to its operating regime. It is, however, noteworthy that, based on a 2009 survey there is a very large difference between the average values of 8% and the maximum unavailability figure of 44%. This indicates that there are a few units with very poor performance but these have not significantly impacted on the international comparative averages. The levels of unavailability of the BL&P's steam plant are probably as stated earlier due to the age of the units.

It must be cautioned that the operating conditions under which the benchmarked systems function may be dissimilar to the BL&P and therefore the information presented should be taken in context. For rational and fair comparisons to be made one must assess similar systems operating under similar conditions. Standalone island systems such as the BL&P's gas turbines operate in simple cycle with many stops and starts and would be expected to have higher unavailability rates than similar systems that are operated continuously. This is due to the stresses imposed during frequent start-up and the resulting greater maintenance requirements. Older plants will also tend to have higher unavailability rates. Preventative maintenance schedules, engine design and technology are all important factors in the realised availability of plant.

4.6 Improvement Opportunities

The following potential areas for improvement in operational efficiency have been identified:

- Improve maintenance planning and unit availability. This would lead to lower operational costs, thus lower electricity tariffs.
- Calculate the cost of fuel at each power station, by considering storage and transportation cost of each of them. This would lead to enhanced economic dispatch.
- Reduce cost of operation by shutting down steam units at night or at low load periods. This action would decrease operational costs but conversely has an implicit risk of potentially increased outages due to age and thermal cycling of plant.

<u>Question 7:</u> Do you have any comment on the BL&P's plant unavailability and dispatch procedure?

5. VERIFICATION AND REPORTING

5.1 Present Reporting to the FTC

Each month the BL&P publishes the value of the FCA in the local newspaper. Prior to this publication, the BL&P submits the monthly report on the FCA to the Commission (see Table 5.1) not for approval, but for information. The Commission reverts to the BL&P if any irregularities are found.

Table 5.1 - FCA Monthly Report to the FTC

Projected fuel cost for the month of April 2011 (BDS $' 000s)	35,048.9
Add under/(less over) recovered at March 31 2010 (BDS $' 000s)	1,664.1
Projected fuel cost to be recovered for the month of April 2011 (BDS $' 000s)	33,384.8
Projected sales - total (GWh)	76.249
Projected fuel clause adjustment April 2011 (cents/kWh)	49.3526

There is, however, a more comprehensive operational report which is submitted on a quarterly basis. This report is used to analyse the generation and transmission performance of the company and includes information on the following:

- Fuel over and under recovery;
- Cost of fuel consumed;
- Generation statistics;
- Fuel consumption and fuel stock data;
- Gas turbine use;
- Heat rates;
- Conversion factors;
- Transmission and distribution losses;
- Sales and revenue summary;
- Pilot programme information; and
- Outage Data.

In the BL&P's annual report which details its expenses and income, the fuel costs and fuel revenues (from the FCA) are provided. The Commission's review of these figures for the year ending 2011 showed that there is no profit to the Company from the fuel charge.

5.2 Proposal for Reporting to the FTC

The study proposed that the current reporting structure be adjusted. The following points detail step-by-step, the proposed process.:

i. The BL&P populates a simple spreadsheet with actual fuel cost and generation data of the previous month, which calculates the FCA to be applied in the current month. This information is then sent to the FTC.

ii. The FTC would check the information. The FTC approves the BL&P's calculation which is then immediately implemented.

iii. A copy of the spreadsheet will be placed on the FTC's website after completion, to ensure transparency to the public.

iv. The calculations and data are reviewed in more detail by the FTC on a quarterly basis.

Additionally it is proposed that heat rates will continue to be monitored quarterly by the FTC to ensure that the values remain acceptable. The FTC plans to require that the efficiency of each generating unit be reported on an annual basis.

<u>Question 8</u>: What are your views on the proposed reporting and should any additional information be supplied to the FTC?

<u>Question 9</u>: Is there any additional information, other than the FCA spreadsheet, that you wish be reported to the public?

<u>Question 10</u>: Which medium (newspaper, radio or website) would you prefer to be used to inform and educate the public about the FCA?

6. INCENTIVES

Dispatch optimisation and availability of generating plant are the two areas, directly impacting the FCA, over which the BL&P has control. These areas therefore lend themselves to the employment of incentive mechanisms to encourage best practice.

6.1 Dispatch Optimisation

As stated in section 4.4 a theoretical estimate of the potential reduction in fuel costs which might result from the operation of plant in strict merit order (i.e. increasing marginal cost) was made. It is emphasised that the values which were determined are estimates only, and would be dependent on changes in operating regime by the BL&P and in particular the company's confirmation that the steam plant could be reliably shut down overnight and restarted every day.

The Commission may consider the application of penalties as a means of encouraging optimal dispatch.

6.2 Availability of Generation Plant

The BL&P currently has little incentive for improvement of the availability rates of its generation plant.

The following three options may provide incentives to the BL&P in this regard:

i. Restrict the amount by which the BL&P may pass on the additional fuel costs associated with out-of-merit generation during outages if due to faulty maintenance or circumstances within the BL&P control;

ii. Set targets for availability values for the different plants and levy penalties if these are not met; or

iii. Provide financial incentives to the BL&P if availability figures are higher than target values.

These options would require, in the absence of justification acceptable to the Commission, the imposition of penalties on the BL&P.

<u>Question 11:</u> What are your views on the three proposed incentive methodologies for plant availability?

<u>Question 12</u>: Is there an alternative incentive method that you would wish to suggest?

<u>Question 13</u>: Do you consider a fixed or graduating penalty more appropriate?

7. CONSULTATION PROCESS

7.1 BACKGROUND

In carrying out its duties as an independent regulator, the Commission must operate in a transparent, accountable and non-discriminatory manner. Consultative documents and the public consultation process are the main ways in which the Commission discharges its responsibilities relating to transparency and accountability.

In addition, the Commission is specifically charged under the FTCA to consult with interested persons when it is discharging certain functions.

Section 4(4) of the FTCA states:

> *"The Commission shall, in performing its functions under subsection (3)(a), (b), (d) and (f)[9], consult with the service providers, representatives of consumer interest groups and other parties that have an interest in the matter before it."*

7.2 Consultative Documents

On important issues that arise in the regulation of the utility industries, the Commission may issue a consultative document, a public discussion paper, in which the Commission:

(a) brings to public attention important issues relating to utility regulation to promote public understanding and debate;

(b) puts forward options and/or proposals as to the approach to adopt in dealing with these issues; and

[9] Section 4(3) of the Act states:

The Commission shall, in the performance of its functions and in pursuance of the objectives set out in subsections (1) and (2):

(a) establish the principles for arriving at the rates to be charged by service providers;
(b) set the maximum rates to be charged by service providers;
(d) determine the standards of service applicable to service providers;
(f) carry out periodic review of the rates and principles for setting rates and standards of service of service providers.

(c) invites comments from interested parties, such as consumers, service providers, businesses, professionals and academics.

The issues at hand will influence the nature of the document and its content. On some issues, the Commission may simply set out what it regards as the available options and, although there would be some analysis of the pros and cons of the options, it might be that no single option emerges as the favoured or proposed approach. On other issues, the Commission may set out a clear preference for a particular approach and invite comments on this basis.

The views and analyses set out by the Commission in a consultative document are intended to invite comments which may assist the Commission in arriving at a decision.

The consultative document generally includes a series of questions on which the Commission is seeking comments. Respondents should reference the relevant question numbers in the document but may also address other aspects of the document for which the Commission has not prepared specific questions. Failure to provide answers to all questions will in no way reduce the consideration given to the response. Commercially sensitive material should be clearly marked as such and included in an annex to the response.

7.3 Responding to this Consultation Paper

The Commission invites and encourages written responses in the form of views or comments on the matters discussed in the Paper from all interested parties including the BL&P, other potential operators, government ministries, non-governmental organisations (NGOs), consumer representatives, residential consumers, businesses and, the academic community.

The Consultation period will begin on **October 8, 2012** and end on **November 16, 2012** at **4:00 p.m**. All written submissions should be submitted by this deadline. The Commission is under no obligation to consider comments received after **4:00 p.m.** on **November 16, 2012**.

This Consultation Paper may also be downloaded from the Commission's website at www.ftc.gov.bb.

Respondents to the Consultation Paper may submit responses to the Commission via the following processes:

i. Email: info@ftc.gov.bb

ii. Fax: (246) 424-0300 and

iii. Mailed or hand delivered to: The Chief Executive Officer, Fair Trading Commission, Good Hope, Green Hill, St. Michael.

7.4 Confidentiality

The Commission expects to receive views from a wide cross section of stakeholders and believes that views and comments received should be shared. Respondents are therefore asked to indicate whether they agree to their submission being placed on the Commission's website.

Respondents should also ensure that they indicate clearly to the Commission any response or part of a response that they consider to contain confidential or proprietary information as responses may be published in their entirety.

7.5 Analysis of Responses

The Commission expects, in most consultations, to receive a range of conflicting views. In such circumstances, it would be impossible for the Commission to agree with all respondents. Through its decisions/findings reports the Commission will seek to explain the basis for its judgments and where it deems appropriate give the reasons why it agrees with certain opinions and disagrees with others. Sometimes, analysis of new evidence presented to the Commission will cause it to modify its view. In the interests of transparency and accountability, the reasons for such modifications will be set out and, where the Commission disagrees with major responses or points that were commonly made, it will in most circumstances, explain why.

8. LIST OF QUESTIONS

Section 2.1

Question 1: Should the FCA be calculated on the basis of actual data or projections? Please indicate why.

Question 2: What are your views on the method currently used by the BL&P to set the fuel clause adjustment? Can you suggest an alternative method to determine the FCA?

Section 3.2

Question 3: Should the BL&P be allowed to continue its process of smoothing the FCA?

Question 4: Of the FCA application options presented, including the current method, what is your preference? Do you have any suggestions that you may wish the Commission to consider?

Question 5: What are your views on capping? Should it be applied and why?

Question 6: Would you prefer to receive a bill that fluctuates from month to month and is directly reflective of the cost of fuel or have a smoothing component that reduces the fluctuations in your bill?

Section 4

Question 7: Do you have any comment on the BL&P's unavailablity and dispatch procedure?

Section 5.2

Question 8: What are your views on the proposed reporting and should any additional information be reported to the FTC?

Question 9: Is there any additional information, other than the FCA spreadsheet, that you wish be reported to the public?

Question 10: Which medium (newspaper, radio or website) would you prefer to be used to inform and educate the public about the FCA?

Section 6.2

Question 11: What are your views on the three proposed incentive methodologies for plant availability?

Question 12: Is there an alternative incentive method that you would wish to suggest?

Question 13: Do you consider a fixed or graduating penalty more appropriate?

APPENDIX I

Consultant's Executive Summary of Review of Fuel Clause Adjustment Report

The main findings of the Consultant's report on the Review of the Method of Application of the Fuel Clause Adjustment of the Barbados Light & Power Company Limited are summarised below. The report was commissioned by the FTC to consider the current format of the FCA, in particular reviewing the equitability of the calculation, to recommend possible improvements, and to assess appropriate methods for incentivising the BL&P.

The main conclusions and recommendations of the report can be summarised as follows:

i. The BL&P has an excess of installed generation capacity relative to maximum demand larger than might normally be expected, though in view of the age of much of the plant it might be argued that such a margin is prudent;

ii. There is no evidence of any significant cumulative under or over recovery by the BL&P, when comparing the historic revenues collected on a monthly basis through the FCA, to the actual fuel costs which were incurred;

iii. Although the FCA is easy to calculate, its forward-looking approach makes it hard to audit. Estimations of future fuel prices as well as billing volumes are subjective - although the latter could have lower margin errors;

iv. It is recommended that the FCA be calculated using historic data for the month completed. This approach does not appear to introduce any additional volatility to the FCA values relative to the current approach;

v. The heat rates (efficiencies) of the BL&P generation plant are broadly within acceptable international levels for plant of similar technological type;

vi. There are potential fuel cost savings which might accrue from the dispatch of generating plant in increasing marginal cost of generation. In particular this would necessitate shutting down the steam units at the Spring Garden Power Station during the night, and making increased use of the lower costs diesel

engines. It is, however, recognised that this might impact on the availability of the steam units and it is therefore recommended that consideration be given to a trial operation for one steam unit, in the short term;

vii. The BL&P generating plant has higher levels of unavailability than is the norm for plants of similar types. This results in higher fuel costs, which are passed directly on to customers;

viii. The costs of fuel at each power station are calculated separately, resulting in differences in the cost of diesel oil between the three power stations. It is recommended that these costs be taken into consideration by the BL&P when determining the order in which the plants are dispatched;

ix. The present FCA reporting mechanism by the BL&P to the FTC is inadequate, and it is recommended that while done quarterly, a spreadsheet should also be sent to the FTC monthly. This will allow auditing by the FTC and the general public;

x. This monthly FCA reporting would be supplemented by annual auditing of overall costs. The auditing should also include a review of the efficiency of the BL&P dispatch and the availability of all plant;

xi. The optimal dispatch of generating plants should be incentivised through the use of penalties which increase over time, corresponding to a percentage of the additional costs which were incurred through inefficient dispatch. The introduction of this arrangement should be deferred for a period of perhaps one year to allow the BL&P to effect corrective actions and to investigate the operational flexibility of the steam units at the Spring Garden Power Station;

xii. The BL&P should be incentivised to improve availability values for generating plant, with a corresponding penalty for failure to meet agreed minimum values; and

xiii. Although the FTC and the BL&P have public relations programmes with regard to the FCA, these should be revised as their effectiveness appears to be limited. The aim of the new public relations exercise should be to educate the public as to the reasons why the FCA exists and what it covers.

APPENDIX 11

EXAMPLES OF FUEL COST RECOVERY METHODS IN OTHER JURISDICTIONS

In this section, three alternative means, used by different jurisdictions, through which the change in costs of fuel can be passed through to customers, are considered.

- Monthly Adjustments - Regulated Industries Commission (RIC), Trinidad & Tobago
- Six-month Reconciliation - Public Service Commission, Kentucky, U.S.A.
- Annual Reconciliation - Public Utilities Commission, Texas, U.S.A.

Monthly Adjustment of Fuel Charge

In this system, the fuel charge is set for each month based on a determined average but is adjusted monthly based on an increase or decrease in fuel cost. The Regulated Industries Commission in Trinidad regulates the fuel charge through this method.

This RIC applies to the following:

1. *The fuel charge is to be applied to all kilowatt-hours billed (including that associated with street lighting) in the month corresponding to that for which the charge was calculated.*

2. *The fuel charge revenue will be billed to customers in the month following that for which the charge was calculated and applied."*

In this jurisdiction no projected values for fuel adjustment are used. This method varies from that which was prescribed by the Public Utilities Board (PUB) in Barbados in the following ways:

1. The charge is applied to the month for which the charge has been calculated and is not carried forward as an over or under recovery or subtracted or added to costs for the following month.

2. The revenue from the charge is applied to customers in the following month, therefore reconciliation occurs monthly.

The advantage of this system is in its transparency, since the fuel clause adjustment is based on actual costs rather than projections, which can be erroneous.

The disadvantage lies in the fact that this method may lead to significant volatility in charges from month to month which may cause difficulties to customers and the utility.

Reconciliation after Six Months

In other jurisdictions a base cost of fuel is used and set for a period of six months after which customers are either granted a refund in the case of over collection or required to pay a surcharge in the case of under collection. Here is an example of how this system is applied by the Public Service Commission of Kentucky, USA.

Public Service Commission, Kentucky, U.S.A[10]

"Fuel Adjustment Clause

Section 1

The fuel clause shall provide for periodic adjustment per KWh of sales equal to the difference between the fuel costs per KWh and sale in the base period and in the current period according to the following formula.

$$\textit{Adjustment Factor} = \frac{F(m) - F(b)}{S(m) - S(b)}$$

"Where F is the expense of fossil fuel in the base (b) and current (m) periods and S is the kWh sale in the base (b) and current (m) months".

In this jurisdiction the charge is reviewed after six months, and the clause is evaluated every two years. The process which the Kentucky Public Service Commission uses to evaluate application of the clause is as follows:

[10] 807 Kentucky Administrative Regulations (KAP) 5:056. Fuel Adjustment Clause Kentucky Revised Statutes (KRS) 278.30.

At the time the fuel clause is initially filed, the utility is required to submit all relevant documents, inclusive of information on other options. Any changes in the documents including price escalations, or any new agreements entered into after the initial submission, must be submitted at the time they are entered into. Fuel charges which are unreasonable shall be disallowed and may result in the suspension of the fuel adjustment clause. The Commission on its own motion may investigate any aspect of fuel purchasing activities covered by this administrative regulation.

This method will result in increased regulatory costs due to the frequency of hearings.

One-Year Reconciliation

The Public Utility Commission in Texas allows the utility to set a fuel charge which is based on one-year projections of the cost of fuel. The fuel charge for the year is based on predicted costs and revenues. If the projections used lead to an over recovery at the end of the year, the company is required to pay a fuel refund to the customer, if the projection leads to under recovery customers are required to pay a fuel surcharge. The utilities are allowed to apply for a change in the charge twice per year if there are significant deviations from projections.

This system is ideal if the projections are accurate and the level of refund or surcharge is not substantial, as this fuel charge does not show a monthly variation. If the over or under recovery is large this may lead to the company or consumers being disadvantaged over a sustained period before reconciliation at the end of the year.