Office of Utilities Regulation

Investigation into Jamaica Public Service Company Limited's 2024 July Fuel Rate

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Abbreviations and Definitions

ADO	Automotive Diesel Oil
CCGT	Combined Cycle Gas Turbine
CF	Capacity Factor
CHP	Combine Heat and Power
COS	Cost of Service
DER	Distributed Energy Resources
FCAM	Fuel Cost Adjustment Mechanism
FOR	Forced Outage Rate
GCT	General Consumption Tax
GSA	Gas Sales Agreement
HB	Hunts Bay
HFO	Heavy Fuel Oil
HHV	Higher Heating Value
IPP	Independent Power Producer
LNG	Liquefied Natural Gas
KJ	Kilo-Joule
MMBTU	Million British Thermal Unit
MW	Megawatt
MWh	Megawatt-hour
JMD	Jamaican Dollar
JEP	Jamaica Energy Partners
JPPC	Jamaica Private Power Company
JPS	Jamaica Public Service Company Limited
LHV	Lower Heating Value
NEO	Net Energy Output
NFE	New Fortress Energy
NSPHL	NFE South Power Holdings Limited
NSPTL	NFE South Power Trading Limited
NG	Natural Gas
NWC	National Water Commission
OCGT	Open Cycle Gas Turbine
OH	Old Harbour
O&M	Operations and Maintenance
OUR	Office of Utilities Regulation
PCR	Plant Capability Report
PPA	Power Purchase Agreement
SCT	Special Consumption Tax
SB	Single Buyer
SO	System Operator
RE	Renewable Energy
RF	Rockfort
SJPC	South Jamaica Power Company
T&D	Transmission and Distribution
USD	United States Dollar
VC	Variable Cost
VOM	Variable O&M
WKPP	West Kingston Power Partners

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Executive Summary

1.0 Introduction

In 2024 August, one month after Hurricane Beryl wreaked havoc on the electricity grid, customers saw significant increases in their electricity bills. The bill of the average residential customer with a monthly consumption of 150 kWh jumped by 15.6% between 2024 July and August. Consequent to this, the Office of Utilities Regulation (OUR) found it necessary to investigate the Jamaica Public Service Company's (JPS's) billing computation to determine the accuracy and validity of the rates it applied to its bills in 2024 August. This report summarizes the outcome of the OUR's analyses.

2.0 The Billing Components That Changed

By examining the components of customer bills that changed between July and August, the three factors identified were the: (1) billing foreign exchange rate; (2) non-fuel IPP rate, and (3) fuel rate. Together they accounted for the overall 15.6% change that occurred. However, the billing foreign exchange rate and the non-fuel IPP rate increased by 1.0% and 3.4% respectively. Consequently, these two factors combined accounted for less than 1 percentage point of the 15.6% increase experienced by customers. In this regard, they were not deemed to be significant contributors to the overall increase. In contrast, the fuel rate accounted for more than 14.6 percentage points of the overall increase, and therefore warranted deeper scrutiny.

Table 1: Factors that changed on Bill

Factors	Unit	2024 July	2024 August	Change
Billing Fx Rate	J$/$US	156.00	157.53	1.0%
IPP Charge	J$/kWh	11.63	12.02	3.4%
Fuel Rate	J$/kWh	24.336	32.172	32.2%
Total Bill (150kWh)	**J$**	**8,035.85**	**9,290.65**	**15.6%**

3.0 The Fuel Rate Analysis

From the outset, it should be recognized that the fuel rate is the ratio of total (JPS & IPP) fuel cost to the energy sold (in kWh). Consequently, if there is an increase in fuel cost, all other things being equal, the fuel rate will increase. Likewise, if there is a reduction in energy sales, all other things being equal, the fuel rate will increase. In the month of 2024 July both occurred, and this amplified the impact of the fuel rate increase.

It is also worth noting that included in the total fuel cost applied in the fuel rate is what is called a 'volumetric adjustment'. Fuel costs after efficiency adjustment are fully passed through to customers. However, they are calculated in one month and recovered in the sales billed the following month. In the event of an over or under-recovery of fuel costs, then it is reconciled by way of the volumetric adjustment the following month.

The OUR's analysis indicates that the increase in fuel rate in 2024 August is primarily attributable to three factors:

1. Reduction in the supply of and the demand for electricity in 2024 July.
2. Net increase in the overall cost of fuel from various sources in 2024 July.
3. Significant fuel volumetric adjustment.

3.1 Supply and Demand Reduction

In the hours leading up to the advent of the hurricane on July 3, the utility and independent power producers would have been forced as a precautionary measure to protect (this requires an explanation) their staff and secure their equipment, to severely reduce the available generation capacity by taking several plants off the grid. Among other things, this involved the removal of the natural gas facility supplying the largest base load generating plants, as well as the curtailment of energy from renewable generation plants. These actions led to a reliance on the backup fuel, automotive diesel oil (ADO). JPS was also forced to increase the operation of the less efficient and more expensive ADO gas turbine peaking units. Additionally, after the hurricane had passed, the damage to critical sections of the transmission and distribution grid, as well as to residences and businesses restricted demand. The effect of the hurricane on net generation and sales is summarized below:

- **Net Generation**: The supply of electricity reflected in net generation was down 13.73% in 2024 July relative to June's output.
- **Sales**: Electricity sales fell by 13.27% during the same period.
- **Impact on Fuel Rate**: The fixed costs of natural gas were spread over fewer units of electricity sold, leading to an increase in the fuel fixed cost per unit of sales.

3.2 Net Increase in the Unit Cost of Fuel

Operating the system under hurricane conditions, of necessity, led to suboptimal generation which translated to an increase in the cost of fuel per kWh sold because of the fixed component of fuel cost.

It is also important to note that ahead of the hurricane, JPS had sought and obtained tax relief on ADO which would be used at higher volumes, as natural gas would be unavailable for some time after the event.

Further, conditions during and immediately after the hurricane did not allow for energy generation from renewable sources, such as solar and wind plants. Consequently, renewable energy generation had to be replaced by fossil fuel-based energy production. The effect of the hurricane on the unit cost of sales is summarized below:

- **Heavy Fuel Oil (HFO)**: Has increased by 4.5%. This contributed 21.81% to the Fuel Rate increase.
- **Automotive Diesel Oil (ADO)**: Prices have decreased by 20.58% due to the removal of the Special Consumption Tax (SCT), but the increased usage of ADO due to the impact of the hurricane still led to higher costs. This contributed 24.5% to the Fuel Rate increase.
- **Natural Gas**: Price has increased by 7.19%. This increase contributed 26.26% to the Fuel Rate increase.
- **Renewable energy generation**: Output from renewable sources decreased by 53.36% from 2024 June to July, increasing reliance on more expensive thermal generation.
- **Impact on Fuel Rate**: The combined effect of the increase in the cost of fuel has translated to a higher fuel rate.

3.3 Volumetric Adjustment

Arising from the reduction in sales during July, there was a significant under-recovery of fuel costs in that month. This triggered a relatively large volumetric adjustment during the August billing period which increased the fuel rate. The result was:

- Volumetric adjustment increased by 129.86%, contributing 27.43% to the fuel rate increase.

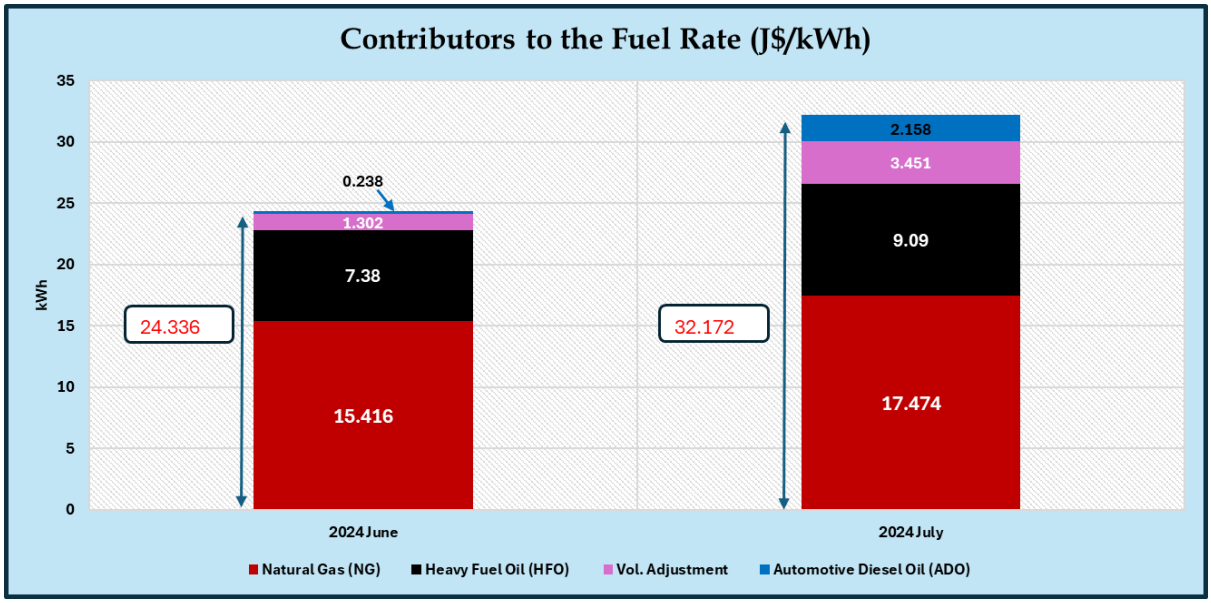
3.4 Contributors to the Fuel Rate Increase

The fuel rate in the August bills increased by $7.837 per kWh over the previous month's bill. The increase may be explained by four factors, the three fossil fuel sources of generation and volumetric adjustment (see Table 2 below). All factors contributed in excess of one-fifth of the increase, with volumetric adjustment accounting for the highest, 27.43%.

Table 2: Fuel Source Contributors the to Fuel Rate Increase

Source	Contribution	
	$/kWh	%
HFO	1.709	21.81
ADO	1.920	24.50
NG	2.058	26.26
Volumetric Adjustment	2.150	27.43
Total	**7.837**	**100.00**

Figure 1: Contributors to Fuel Rate (J$/kWh) -2024 June & July



4.0 Lessons Learned

Despite the inconvenience of some customers being without electricity for extended periods, there are some aspects of the response to the hurricane threat that the industry got right. This included JPS's tactical curtailment of electricity supply and its request to the Ministry of Finance and the Public Service

for an ADO tax exemption before the event. The increase in electricity price would have been higher without the latter intervention.

However, other areas could have been handled better. The OUR had previously communicated to JPS that it regarded overall increases in rates above 5% to constitute a bill shock. There was precedence for consultation between JPS and the OUR regarding the pass-through of significant and unexpected rate increases to avert bill shock. Unfortunately, this was not observed with respect to the July bill even though it is clear that JPS' application for a waiver of the tax on ADO indicated that it appreciated that a bill shock was imminent.

The curtailment in supply and the fall off in demand in 2024 July, inevitably resulted in a significant volumetric adjustment for 2024 August that was quite predictable. That adjustment represents a legitimate cost recoverable by JPS, but which as in a previous instance after consultation with the OUR, could have been collected over time to minimize the price effect on customers. It bears underscoring, therefore, that going forward, both the JPS and the OUR in consultation will need to be more vigilant to avert the kind of bill shock that can take place resulting from both the disruption to generation configuration and consumption caused by an event such as Hurricane Beryl.

The passage of Hurricane Beryl has highlighted the need for enhanced resilience in Jamaica's electricity sector. Other key lessons include:

- **Improved Preparedness**: The importance of pre-emptive measures to protect infrastructure and ensure rapid recovery.
- **Diversification of Energy Sources**: The need to reduce reliance on any single fuel type in the generation mix.
- **Enhanced Communication**: The need for better communication with consumers regarding the reasons for bill increases and the measures being taken to mitigate future impacts.

The OUR remains committed to ensuring transparency and fairness in the electricity sector and will continue to work with all stakeholders to address the challenges and improve the resilience of Jamaica's electricity supply system.

I. INTRODUCTION

Background

The month of 2024 July proved to be particularly challenging for Jamaica's energy sector as the country faced its first hurricane of the season. Hurricane Beryl, which passed in close proximity to Jamaica on 2024 July 3, resulted in widespread disruptions to the electricity supply across the island, significantly impacting Jamaica Public Service Company Limited's (JPS) ability to meet the demand of its customer base.

According to data submitted by JPS to the OUR, the System generation capacity plummeted during the hurricane, with available capacity dropping to less than 100MW—approximately one-eighth of its normal operating capacity of over 800 MW.

The recovery process was slow, and it was not until mid- July, that JPS's generation system began showing signs of stabilization. Full restoration of electricity supply to all customers was not achieved until the end of 2024 August. Many customers, especially those in the southern St. Elizabeth region, were without power for extended periods.

Despite the operational challenges and supply disruptions, for the 2024 August billing cycle, customers received a substantial increase in their electricity bills compared to the previous billing period. This sharp rise in electricity bills, following the service disruptions, sparked widespread public concern and dissatisfaction, with many questioning the justification for the increase.

In light of the public concerns, the OUR launched an investigation to assess the circumstances surrounding the reported increase in electricity bills for the 2024 August billing cycle.

Purpose

This report provides a summary of the findings from the investigation into the JPS 2024 July Fuel Rate.

The aim of the investigation was to:

1. Check the accuracy of input data and parameters used in 2024 July fuel rate calculations.
2. Ascertain what were the driving factors contributing to the high increase in customers' bills for the 2024 August billing period over the previous billing period.
3. Ascertain whether JPS' Fuel Rate Calculation for 2024 July is in conformance with the approved Fuel Cost Adjustment Mechanism (FCAM).
4. Determine whether the Merit Order ranking and generation dispatch process followed the requirements of the legal and regulatory framework.
5. Validate whether JPS had applied the Special Consumption Tax (SCT) concessionary rate to the Automotive Diesel Oil (ADO) fuel cost charged for 2024 July.

The report identifies the following critical areas of focus:

- The operational challenges and inefficiencies stemming from Hurricane Beryl, which forced JPS to rely on less efficient peaking units which more expensive fuels Automotive Diesel Oil (ADO).
- The main drivers behind the increased Fuel Rate of J$32.172/kWh applied by JPS for the 2024 August billing period.

Report Structure

This report comprises six (6) sections, including this Introduction.

- Section 2: Outlines the Licence requirements relating to JPS' fuel rates.
- Section 3: Describes the prescribed Fuel Cost Adjustment Mechanism (FCAM).
- Section 4: Covers Summary of Events as Reported by JPS.
- Section 5: Observations and Findings
- Section 6: Conclusion

II. LICENCE REQUIREMENTS – FUEL RATES

The provisions of JPS's Licence 2026 (hereafter referred to as "the Licence"), that are relevant to the investigation are outline below.

Paragraphs 1-5 of Schedule 3 of the Licence state:

> *"1. The rates shall be charged to customers in accordance with rate classes approved by the Office,*
>
> *2. The rates are comprised of the following:*
> *a. Non-fuel rate; and*
> *b. Fuel rate.*
>
> *3.* ***The fuel rate shall be adjusted by the Office monthly in accordance with the Fuel Cost Adjustment Mechanism,***
>
> *4. The non-fuel rate shall be reviewed by the Office:*
> *a. In rate reviews that are customarily done every five years*
> *b. In extra-ordinary rate reviews which may be conducted in between rate reviews; and*
> *c. Annually under the Performance Based Rate-making Mechanism adjustment.*
>
> *5.* ***All rates shall be determined by the Office.****"*

The provisions of the Licence addressing the FCAM are outlined at Paragraph 57 and 58 and Exhibit 2 of Schedule 3. The provisions applicable to the H-Factor are set out at Paragraph 37, 39, 40 and 46(b) of schedule 3.

III. FUEL COST ADJUSTMENT AND RECOVERY MECHANISM

A significant portion of JPS' operating expenses includes the cost of fuel consumed by JPS and independent power producers (IPPs) plants in the production of electricity supplied to the grid. The total fuel cost incurred for the system each month is largely dependent on the following factors:

- The price of fuel (NG, ADO, HFO) consumed in JPS and IPPs generating plants;
- The conversion efficiencies (Heat Rates) of JPS and IPPs generating plants;
- The total net generation (MWh) for the applicable month;
- The energy supply mix and the proportion of net generation (MWh) supplied by each generating plant utilized in the electricity production process; and
- The generation "Merit Order" and the efficacy of the generation dispatch process.

The system fuel cost in each month is therefore likely to change whenever one or more of the above factors are altered.

Determination of Monthly Fuel Rates

Subject to the relevant regulatory requirements, the fuel rate for a given month should reflect the prudently incurred costs of fuel used for the production of electricity required to meet system energy demand during that period. In accordance with this condition, the recovery of "allowable" monthly system fuel costs, is dependent on the fuel rates (J$/kWh) derived from the approved FCAM.

Approved FCAM

As set out in the Jamaica Public Service Company Limited Rate Review 2019-2024 Determination Notice ("the 2019-2024 Determination Notice"), the FCAM defined as "Alternative 1" of Exhibit 2, Schedule 3 of the Licence, is the approved methodology to be applied over the 2019-2024 regulatory period. This methodology will be applicable up until the 2024-2029 Determination Notice become effective and can be represented mathematically as shown in the formula below.

$$\boldsymbol{AFC = IPP\ Fuel\ Cost + (JPS\ Fuel\ Cost \times HFactor) + NG\ Infra\ Fixed\ Demand\ and\ GOJ\ Charges}$$

Fuel Rate Calculation Data Inputs

According to Schedule 3 (Exhibit 2) of the Licence, the applicable fuel rate (J$/kWh) each month (net of efficiencies) shall be calculated on the basis of the total fuel computed (inclusive of fuel additives) to have been consumed in JPS' and the IPPs' generation plants in the production of electricity. The specific inputs/parameters used in computing the monthly fuel rates are described in Table 3.1 below.

Table 3.1: Definition of Inputs used in Monthly Fuel Rate Calculation

FUEL RATE CALCULATION KEY INPUTS

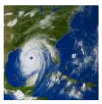
Components	Description	Remarks
Net Generation (MWh)	The measured net electricity generation (JPS & IPP) for the applicable month.	Subject to merit order & generation dispatch
Electricity Sales (MWh)	Normalized electricity sales for the applicable month.	
System Fuel Cost (J$)	The total cost of fuel consumed in JPS' and IPPs' plants for electricity production during the applicable month, plus the fixed cost associated with the natural gas infrastructure that supplies Bogue, SJPC, and NFE 94MW CHP power generating unit facilities.	Influenced by international fuel markets/prices.
Total Energy Cost (J$)	The total applicable energy cost for the period in accordance with Exhibit 2 of the Electricity Licence 2016.	
Heat Rate - actual (kJ/kWh)	Heat rate performance of JPS' thermal plants utilized during the applicable month.	
Heat Rate Target (kJ/kWh)	The target set by the OUR for-efficiency adjustment of JPS' thermal generating units fuel costs, which is applied via the H-Factor in the FCAM.	
Billing Exchange Rate	The JMD/USD exchange rate ("FX Rate") used for converting fuel cost/charges between currencies.	

IV. SUMMARY OF EVENTS AS REPORTED BY JPS – CONCERNING SYSTEM OPERATIONS DURING 2024 JULY

Generation Operations

The passage of Hurricane Beryl on 2024 July 3, severely disrupted the island's generation supply, resulting in significant operational challenges across the electricity generation system. Below is a summary of the key events and factors that impacted the generation fleet.

- Preparation July 1-2
- Natural Gas Supply disruption
- SJPC derated to 172MW on ADO
- NFE-94MW became unavailabe
- Hunt Bay GT#10 and GT#5 were dispatched higher than normal
- Most Renewable Plants became unavalable
- Available Capacity: 700 MW



- During July 3-4
- Only Hunts bay GT#10, JPPC, WKPP and Rockfort plants were available
- Available Capacity: 195 MW

- After July 5-31
- Natural Gas Supply restored
- NFE 94MW came back online
- Bogue GTs operated in Simple cycle mode
- Available : 820 MW

A total of 405.7MW (39%) of installed generating capacity was pre-emptively taken offline across the system to safeguard assets and personnel, significantly affecting grid stability and supply.

Precautionary Measures on Generation Operations (2024 July 1–2)

JPS took precautionary actions taken ahead of Hurricane Beryl's passing. These actions included the unavailability of the 94MW NFE CHP plant on July 1 and the derating of SJPC to 172MW due to natural gas unavailability, which had notable effects on JPS's generation operations. These includes.

1. Increased Reliance on Peaking Units
    - Gas turbine (GT) peaking units at Hunts Bay, fired with automotive diesel oil (ADO), were heavily utilized to meet peak loads of up to 645.2MW. This was achieved with approximately 700MW of available firm capacity, of which 133.5MW came from peaking units, some of which were also needed for spinning reserve duties.
2. Deterioration in JPS's Thermal Efficiency
    - For the July 1-2 period, JPS recorded a thermal heat rate of approximately 11,269 kJ/kWh, representing a significant deterioration from the 9,184kJ/kWh recorded in 2024 June.

According to JPS these precautionary measures ensured grid stability but came at the cost of increased operational inefficiency and higher reliance on less efficient and more expensive generating units.

System Operations and Disturbances During Hurricane Beryl (2024 July 3)

The passage of Hurricane Beryl caused significant grid disruptions, including voltage surges, reduced load demand, and the eventual separation of the grid into two electrical islands; Easter and Western operations. Below is an indication of some of what transpired.

1. Western Electrical Island Operations
    - Generating units at Bogue Power Station, including GTs 3, 9, 11, and the Bogue CCGT plant, initially supplied power to the western island.
    - Severe weather-induced grid faults and surges eventually tripped all units offline, disrupting supply.
2. Eastern Electrical Island Operations
    - Power supply was initially provided by units at Hunts Bay (GT5 and GT10), Rockfort (RF1 and RF2), West Kingston Power Partners (WKPP), and Jamaica Private Power Company (JPPC).
    - This supply energized sections of St. Catherine, Kingston, St. Andrew, and St. Thomas, while the western electrical island remained offline.
3. Operational Challenges and Inefficiencies
    - Low demand and grid instability forced the Bogue CCGT plant to operate at reduced capacity factors, dropping from 53% before sunrise to just 12% during the day.
    - To avoid breaching the plant's minimum loading requirements, the steam turbine unit (ST14) of CCGT was taken offline.
4. Increased Use of Costly Units
    - Expensive, less efficient generating units were heavily utilized to maintain supply for as long as possible amidst worsening grid conditions.

Ultimately, the worsening instability on the western electrical island led to all running units at Bogue tripping offline, highlighting the severe operational challenges posed by Hurricane Beryl.

System Operations (2024 July 4–9,) Post-Hurricane Beryl

After the passage of Hurricane Beryl, JPS implemented strategic operational measures to stabilize the grid and gradually restore electricity supply to affected areas.

Eastern Electrical Island (July 4–5)

High Utilization of Eastern Units.

- Hunts Bay GT units operated at high-capacity factors, exceeding 30% on July 4 and 5, to meet growing demand and ensure grid stability.

- Rockfort units increased utilization from ~66% on July 3 to an average of 81% from July 4 to July 8, reflecting their critical role in maintaining supply.

Western Electrical Island Restoration (July 4–8)

Severe weather conditions left the western grid isolated and without power. Recovery efforts focused on restoring key facilities.

1. Black-Start Operations
    - On the evening of July 4, GT3 was black-started to provide auxiliary power to Bogue Power Station.
    - GT9 followed, restoring supply to two feeders serving Sangster International Airport and Cornwall Regional Hospital, marking the reactivation of the northern electrical island.
2. Unit Operations
    - GT13 was brought online on July 5 at 9:13 PM, and GT12 followed on July 6 at 11:38 AM. However, they operated predominantly in simple-cycle mode due to challenges such as:
        i. The offline status of ST14 due to boiler water contamination and auxiliary power loss.
        ii. The need for barring and restoration of ST14 after extended downtime.
    - These units, along with GT3, GT9, and GT11, supplied all power from Bogue Power Station.

Synchronization and System Constraints (July 5–9)

By the night of July 5, the eastern and western electrical islands were synchronized via the Tredegar-Bellevue 138kV transmission line. Sub-optimal dispatching was necessary to reduce loading on this critical line, as any trip could lead to re-islanding or a total grid shutdown. To mitigate risks, all units at Bogue operated at elevated utilization levels to maintain stability and prevent disruptions.

OUR View

In summary, between July 4 and 9, it is evident that JPS implemented intricate recovery strategies under exceptionally challenging circumstances. The utility operator effectively leveraged gas turbines, particularly at Bogue and Hunts Bay, and increased dispatch of Rockfort units to meet critical load demands while working to restore and synchronize the grid.

While these actions successfully maintained system stability and supported recovery efforts, there are concerns regarding the associated operational inefficiencies. The reliance on gas turbines operating in simple-cycle mode, combined with the extensive use of peaking units, has implications for increasing generation costs during this period. This highlights the need for strategies that balances grid resilience with cost-effectiveness in emergency situations.

V. KEY OBSERVATIONS AND FINDINGS

Main Drivers of Electricity Cost Increase during the 2024 August Billig Cycle

Hurricane Beryl's Impact:

The passage of Hurricane Beryl on 2024 July 3, had a devastating impact on Jamaica's electricity infrastructure, causing widespread outages and operational challenges.

a) Severe Grid Disruptions

- **Pre-emptive Measures**: Approximately **405.7 MW**, or **39% of the total installed generation capacity**, was proactively taken offline to protect equipment and ensure personnel safety during the hurricane. This included all renewable energy plants and key thermal generation units, leaving the grid heavily constrained to meet customer's electricity demand.
- **System Separation**: The grid was forced to separate into two electrical islands (Eastern and Western), exacerbating the challenges in maintaining stability and efficient operations.

b) Reliance on Costlier Peaking Units

- **Unavailable of Baseload Generation**: Critical facilities such as the 94MW NFE CHP were offline for nearly a week due to the unavailability of natural gas. The SJPC plant was derated from 194MW to 172MW, as it operated on its backup fuel, Automotive Diesel Oil (ADO), which is costlier and less efficient.
- **Gas Turbines as Emergency Backup**: To stabilize the grid, JPS relied heavily on peaking units such as those at Hunts Bay and Bogue. These gas turbines, designed for short-term operation, ran extensively on ADO, leading to elevated generation costs. For example, Hunts Bay GT units operated at utilization rates exceeding 30% during critical recovery days.

c) Inefficient Fuel Utilization

- **Thermal Efficiency Decline**: JPS thermal unit heat rate, a measure of fuel efficiency, worsened significantly to **9,900 kJ/kWh** in July, up from **9,184 kJ/kWh** in June. This decline was largely due to the heavy reliance on less efficient units and reduced contributions from high-efficiency plants like the 190MW SJPC CCGT.
- **Cost Implications**: This deterioration in fuel utilization efficiency compounded the already high fuel costs, driving up the overall cost of electricity production during the period.

d) Renewable Plants Unavailability

- All renewable plants (187.7 MW installed capacity), including JPS's hydro units, were taken offline before the hurricane. As part of the Disaster Management Plan, this was done to prevent equipment damage and ensure personnel safety. Most of these pants came back online in the latter part of the month due to transmission system outage and other operational challenges.

In summary, Hurricane Beryl's impact created a cascading series of operational challenges, forcing JPS to depend on costly, inefficient generation methods that substantially increased system costs.

Fuel Rate Escalation

a) Substantial Increase

The monthly Fuel Rate was computed using the formula below.

$$Fuel\ Rate\ (J\$/kWh) = \frac{Total\ Energy\ Cost\ (J\$)}{Electricity\ Sales\ (kWh)}$$

Table 5.1: Cost items which contributed to the fuel rate for 2024 June and July.

Items that Constitute the Monthly Fuel Rate							
	2024 June			2024 July			
Cost Items	**(J$M)**	**Electricity Sales (MWh)**	**Contribution to the Fuel Rate (J$/kWh)**	**(J$M)**	**Electricity Sales (MWh)**	**Contribution to the Fuel Rate (J$/kWh)**	**Change (%)**
Total Energy Cost	**7,078.308**	**290,861**	**24.336**	**8,115.472**	**252,254**	**32.172**	**32.20**
Allowed fuel cost	6,699.561	290,861	23.034	7,244.891	252,254	28.721	24.69
*JPS fuel Cost	1,438.684	290,861	4.946	1,753.098	252,254	6.950	40.50
IPP Fuel expense	5,050.414	290,861	17.364	5,182.585	252,254	20.545	18.32
JPS NG fix cost	210.463	290,861	0.724	309.208	252,254	1.226	69.40
Vol. Adjustment	378.746	290,861	1.302	870.581	252,254	3.451	165.04

**This represents the product of JPS Fuel Cost (including all adjustments from previous month) and the applicable H-factor.*

The Total Energy Cost, which forms the basis for the fuel rate calculation, represents the sum of two key components:

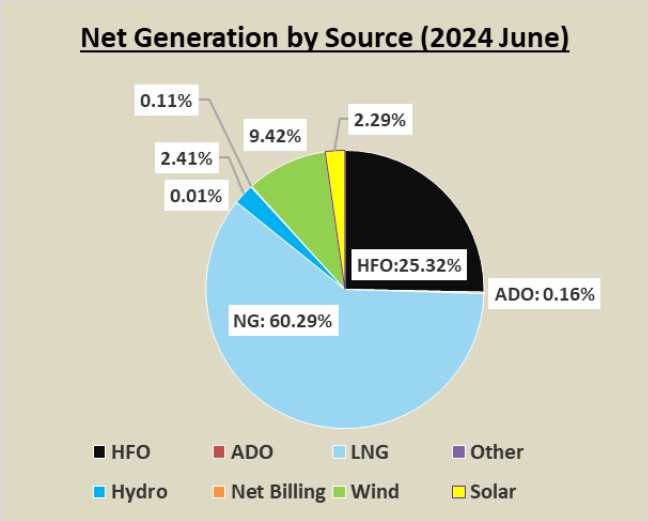
1. **Allowed Fuel Cost (AFC)**: This is determined by applying the H-factor to the JPS's fuel cost and aggregating it with the IPP fuel expenses and JPS's Bogue NG infrastructure fixed demand and government charges.
2. **Volumetric Adjustment**: This accounts for the differences between the expected billed fuel revenue and the actual revenue billed by JPS.

As shown in Table 5.1, the fuel rate registered a significant spike, increasing by **32.20%**, from **J$24.335/kWh** in 2024 June to **J$32.172/kWh** in 2024 July. The increase in the fuel rate reflects the heightened costs of electricity generation under challenging operational conditions during 2024 July. Given the relationship outlined in the fuel rate formula above, if electricity sales in 2024 July had been equivalent to those recorded in 2024 June, the Fuel Rate, which stood at J$32.172/kWh, would have been reduced to approximately J$27.902/kWh.

b) Key Contributors to the Spike in the Fuel Rate

- **Higher System Fuel Costs**:
  The reliance on inefficient and high-cost generation units, such as gas turbines operating on ADO, significantly inflated system fuel expenses. These units were dispatched out of necessity to stabilize the grid following the widespread disruptions caused by Hurricane Beryl.

Figure 5.1: Shows the Generation by fuel source for 2024 June and July.



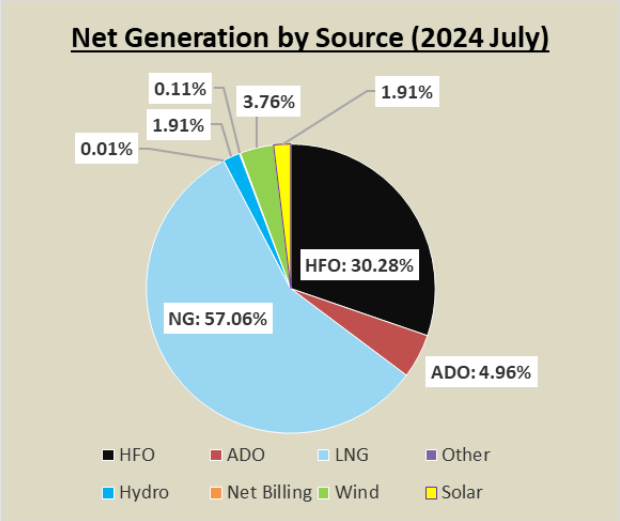


Table 5.2: Shows the Generation by fuel source for 2024 June and July.

Month	Generation by Source (%)							
	HFO	ADO	LNG	Other	Hydro	Net Billing	Wind	Solar
2024 June	25.32%	0.16%	60.29%	0.01%	2.41%	0.11%	9.42%	2.29%
2024 July	30.28%	4.96%	57.06%	0.01%	1.91%	0.11%	3.76%	1.91%

- **Natural Gas Infrastructure Charges**:
  JPS NG Fixed Cost: The government charges and the fixed demand charges associated with the natural gas (NG) infrastructure in Montego Bay, increased by **46.92%** in July compared to June. This rise is attributable to:

  i. a depreciation in the foreign exchange rate;
  ii. an increase in the government charges due to an increase in NG prices, which directly affected the overall cost of delivered volumes since most government charges are calculated as a percentage of these costs; and
  iii. an increase in the demand charges as a result of an additional week's charge (five (5) weekly charges in 2024 July compared to four (4) in 2024 June).

Table 5.3: JPS NG Infrastructure and Government charges for 2024 June and July.

JPS NG Infrastructure and Government charges			
Main cost Items	**2024 June**	**2024 July**	**Change (%)**
Total NG Infrastructure Fixed Demand & GOJ Charges ($JM)	**210.463**	**309.208**	**46.92**
Demand Charges (J$M)	187.556	236.293	25.99
*Demand Charges (US$)	1,200,000	1,500,000	25
FX (J$/US$)	156.2963	157.5285	0.79
Government Charges (J$M)	62.579	72.915	16.52

**The demand is a fixed weekly charge of USD 300,000.*

IPP relate NG Infrastructure Cost: A significant portion of the fuel expense for the SJPC and NFE-94MW plants—approximately 70%—is governed by a fixed cost arrangement under their GSA, regardless of the plants' actual utilization. However, there is a segment which varies based on the number of days within the recovery period. This contractual condition ensures that a baseline cost remains fairly constant, irrespective of fluctuations in operations. Therefore, the additional day in July, in comparison to June contributed to an increase in this component.

- **Operational Inefficiencies**:
  JPS thermal heat rate deterioration (from 9,184 kJ/kWh in 2024 June to 9,900 kJ/kWh in July) is a valid indication that there was an increase in the cost of fuel required for electricity production. This inefficiency further drove up the total energy cost used to determine the monthly fuel rate.

- **Volumetric Adjustments**
  This adjustment is a mechanism which is used to balance prior under/over-recoveries in fuel revenue. The adjustment for 2024 July, increased by approximately 129.86% compared to June. This suggests that JPS' actual fuel cost recovery fell significantly short of projections, as customers faced financial constraints during the post-Hurricane Beryl recovery period.

Breakdown of Cost:

Total Energy Cost Breakdown:

- **Allowed Fuel Cost (AFC):** The AFC for 2024 July, which aggregates JPS's efficiency adjusted, and IPP fuel costs along with fixed natural gas infrastructure charges associated with the natural gas (NG) infrastructure in Montego Bay, reached J$7.245billion.

  - JPS' share of this cost exceeded J$1.833 billion, reflecting the heavy reliance on its thermal units. After it is adjusted by the H-factor becomes a little over J$1.753 billion. This accounts for approximately 21.60% of the applied Fuel Rate, or J$6.950/kWh.

    JPS Fuel Cost

    - 31.35% Increase: JPS's fuel costs rose sharply in July due to the extensive use of peaking units at facilities like Hunts Bay and Bogue. These units operate on ADO, a high-cost fuel with lower efficiency compared to natural gas.
    - Impact of Heat Rate Decline: JPS thermal heat rate, a measure of fuel efficiency, deteriorated to 9,900 kJ/kWh in 2024 July, a marked increase from the 9,184 kJ/kWh recorded in 2024 June. This decline in efficiency directly translated to higher fuel consumption and costs.

Table 5.4: JPS Fuel Cost for 2024 June and July.

JPS Fuel Cost

Cost Items	2024 June	2024 July	Change (%)
JPS's Efficiency Adjusted Fuel Cost (J$M)	**1,438.684**	**1,753.098**	**21.85**
Total JPS Thermal Units Fuel Cost (J$M)	1,395.206	1,832.641	31.35
H-Factor	1.031	0.957	-

- IPPs allocation to this cost was significant, with their fuel expense forming the bulk of the system cost at J$5.183 billion. This accounts for approximately 63.86% of the applied Fuel Rate, or J$20.545/kWh.The monthly fuel expense for IPPs is determined based on a combination of the estimated fuel expense for the current month and adjustments made to reconcile the previous month's estimated and actual fuel expenses.

IPP Fuel Expense

- 2.62% Increase: IPP fuel expenses showed a smaller but notable rise in 2024 July, primarily reflecting the fixed portion of the costs associated with the based load plants and the unique operational factors. The main drivers behind this increase were largely tied to;
  - Increased fuel prices (See Appendix)
  - Increased fuel consumption due to increased electricity generation.
  - Fuel cost adjustments from previous month.
  - The use of ADO in base load power plants.
  - Unique operational and contractual factors.

Table 5.5: IPP Fuel Expense for 2024 June and July.

IPP FUEL EXPENSE (J$M)			
Plants	**2024 June**	**2024 July**	**Change (%)**
SJPC	1,842.41	2,062.10	11.92
NFE 94MW	1,437.64	1,212.86	-15.64
WKPP	769.10	845.88	9.98
JPPC	516.63	575.52	11.40
JEP	384.29	411.02	6.96
CB – Hill Run	100.34	75.21	-25.04
Total	**5,050.41**	**5,182.52**	**2.62**

- The JPS NG Fixed infrastructure and government charges accounted for a little over J$0.309 billion, an increase of approximately 46.92% when compared to 2024 June. (See Table 5.3)
  - Despite the increase in these charges, their contribution to the overall Fuel Rate increase in 2024 July was minimal, accounting for less than 4% (J$1.226/kWh).

- **Volumetric Adjustment**: The volumetric adjustment for 2024 July increased to J$0.871 billion from J$0.379 billion. The volumetric adjustment accounted for approximately 10.73% of the overall fuel rate in July, or J$3.451/kWh.

SCT Concession

The analysis of the government's concession on the 2024 July Fuel Rate, focused on understanding the impact of the concession on the 2024 July Fuel Oil Statement. The assessment revealed that:

- The government had approved a concessionary rate of 4.5611 per Litre for ADO purchases during the month of 2024 July. The standard SCT rate for ADO is 37.4845 J$/Litre.
- JPS has demonstrated that the concessionary rate was incorporated in the fuel cost associated with its thermal units.
- Without the SCT concession, the System Fuel Cost would have been J$7.356 billion, translating to a Fuel Rate of 32.293 J$/kWh.
- Because of the weighted average cost methodology, the impact of the concession on the overall fuel cost for 2024 July was limited.

VI. CONCLUSION

The investigation revealed that:

1. The primary contributor to the significant increase in electricity bills for the 2024 August billing period was the sharp rise in the 2024 July Fuel Rate. While the line items - IPP Rate and foreign exchange rate, on the bill had a lesser impact, the steep increase in fuel costs, particularly in the aftermath of Hurricane Beryl, accounted for the majority of the cost escalation.

2. The Fuel Rate Calculation for 2024 July was in conformance with the approved Fuel Cost Adjustment Mechanism (FCAM). Therefore, the Fuel Rate of J$32.172/kWh which was computed and applied by JPS for the 2024 August billing period, was found to be representative.

3. The Merit Order ranking and generation dispatch process followed the requirements of the legal and regulatory framework. However, the extraordinary circumstances brought about by the passage of Hurricane Beryl, necessitated deviations from these protocols. JPS had to implement adaptive strategies to manage the grid effectively, prioritizing system stability and risk mitigation to prevent a complete all-island shutdown.

4. The Special Consumption Tax (SCT) concessionary rate applied to the purchases of Automotive Diesel Oil (ADO) during the month of 2024 July was incorporated in the total fuel cost charged.

The investigation further revealed that the driving factors contributing to the high increase in customers' bills were, as follows:

- A reduction in electricity sales of 13.27 %.
- The high reliance on peaking units - which are less efficient, during the month of 2024 July, for grid stability as well as to meet customers' electricity demand. This resulted in higher fuel costs associated with these plants.
- An increase in fuel cost per unit of sales (See table in appendix).
- An increase in IPP fuel expense which accounts for approximately 63.86% of the applied Fuel Rate, or J$20.545/kWh.
- An increase in the volumetric adjustment, which accounted for approximately J$3.451/kWh or 10.73% of the Fuel Rate.

The assessment also revealed that the inclusion of the SCT concession had a marginal yet positive impact on reducing the overall cost of electricity for customers. The analysis revealed that the Fuel Rate would have been 0.38% higher without the concession, underscoring the modest impact of the tax relief in lowering fuel-related expenses and ultimately contributing to a slight decrease in the electricity rate for customers.

APPENDIX

FUEL PRICES

Comparing Fuel Prices between 204 June and July

Fuel Prices									
Plants	2024 June			2024 July			Change		
	HFO (US$/MMBTU)	ADO (US$/MMBTU)	NG (US$/MMBTU)	HFO (US$/MMBTU)	ADO (US$/MMBTU)	NG (US$/MMBTU)	HFO (%)	ADO (%)	NG (%)
JPS	13.39	27.65	13.28	13.55	*21.91	14.23	1.21	-20.58	7.19
SJPC			8.59			8.73			1.63
NFE 94MW			8.59			8.73			1.63
WKPP	12.64			13.24			4.76		
JPPC	15.26			15.91			4.22		
JEP	11.46			12.36			7.81		
CB – Hill Run			10.41			10.55			1.30

**Concessionary was taken into consideration*.

OPERATING PERFORMANCE OF JPS' UNITS.

JPS Thermal Unit Performance over the period 2024 May- July

JPS Thermal Unit Performance over the period 2024 May-Jul					
Unit	MCR (MW)	Full Load Heat Rate (kJ/kWh)	Net Capacity Factor (%)		
			2024 May	2024 June	2024 July
Rockfort RF1	20.0	8,954	73.22	75.18	78.14
Rockfort RF2	20.0	8,959	88.98	86.70	81.24
Hunts Bay GT 5	21.5	15,082	6.73	0.42	2.43
Hunts Bay GT 10	32.5	13,695	16.73	2.24	16.80
Bogue GT 3	21.5	16,651	4.72	0.00	4.91
Bogue GT 6	18.0	16,110	2.41	0.00	0.41
Bogue GT 9	20.0	16,612	2.46	0.71	3.61
Bogue GT 11	20.0	11,373	24.03	0.00	5.03
Bogue GT 12	38.0	13,004	57.90	64.36	63.11
Bogue GT 13	38.0	13,401	58.78	74.17	63.38
Bogue GT 14	38.8	-	61.53	74.62	62.00