# Office of Utilities Regulation

# Jamaica Public Service Company Limited

# Annual Review 2023

# Determination Notice

OFFICE OF UTILITIES REGULATION

2023 August 09

# DOCUMENT TITLE AND APPROVAL PAGE

**1. DOCUMENT NUMBER: 2023/ELE/012/DET.001**

**2. DOCUMENT TITLE: Jamaica Public Service Company Limited Annual Review 2023: Determination Notice**

**3. PURPOSE OF DOCUMENT:**

This document sets out the Office's decisions on issues related to the 2023 annual rate adjustment for the Jamaica Public Service Company Limited's Tariff Review Period 2019 – 2024, the third such under the Revenue Cap regime established pursuant to the Electricity Licence, 2016 and an application for extraordinary rate review by the company.

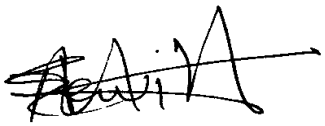
**4. ANTECEDENT DOCUMENTS:**

| | | |
|---|---|---|
| 2019/ELE/003/RUL.001 | Final Criteria – Jamaica Public Service Company Limited: 2019 - 2024 Rate Review Process | 2019 March 14 |
| 2019/ELE/007/ADM.001 | Addendum to Final Criteria – Jamaica Public Service Company Limited: 2019 - 2024 Rate Review Process | 2019 April 24 |
| 2020/ELE/016/DET.003 | Jamaica Public Service Company Limited Rate Review 2019 – 2024: Determination Notice | 2020 December 24 |
| 2021/ELE/001/ADM.001 | Addendum to Jamaica Public Service Company Limited Rate Review 2019 – 2024: Determination Notice | 2021 January 29 |
| 2021/ELE/010/DET.001 | Jamaica Public Service Company Limited Annual Review 2021: Determination Notice | 2021 September 01 |
| 2021/ELE/016/RCN.001 | Reconsideration Decision: Jamaica Public Service Company Limited Annual Review 2021 - Determination Notice | 2021 December 28 |
| 2022/ELE/007/DET.001 | Jamaica Public Service Company Limited Annual Review and Extraordinary Rate Review 2022: Determination Notice | 2022 August 22 |

**APPROVAL:**

This document is approved by the Office of Utilities Regulation and this Determination becomes effective as of 2023 August 09.

On behalf of the Office:



……..
Ansord E. Hewitt
**Director- General**

**2023 August 09**

# Abstract

On 2023 May 08, the Jamaica Public Service Company Limited (JPS) submitted to the Office of Utilities Regulation (OUR/Office), its 2023 Annual Tariff Adjustment Submission (2023 Application). The applications were made in accordance with the provisions of the Performance Based Rate-making Mechanism ("PBRM") outlined in the Electricity Licence, 2016 (Licence 2016).

The annual review application is the third such application for rate adjustment following the conclusion of the 2019 - 2024 Rate Review Process, under the new forward-looking revenue cap regime. This document sets out the Office's decisions on matters contained in the submissions.

# Table of Contents

## Definitions, Acronyms and Abbreviations

| | |
|---|---|
| 2019-2024 Rate Review Determination Notice | Jamaica Public Service Company Limited Rate Review 2019 -2024 Determination Notice: Document No. 2020/ELE/016/DET.003 |
| 2019 – 2024 Rate Review Application | Jamaica Public Service Company Limited 2019 - 2024 Tariff Application |
| 2021 Annual Review Determination Notice | Jamaica Public Service Company Limited Annual Review 2021: Determination Notice, Document No. 2021/ELE/010/DET.001 |
| 2022 Annual Review Determination Notice | Jamaica Public Service Company Limited Annual Review and Extraordinary Rate Review 2022: Determination Notice, Document No. 2022/ELE/007/DET.001 |
| 2023 Annual Review Application | Jamaica Public Service Company Limited 2023 Annual Tariff Adjustment Submission dated 2023 May 5 |
| Addendum to 2019 – 2024 Rate Review Determination Notice | Addendum to Jamaica Public Service Company Limited Rate Review 2019 – 2024: Determination Notice, Document No. 2021/ELE/001/ADM.001 |
| Addendum to Final Criteria | Addendum to Final Criteria – Jamaica Public Service Company Limited 2029 – 2024 Rate Review Process, Document No. 2019/ELE/007/TADM.001 |

| | |
|---|---|
| Final Criteria | Final Criteria – Jamaica Public Service Company Limited 2019 – 2024 Rate Review Process, Document No. 2019/ELE/003/RUL.001 |
| Reconsideration Decision 2021 | Reconsideration Decision: Jamaica Public Service Company Limited Annual Review 2021 – Determination Notice, Document No. 2021/ELE/016/RCN.001 |
| ABNF | Adjusted Base-rate Non-Fuel |
| CAIDI | Customer Average Interruption Duration Index |
| CCGT | Combined Cycle Gas Turbine |
| CIS | Customer Information System |
| COD | Commercial Operations Date |
| CPI | Consumer Price Index |
| CRR | Community Renewal Rate |
| CT | Current Transformer |
| dCPI | Annual rate of change in non-fuel electricity revenues as defined in exhibit 1 of the Licence |
| dI | The annual growth rate in an inflation and devaluation measure |

| | |
|---|---|
| EEIF | Electricity Efficiency Improvement Fund |
| EGS | Electricity Guaranteed Standard |
| ELS | Energy Loss Spectrum |
| EOS | Electricity Overall Standard |
| ESET | The Electricity Sector Enterprise Team |
| FCAM | Fuel Cost Adjustment Mechanism |
| GCT | General Consumption Tax |
| GDP | Gross Domestic Product |
| GNTL | Non-technical losses that are not totally within the control of JPS – designated by JPS as general non-technical losses |
| GoJ | Government of Jamaica |
| GIS | Geographic Information System |
| HB | Hunts Bay |
| HESS | Hybrid Energy Storage System |
| HPS | High Pressure Sodium |
| IAS | International Accounting Standards |
| IASB | International Accounting Standards Board |
| ICAJ | Institute of Chartered Accountants of Jamaica |

| | |
|---|---|
| IFRS | International Financial Reporting Standards |
| IPP | Independent Power Producer |
| IRP | Integrated Resource Plan being prepared pursuant to section 7 of the Electricity Act, 2015 |
| JEP | Jamaica Energy Partners Limited |
| JMD | Jamaican Dollars |
| JNTL | Non-technical losses that are within JPS's control |
| JPS/Licensee | Jamaica Public Service Company Limited |
| KVA | Kilo Volt Amperes |
| KWh | Kilowatt-hours |
| Licence 2016 | The Electricity Licence, 2016 |
| LED | Light-emitting Diode |
| MAIFI | Momentary Average Interruption Frequency Index |
| MED | Major Event Day/s |
| MSET | Ministry of Science Energy and Technology |
| MV | Mercury Vapour |
| MVA | Mega Volt Amperes |
| MW | Megawatt |
| MWh | Megawatt-hours |
| NBV | Net Book Value |

| | |
|---|---|
| NFE | New Fortress Energy |
| NPV | Net Present Value |
| NTL | Non-technical losses |
| O&M | Operating and Maintenance |
| OCC | Opportunity Cost of Capital |
| Office/OUR | Office of Utilities Regulation |
| OH | Old Harbour |
| OUR/Office | The Office of Utilities Regulation |
| OUR Act | The Office of Utilities Regulation Act |
| PATH | Programme of Advancement Through Health and Education |
| PAYG | Pay As You Go |
| PBRM | Performance Based Rate-Making Mechanism |
| PCI | Non-fuel Electricity Pricing Index |
| PPA | Power Purchase Agreement |
| RE | Renewable Energy |
| ROFR | JPS's Right of First Refusal exercisable in accordance with the Electricity Act, 2015 |
| SAIDI | System Average Interruption Duration Index |
| SAIFI | System Average Interruption Frequency Index |
| SBF | System Benefit Fund |

| | |
|---|---|
| SJPC | South Jamaica Power Company Limited |
| SSP | Smart Streetlight Programme |
| System | Refers to the physically connected generation, transmission and distribution network of JPS |
| T&D | Transmission & Distribution |
| TFP | Total Factor Productivity |
| TL | Technical losses |
| TOU | Time of Use |
| USD | United States Dollars |
| WKPP | West Kingston Power Plant |
| WT | Wholesale Tariff |
| YTD | Year to date |

# 1 Executive Summary

## 1.1 The JPS Tariff Proposal

**1.1.1** The Jamaica Public Service Company Limited (JPS) in its 2023 Annual Review Application to the Office of Utilities Regulation (OUR/Office), among other things, made the following requests:

- An increase of 39.54% in the 2023 Annual Revenue Cap adjustment factor (dPCI).
- A Q-Factor adjustment of 0.0% to the 2023 Annual Revenue Cap ($RC_{2023}$).
- No Z-Factor adjustment in relation to its capital project transactions.
- Annual Revenue Target for 2023 ($ART_{2023}$) of J$55.09B.
- An overall non-fuel tariff adjustment of 13.2%.
- No Z-Factor adjustment on major projects as it is the subject of ongoing legal appeal.

**1.1.2** According to JPS, the 13.2% increase on non-fuel rates would have a bill impact of approximately 0.8% and 0.2% increase for residential customers and RT40 customers, respectively and a 2.5% reduction for other commercial and industrial customers.

## 1.2 The Analysis of the Proposal

**1.2.1** The OUR's review of the components of the Performance Based Rate-making Mechanism (PBRM) resulted in the following:

- Verification of the proposed Growth Rate in Inflation/Exchange Rate factor (dI) of 39.54%. The 2019 March Consumer Price Indices (CPIs) were used as base indices.
- A Q-Factor adjustment of -0.25 was deemed applicable. JPS proposed 0.0%.
- A Z-Factor adjustment of -0.57% was determined. JPS did not propose a Z-Factor adjustment.
- All components of the PBRM considered, the OUR approved a Rate of Change factor (dPCI) of 38.72%, which was applied to the 2023 Revenue Cap. See Table 1.1 below for details.

**Table 1.1: Growth Rate in Inflation & F/X (dI) and Rate of Change of the Revenue Cap (dPCI)**

| Description | | Value | |
|---|---|---|---|
| **JPS Proposed** | **OUR Approved** | **JPS Proposed** | **OUR Approved** |
| Base Exchange Rate | Base Exchange Rate | **128.00** | **128.00** |
| Adjusted Billing Exchange Rate | Adjusted Billing Exchange Rate | 155.00 | 155.00 |
| Jamaican Inflation Index | Jamaican Inflation Index | | |
| CPI @ March 2023 | CPI @ March 2023 | 128.00 | 128.00 |
| CPI @ March 2019 | CPI @ March 2019 | **98.20** | **98.20** |
| US Inflation Index | US Inflation Index | | |
| CPI @ March 2023 | CPI @ March 2023 | 301.84 | 301.84 |
| CPI @ March 2019 | CPI @ March 2019 | **254.20** | **254.20** |
| Exchange Rate Factor | Exchange Rate Factor | 21.09% | 21.09% |
| Jamaican Inflation Factor | Jamaican Inflation Factor | 30.35% | 30.35% |
| US Inflation Factor | US Inflation Factor | 18.74% | 18.74% |
| **The Growth Rate (dI)** | **The Growth Rate (dI)** | **39.54%** | **39.54%** |
| Q Factor | Q Factor | 0.00% | **-0.25%** |
| Z Factor | Z Factor | **0.00%** | **-0.57%** |
| **The Rate of Change of the Revenue Cap (dPCI)** | **The Rate of Change of the Revenue Cap (dPCI)** | **39.54%** | **38.72%** |

**1.2.2** The OUR's review of the revenue true-up calculations show significant variances between the proposed values of several parameters versus the values approved by the OUR. The largest variances were observed for the foreign exchange and system losses surcharges. JPS proposed the addition of J$893.14M and the subtraction of J$437.3M respectively, while the OUR approved the subtraction of J$3.02M and the subtraction of J$1.34B respectively.

**1.2.3** The OUR made an adjustment of -J$540.9M to the TUVol surcharge computation. This adjustment relates to the inclusion of IPP Revenue Requirement for the years 2020, 2021 and 2022, which are now included in the Revenue Cap. The total amount approved for the 2022 Revenue True-Up is -J$3,007.02M. JPS proposed an addition of J$968.14M to the revenue cap (see Table 1.2 below).

**Table 1.2: Revenue True-Up – JPS Proposed and OUR Approved Values**

| 2022 Revenue True-Up | | |
|---|---|---|
| **Parameters** | **JPS Proposed (J$M)** | **OUR Approved (J$M)** |
| FX Surcharge ($SFX_{2022}$) | 893.14 | (3.02) |
| Interest Surcharge ($SIC_{2022}$) | 137.81 | (210.36) |
| Volumetric ($TUVol_{2022}$) | 271.76 | (280.09) |
| System Losses ($TULos_{2022}$) | (437.30) | (2,194.49) |
| WACC | 102.72 | (319.06) |
| **Total** | **968.14** | **(3,007.02)** |

## 1.3 System Losses Performance and Y-Factor Adjustment

**1.3.1** The review of JPS's system losses performance and Y-Factor proposal, resulted in the OUR deciding the following:

1. The responsibility factor (RF) shall remain unchanged at 20% for the entire 2019-2024 Rate Review period.
2. The Y-Factor applicable to the 2023 Annual Revenue Target adjustment is **-2.77%**

## 1.4 H-Factor and Fuel Cost Adjustment Mechanism

**1.4.1** Having reviewed JPS's heat rate target proposal, the OUR has determined the following:

1. JPS is proposing that the thermal heat rate target for the period, remains at the current target of 9,495 kJ/kWh as this would give the company more latitude than the 9,470 kJ/kWh target to absorb impacts from possible risks not included in its base projection.
2. The 2023-2024 Heat Rate target was set at **9,470 kJ/kWh,** consistent with the level established in the 2019-2024 Rate Review Determination Notice.

## 1.5 Quality of Service (Q-Factor Adjustment)

**1.5.1** Based on the OUR's review of JPS's performance under the Quality-of-Service Standards for 2022, the OUR, among other things, determined the following:

1. The Q-Factor applicable in the 2023 PBRM is **-0.25%.**
2. JPS shall be required to submit to the Office a detailed "Monthly Reliability Report", in MS Excel format, that captures data represented in the "Annual Outage Dataset" template, for the applicable month.
3. JPS shall provide a detailed breakdown of the CIS/OMS customer count data used in the prescribed quality indices computations, by customer category and status, as part of the Q-Factor reporting requirements.
4. JPS shall include all momentary interruptions that occurred on the system each month, along with the related MAIFI measurements, in the Monthly Reliability Reports to be submitted to the Office.

## 1.6 Capital Projects Assessment (Z-Factor Adjustment)

**1.6.1** Arising from the OUR's review, of JPS's performance in relation to the approved Capital Projects for 2022, the OUR, among other things, determined the following:

1. The Major Projects, the Old Harbour – Hunts Bay 138kV line and the Voltage Standardization Program had a Z-factor adjustment. Both projects had an underspend and a variance of 99% and 91.2% respectively. Given that these investments were not made, the OUR has adjusted the 2022 revenue requirement downwards by US$1.421M (before the application of WACC) to reflect the associated over-recovery of revenue.
2. A Z-factor adjustment was applied to the Minor projects as there was a budget variance of 6.49% for this category. This translates into a downward revenue adjustment of US$0.123M (before the application of WACC).
3. The OUR has no objection to JPS's request that the revenue adjustment for the projects from the 2022 Extraordinary Project Review be done in 2024, instead of in the 2023 Annual Review. In this regard, no Z-Factor adjustment is required at this point.
4. Based on the above decisions, the required Z-Factor adjustment outcome and considering the WACC amounts to J$221.1M. This translates to a relative Z-Factor adjustment of **-0.57%.**

Prepaid Rates: RT10 and RT20

**1.6.2** The approved non-fuel pre-paid rates for RT10 customers are as follows:

(i) J$15.72/kWh for the first 117kWh within a thirty (30)-day consumption cycle.

(ii) J$23.86/kWh for each additional kWh thereafter, within that thirty (30)-day consumption cycle.

(iii) Additionally:

- The IPP rate shall be displayed in a separate line item on the customer bill.
- The prepaid rates will be reviewed at the next Tariff Review.

**1.6.3** The approved non-fuel pre-paid rate, when compared with the post-paid rate, shall be revenue-neutral for services to Rate 20 customers. The prepaid rates are as follows:

(i) First 10kWh J$138.94/kWh

(ii) Each additional kWh J$10.25/kWh

(iii) Additionally:

- The IPP rate shall be displayed in a separate line item on the -customer bill.
- The pre-paid rates will be reviewed at the next Tariff Review.

**1.6.4** A comparative analysis of JPS's proposal against what the OUR has approved is shown in Table 1.3 below. It is important to note that even though JPS had estimated that its proposed 13.2% increase on non-fuel tariff, would have a bill impact of approximately 0.8% and 0.2% increase for residential customers and RT40 customers, respectively and a 2.5% reduction for commercial and industrial customers, the OUR's analysis, using JPS's data, shows that the average increase would by approximately 4.9%. With the OUR approved 5.5% increase on the 2022 approved Revenue Target, the average overall bill impact will be an increase of approximately 1.6% (see Table 1.3 below).

**Table 1.3: Comparative Results**

| Comparative Results | | |
|---|---|---|
| **Description** | **JPS Proposed (J$M)** | **OUR Approved (J$M)** |
| Approved Revenue Cap | 38,783 | 38,783 |
| Annual Rate of Change | 39.54% | 38.72% |
| Adjusted Revenue Cap | 54,117 | 53,799 |
| 2022 Revenue True-Up (incl.WACC) | 968 | (3,007) |
| **2023 Annual Revenue Target** | **55,085** | **50,792** |
| | | |
| **Heat Rate Target (kJ/kWh)** | **9,495** | **9,470** |
| | | |
| **Overall Bill Impact** (incl.fuel and IPP charges)**:** | **4.9%** | **1.6%** |
| Residential Customers (RT10) | 4.73% | Average 1.6% |
| Small Commercial Customers (RT20) | 3.40% | Average 1.3% |
| Large Commercial Customers LV (RT40) | 6.70% | Average 1.9% |
| Large Commercial Customers HV (RT50) | 7.45% | Average 2.4% |
| Large Commercial Customers HV Standard (RT70) | 2.01% | Average 1.0% |

## 1.7 The 2023 Non-Fuel Rate Schedule

**1.7.1** The rate schedule which sets out the approved rates and charges by customer categories are shown in Table 1.4 below.

**Table 1.4: The 2023 Non-Fuel Rate Schedule**

| RATE SCHEDULE -2023 Non-Fuel Rates (Base Exchange Rate J$155.00:US$1:00) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rate Category | Blocks | Customer Charge (J$/Month) | Energy Charge (J$/kWh) | | | | Demand Charge (J$/kVA) | | | |
| | | | STD | Peak | Partial Peak | Off Peak | STD | Peak | Partial Peak | Off Peak |
| Rate 10 STD | 0 - 100 | 603.54 | 8.31 | | | | | | | |
| | > 100 | | 23.86 | | | | | | | |
| Rate 10 Pre-Paid | 0 - 117 | | 15.72 | | | | | | | |
| | > 117 | | 23.86 | | | | | | | |
| Rate 20 STD | | 1,286.87 | 10.25 | | | | | | | |
| Rate 20 Pre-Paid | 0 - 10 | | 138.94 | | | | | | | |
| | > 10 | | 10.25 | | | | | | | |
| Rate 40 STD | | 9,066.66 | 6.91 | | | | 3,105.57 | | | |
| Rate 40 TOU | | 9,066.66 | | 6.66 | 5.96 | 5.81 | | 1,732.18 | 1,278.40 | 371.07 |
| Rate 50 STD | | 9,066.66 | 4.90 | | | | 2,151.84 | | | |
| Rate 50 TOU | | 9,066.66 | | 5.52 | 4.95 | 4.82 | | 1,335.70 | 989.77 | 353.17 |
| Rate 60 Streetlight | | 3,655.91 | 14.06 | | | | | | | |
| Rate 60 Traffic Signal | | 3,655.91 | 13.55 | | | | | | | |
| Rate 70 STD | | 9,066.66 | 4.89 | | | | 2,852.04 | | | |
| Rate 70 TOU | | 9,066.66 | | 6.03 | 5.39 | 5.26 | | 1,513.41 | 987.77 | 354.57 |

# 2 Summary of JPS's Annual Review Submission 2023

## 2.1 Introduction

**2.1.1** On 2023 May 8, the Jamaica Public Service Company Limited (JPS) applied for its Annual Tariff Adjustment, pursuant to Schedule 3 of the Electricity Licence, 2016 (Licence 2016). The company's 2023 Annual Review Application, among other things, outlined its proposed Performance-Based Ratemaking Mechanism (PBRM) parameters.

## 2.2 JPS Annual Review Submission

### 2.2.1 2023 Annual Revenue Target excluding IPP Non-fuel cost ($ART_{2023}$)

**2.2.2** The company requested a 2023 Annual Revenue Target ($ART_{2023}$) excluding IPP Non-fuel cost of J$55.04B. Table 2.1 below shows JPS's proposed 2023 Annual Tariff Adjustment.

**Table 2.1: JPS Proposed 2023 Annual Tariff Adjustment Summary**

| JPS Proposed 2023 Annual Tariff Adjustment Summary | |
|---|---|
| **Item** | **Amount (J$'M)** |
| Revenue Cap 2023 | 38,783 |
| dI Adjustment (39.54%) | 15,333 |
| **Revenue Cap 2023 (Adjustment for Growth -dI)** | **54,116** |
| **Q-Factor (0%)** | - |
| **Z-Factor Adjusmtents** | - |
| **RC2023 * (1 + dPCI) 39.54%** | **54,116** |
| **Performance Adjustments** | |
| Revenue Surcharge - $RS_{2022}$ | (166) |
| FX Surcharge - $FX_{2022}$ | 893 |
| Interest Surcharge - $SIC_{2022}$ | 138 |
| WACC | 11.87% |
| **2022 Adjustments - ($RS_{2022}$+$FX_{2022}$-$SIC_{2022}$) *(1+WACC)** | **968** |
| **2023 Annual Revenue Target -$ART_{2023}$** | **55,084** |

Adjusted Revenue Cap

**2.2.3** JPS requested a growth rate (dPCI) of 39.54%, which is to be used to adjust the approved 2023 Revenue Cap ($RC_{2023}$). This was derived from an annual growth rate (dI) factor of 39.54% and a Q-Factor of 0.0%. JPS did not propose a Z-factor adjustment.

**2.2.4** The annual growth rate (dI) represents the changes in the value of the Jamaican dollar (JMD) against the United States dollar (USD), as well as inflation. JPS has proposed that 39.54% is the composite inflation and foreign exchange adjustment factor, applicable to the annual growth rate.

**2.2.5** With JPS's proposed dPCI of 39.54%, the approved revenue cap ($RC_{2023}$) of $38,783M would be adjusted upwards, resulting in an adjusted 2023 revenue cap (Adjusted $RC_{2023}$) of $54,116M.

Revenue True-Up

**2.2.6** JPS's revenue true-up has three components:

1) The revenue surcharge comprises of true-up for volume adjustments and system losses.
2) The FX surcharge, which is a true-up for FX gains/ losses.
3) The net interest surcharge, which is a true-up of net of interest expense/(income) and late-payment penalties levied on customers.

**2.2.7** These true-ups reconcile JPS's actual performance during 2022, against the targets set for that year. Based on its performance during 2022, JPS has proposed the following surcharge adjustments for 2023:

- Revenue Surcharge ($RS_{2022}$): -$165,536,383 (reduction).
  - Volume adjustment true-up ($TUVol_{2022}$): $271,760,113
  - System losses adjustment true-up ($TULos_{2022}$): -$437,296,496
- Foreign Exchange Surcharge ($FX_{2022}$): $893,140,080 (increase).
- Annual Net Interest Surcharge ($SIC_{2022}$): $137,810,010 (increase).

**2.2.8** JPS's proposed total revenue true-up derived from computing the three (3) surcharge components, is $865,413,707. However, the application of the pre-tax WACC of 11.87% to account for the opportunity cost of the revenue surcharge, results in a proposed upward adjustment of the revenue cap by $968,138,314.

## 2.3 Proposed 2023 Tariff Basket and Rates

**2.3.1** Based on the proposed $ART_{2023}$ excluding IPP Non-fuel cost, JPS stated that an overall non-fuel tariff adjustment of 13.2% would be required. The company explained that the 13.2% increase on non-fuel tariff would have a bill impact of approximately 0.8% and 0.2% increase for residential customers and RT40 customers, respectively and a 2.5% reduction for commercial and industrial customers.

**2.3.2** Table 2.2 below shows a breakdown of revenues per customer category required to recover the proposed $ART_{2023}$ excluding IPP Non-fuel cost. The respective proposed tariffs for achieving these revenues are shown in Table 2.3 below.

**Table 2.2: JPS's Proposed 2023 Revenue Basket**

| Class | Voltage Level | Block | Customer Charge | Energy | Demand | Total Revenue |
|---|---|---|---|---|---|---|
| | | | ($) | ($) | ($) | ($) |
| Rate 10 | LV | ≤ 100 | 4,908,243,982 | 4,876,018,423 | - | 9,784,262,405 |
| Rate 10 | LV | > 100 | - | 14,391,486,660 | - | 14,391,486,660 |
| Rate 20 | LV | | 1,195,434,284 | 6,613,163,083 | - | 7,808,597,367 |
| Rate 40-STD | LV | | 215,213,238 | 5,108,073,349 | 7,851,507,527 | 13,174,794,114 |
| Rate 40-TOU | LV | | 13,413,732 | 744,459,529 | 941,841,067 | 1,699,714,328 |
| Rate 50-STD | MV | | 15,075,610 | 1,145,991,052 | 1,543,279,891 | 2,704,346,553 |
| Rate 50-TOU | MV | | 2,848,934 | 245,508,988 | 447,736,947 | 696,094,869 |
| Rate 70-STD | MV | | 2,374,112 | 1,335,910,656 | 2,177,506,685 | 3,515,791,453 |
| Rate 70-TOU | MV | | 474,822 | 256,493,845 | 343,517,482 | 600,486,149 |
| Rate 60-S | LV | | 8,998,662 | 676,928,087 | - | 685,926,749 |
| Rate 60-T | LV | | 15,173,276 | 7,766,268 | - | 22,939,544 |
| **TOTAL** | | | **6,377,250,652** | **35,401,799,940** | **13,305,389,599** | **55,084,440,191** |

**Table 2.3: JPS's Proposed 2023 Non-Fuel Tariffs**

| Class | Voltage Level | Block | Customer Charge | Energy-J$/kWh | | | | Demand-J$/KVA | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Std. | Off-Peak | Part Peak | On-Peak | Std. | Off-Peak | Part Peak | On-Peak |
| | | | ($) | | | | | | | | |
| Rate 10 | LV | ≤ 100 | 660.32 | 9.15 | - | - | - | - | - | - | - |
| Rate 10 | LV | > 100 | 660.32 | 25.86 | - | - | - | - | - | - | - |
| Rate 20 | LV | | 1,409.86 | 10.93 | - | - | - | - | - | - | - |
| Rate 40-STD | LV | | 9,857.53 | 7.56 | - | - | - | 3,485.27 | - | - | - |
| Rate 40-TOU | LV | | 9,857.53 | - | 6.36 | 6.50 | 7.25 | | 394.83 | 1,382.75 | 1,871.92 |
| Rate 50-STD | MV | | 9,857.53 | 5.15 | - | - | - | 2,368.78 | - | - | - |
| Rate 50-TOU | MV | | 9,857.53 | - | 5.08 | 5.21 | 5.81 | | 414.03 | 1,020.38 | 1,397.79 |
| Rate 70-STD | MV | | 9,857.53 | 5.05 | - | - | - | 3,046.56 | - | - | - |
| Rate 70-TOU | MV | | 9,857.53 | - | 5.43 | 5.58 | 6.23 | - | 348.82 | 963.19 | 1,365.51 |
| Rate 60-S | LV | | 3,949.91 | 16.60 | - | - | - | - | - | - | - |
| Rate 60-T | LV | | 3,949.91 | 14.58 | - | - | - | - | - | - | - |

## 2.4 Quality of Service (Q-Factor)

**2.4.1** The Q-Factor is a price adjustment that allows for changes in the quality of service. JPS argued that since the implementation of its new OSI OMS system in March 2022, the company has experienced challenges with data validation and quality assurance that have impacted its reliability indices. With these challenges, JPS is requesting that zero (0) quality points be assigned, resulting in a proposed Q-Factor adjustment for the 2023 Annual Adjustment Filing of 0%.

**2.4.2** JPS also requested that the OUR considers the following:

1. A revision of the baseline, which was developed using the previous Ventyx OMS data, taking into considerations challenges of the current OSI OMS.
2. The establishment of a mechanism with the OUR/MSET for the timely approval of Force Majeure applications, as provisioned in the Licence 2016.

3. The exclusion of outages due to motor vehicle accidents, which JPS states is out of its control.
4. The exclusion of non-Reportable outages from the reliability Q-Factor calculations.
5. Re-consideration for the adoption of the 2.5 beta methodology in the IEEE 1366 Standard.
6. The establishment of the CAIDI target is based on the utility's ability/capacity to respond to outages, rather than it being derived from the ratio of SAIDI and SAIFI.
7. Changing the definition of "Force Majeure" to align with international utility best practices.

## 2.5 System Losses (Y-Factor)

**2.5.1** JPS expressed optimism that its initiatives will yield a loss reduction of 50GWh in 2023 and proposed system losses target of 28.15%.

**2.5.2** Table 2.4 below shows the proposed system loss components.

**Table 2.4: JPS Proposed System Losses Targets**

| System Loss Component | Target |
|---|---|
| *Technical Loss* | *7.90%* |
| *Non-Technical Loss* | *20.25%* |
| **Total** | **28.15%** |

## 2.6 Heat Rate (H-Factor)

**2.6.1** JPS argued that its thermal heat rate for July 2023 to June 2024 is forecasted to finish at 9,379 kJ/kWh, barring the impact of unforeseen events. JPS's proposal is that the thermal heat rate target for the period remains at the current target of 9,495 kJ/kWh. JPS argued that the current target would provide the company with more latitude than the 9,470 kJ/kWh target, to absorb impacts from possible risks not included in its base projection.

## 2.7 Capital Plan Adjustment (Z Factor)

**2.7.1** JPS proposed that there should be no Z-Factor adjustment for the value associated with the implementation of the Old Habour-Hunts Bay 138kv transmission Line and the Voltage Standardization Program.

## 2.8 Request for Revenue Uplift

**2.8.1** JPS's proposal is to defer to the 2024 Annual Review, its request for revenue adjustment of US$6.6M, on projects that received approval as Extraordinary Projects arising from system risks not identified prior to submitting its 2019-2023 investment plan.

**2.8.2** The 40 MVARS Bulk Capacitor Banks, GT10 Major Overhaul, Rockfort Plant Overhauls, Bogue Gas Turbines, Critical Spares, and the Northeast Coast Voltage Enhancement

projects were approved by the OUR, in response to an Extra-ordinary request made by JPS in 2022.

## 3 Legal Framework

**3.1** The OUR is a multi-sector regulator established pursuant to the Office of Utilities Regulation Act, (the "OUR Act"), to regulate the provision of prescribed utility services in Jamaica. Under section 4(1)(a) of the OUR Act, the Office has regulatory authority over, inter alia, the generation, transmission, distribution and supply of electricity.

Pursuant to Condition 2, paragraphs (2) and (3) of the Licence 2016, JPS is authorized to:

*"…generate, transmit, distribute and supply electricity for public and private purposes in all parts of the Island of Jamaica"*, and is obligated to *"…provide an adequate, safe and efficient service based on modern standards, to all parts of the Island of Jamaica at reasonable rates so as to meet the demands of the Island and to contribute to economic development."*

**3.2** In the exercise of its powers and functions, section 4(3) of the OUR Act mandates the OUR to:

*"…undertake such measures as it considers necessary or desirable to -*

*(a) encourage competition in the provision of prescribed utility services.*

*(b) protect the interests of consumers in relation to the supply of a prescribed utility service.*

*(c) encourage the development and use of indigenous resources; and*

*(d) promote and encourage the development of modern and efficient utility services…"*

**3.3** Among the various powers and functions of the OUR, set out in section 4 of the OUR Act, is a power to determine rates in respect of the generation, transmission, distribution, and supply of electricity. A portion of section 4(4A) of the OUR Act directs that:

*"(4A) The rates determined by the Office in respect of prescribed utility services for the generation, transmission, distribution and supply of electricity shall –*

*(a) be in accordance with -*

*…*

*(iv) the tariff provisions set out in all licences and enabling instruments with respect thereto;" …*

*(b) take into account –*

*(i) the interest of consumers in respect of matters, including the cost, safety, and quality of the services; …*

**3.4** Condition 15 and Schedule 3 of the Licence 2016 make provision for the determination of rates. Paragraph 2 of Condition 15 and paragraph 5 of Schedule 3 specify respectively that:

Condition 15:

*"2. The rates to be charged by the Licensee in respect of the Supply of electricity shall be subject to such limitation as may be imposed from time to time by the Office.*

*…*

Schedule 3:
*"5. All rates shall be determined by the Office."*

**3.5** Schedule 3 of the Licence 2016 outlines the procedures for determination and review of JPS's electricity tariff. Schedule 3 outlines three (3) instances in which the OUR may be requested to review and determine rates which may result in revisions or adjustments to JPS's non-fuel rates based on a revenue cap methodology, viz:

1. **Five-Year Rate Reviews (paragraphs 6- 41):** As the name suggests, these reviews are scheduled at five-year intervals. The Five-year Rate Review involves an exhaustive examination of all aspects of the revenue requirement, including rate base, return on investment, operating and maintenance cost, depreciation, as well as efficiency targets and incentive mechanisms.
2. **Extraordinary Rate Reviews (paragraphs 59-61):** These reviews may be done between five-year rate reviews and are occasioned by the impact of exceptional circumstances on the electricity sector and/or JPS. Such a review is only permissible where the impact is significant, and where the circumstances did not comprise factors that were considered or known when the last rate review was undertaken. Rate reviews of this type are done at the request of either the Minister or JPS. The prescribed period for such a review is sixty (60) days, unless the OUR and JPS agree, and the scope of the review is limited to the impact of the exceptional circumstances.
3. **Annual Review or Annual Rate Adjustment (paragraphs 42-56): The** Licence 2016 details the formula to be employed for an annual adjustment to the revenue target and, the period specified for conducting the adjustment is sixty (60) days. Notably, the formula specifically assumes, inter alia, that tariffs based on the revenue-cap regime are already in place. Therefore, changes are only required for the superstructure and not the substructure of the tariff.

   Exhibit 1 of Schedule 3 of the Licence 2016 specification of the Annual Review formula is as follows:

$$\mathrm{ART_y} = \mathrm{RC}_y(1 + (\mathrm{dI} + \mathrm{Q} \pm \mathrm{Z})) + \left(\mathrm{RS}_{y-1} + \mathrm{SFX}_{y-1} - \mathrm{SIC}_{y-1}\right) * (1 + \mathrm{WACC})$$

Where:

$\mathrm{ART}_y = Allowed\ Revenue\ Target\ for\ current\ year (i.e., y)$
$\mathrm{RC}_{y-1} = the\ Approved\ Revenue\ Cap\ for\ previous\ year\ (i.e., y-1)$
$\mathrm{dI} = change\ in\ inflation$
$\mathrm{Q} = the\ quality\ of\ service\ improvement\ factor$
$\mathrm{Z} = the\ exogenous\ factor$
$\mathrm{RS}_{y-1} = Adjustment\ for\ previous\ year\ Revenue\ \frac{under}{over}\ recovery$

$$SFX_{y-1} = Adjustment\ for\ previous\ year\ Net\ Foreign\ Exchange\ Losses$$
$$SIC_{y-1} = Adjustment\ for\ Net\ Interest\ Income\ on\ unpaid\ Customer\ bills$$
$$WACC = the\ Weighted\ Average\ Cost\ of\ Capital$$

**3.6** Within the framework of Annual Rate Adjustments, provision is made for alterations to the tariff using the Z-factor mechanism. The application of the Z- factor is triggered by special circumstances that materially affect, inter alia, JPS's non-fuel costs, for which the recovery of such costs is done through an allowed percentage increase in the revenue cap. The provisions governing the Z-Factor mechanism that are most relevant to JPS's submission are that set out in paragraph 46.d.(i) of Schedule 3 of the Licence 2016, which states in part:

> *"d…. The Z factor is the allowed percentage increase in the Revenue Cap due to any of the following special circumstances:*
> *(i) Any special circumstances that satisfy all of the following:*
> *a) affect the Licensee's costs or the recovery of such costs, including asset impairment adjustments.*
> *b) are not due to the Licensee's managerial decisions.*
> *c) have an aggregate impact on the Licensed Business of more than $50 million in any given year; and*
> *d) are not captured by the other elements of the revenue cap mechanism."*

**3.7** The Licence 2016 therefore makes provision for the treatment of exceptional and defined special circumstances affecting the tariff in between Five-Year Rate Reviews, by way of two channels:

1) the Z-factor adjustment mechanism specified under the Annual Review; and
2) Extraordinary Rate Review utilizing the rate review mechanism applicable to the Five-Year Rate Review (i.e., an adjustment to the base revenue requirement).

**3.8** In accordance with sections 4(4) and 4(4A) of the OUR Act, as well as Condition 15 and Schedule 3 of the Licence 2016, the Office makes the **DETERMINATIONS** set out below.

# 4 OUR's Analysis of the Proposal

## 4.1 Computation of the Annual Rate of Change (dPCI)

**4.1.1** Schedule 3 of the Licence 2016, defines the annual rate of change factor (dPCI) as follows:

$$dPCI = dI \pm Q \pm Z$$

Where:

dI = the growth rate in the inflation and JMD to USD exchange rate measures
Q = the Q-Factor *(i.e. the allowed price adjustment to reflect changes in the quality of service provided to the customers versus the target for the prior year*)
Z = the Z-factor *(i.e. the allowed rate of price adjustment for special reasons, not under the control of the Licensee and not captured by the other elements of the formulae*)

**4.1.2** It further defines the growth rate inflation and exchange rate (dI) as:

$$dI= (EX_n-EX_b)/EX_b\{USP_b+INF_{US}(USP_b-USDS_b)\}+INF_{us}(USP_b-USDS_b)+(1-USP_b)INF_J$$

Where:
EXb = Base US exchange rate at the start of the Rate Review period.
$EX_n$ = Applicable US exchange rate at Adjustment Date.
$INF_{US}$ = Change in the agreed US inflation index as at 60 days prior to the Adjustment Date and the US inflation index at the start of the Rate Review period.
$INF_J$ = Change in the agreed Jamaican inflation index as at 60 days prior to the Adjustment Date and the Jamaican inflation index at the start of the Rate Review period.
$USP_b$ = US portion of the total non-fuel expenses as determined from the Base Year.

**4.1.3** Conceptually, the purpose of the rate of change factor (dPCI) is to ensure that the revenue cap for the current year is kept constant in real terms, all other things remaining equal. Consequently, the basic revenue cap (**$RC_Y$**) is adjusted to include the effect of **dPCI** and this results in what is referred to in this Determination Notice as the **Adjusted Revenue Cap**. The Adjusted Revenue Cap, as shown below, captures the effect of inflation and exchange rate movement over the 2019 base year values.

$$\textbf{Adjusted Revenue Cap} = RCy\ (1 + dPCI)$$

## 4.2 JPS Annual Revenue Target ($ART_{2023}$) (excluding IPP Non-fuel cost) Proposal

### 4.2.1 2023 Revenue Cap ($RC_{2023}$)

4.2.1.1 In its submission, JPS argued that in the absence of an order from the Tribunal, it retains the OUR determined revenue cap of J$38,783M.

### 4.2.2 Rate of Change of the Revenue Cap (dPCI)

4.2.2.1 JPS requested an inflation and foreign exchange growth rate (dI) of 39.54% and that the growth rate (dPCI) be set at 39.54%. It predicated its request on the following factors:

- Jamaican point-to-point inflation ($INF_J$) of 30.3% for the period 2019 March - 2023 March.
- U.S. point-to-point inflation rate ($INF_{US}$) of 18.70% for the period 2019 March - 2023 March.
- A 21.09% increase in the Base Exchange Rate moving from J$128.00: US$1 to J$155.00: US$1.
- A Q-Factor adjustment of 0.0%.
- No Z-Factor adjustment.

### 4.2.3 Foreign Exchange and Interest Surcharges

4.2.3.1 In its submission, JPS stated that the 2022 revenue requirement for FX losses and interest income are as follows:

- **FX Losses (TFX)**: The FX target was J$280M. When adjusted for the 2022 growth rate (dI) of 33.02%, the proposed FX losses provision for 2022 is J$372.5M.
- **Net interest expense (TIC)**: The TIC target was J$136.5M including adjustment for the 2022 growth rate (dI) of 33.02%.

4.2.3.2 JPS presented actual foreign exchange losses (AFX) of J$1.266B, which the company stated was the actual recorded FX losses at the average exchange rate for 2022 of J$152: US$1. Similarly, JPS presented actual net interest income (AIC) of $136.49M at the same exchange rate.

4.2.3.3 Based on those assumptions, JPS proposed foreign exchange and interest surcharges of J$893.1M and J$137.8M respectively.

### 4.2.4 Revenue Surcharge

4.2.4.1 The revenue surcharge is comprised of a true-up for sales volume adjustment and a true-up for system losses adjustment. JPS argued that the targets should be reasonable and achievable, pursuant to paragraph 37 of Schedule 3 of the Licence 2016.

4.2.4.2 JPS stated that its proposed true-ups reconcile actual performance during 2021, against the targets set for that year. The result is a reduction of J$539 million to the 2022 ART (excluding IPP Non-fuel cost). The reduction is as follows:

a) Volumetric performance adjustment of **$271.76 Million**.
b) System losses performance adjustment of **negative $437.3 Million**.

4.2.4.3 With its adjustments, JPS proposed a 2023 Annual Revenue Target ($ART_{2023}$) excluding IPP Non-fuel cost of J$55.084B.

## 4.3 The OUR's Position

### 4.3.1 The 2023 Revenue Cap ($RC_{2023}$)

4.3.1.1 In accordance with Determination #29 in the 2019-2024 Rate Review Determination Notice, the revenue cap applicable for the review period, Year 2023 is J$38,783M.

### 4.3.2 The Rate of Change of the Revenue Cap (dPCI)

4.3.2.1 The Office reiterates that all costs used to determine the revenue requirements are based in the reference year of the review (i.e., 2019 values in the case of the 2019-2024 Rate Review). In the 2019 – 2024 Rate Review, the most recent audited financial accounts (2018) were presented in support of the JPS's application. Additionally, in setting the base tariff, costs were adjusted to account for all known and measurable changes, that would occur within twelve (12) months of the 2018 audited accounts. Furthermore, in the 2019-2024 Rate Review, JPS submitted its 2019 audited accounts, and this was relied on in the process of evaluating and the setting of base tariffs.

4.3.2.2 The OUR approves an inflation and foreign exchange growth rate (dI) of 39.54% and a revenue cap growth rate (dPCI) of 38.72%. These rates are based on the following factors:

- Jamaican point-to-point inflation[1] ($INF_J$) of 30.35% for the period 2019 March - 2023 March.
- U.S. point-to-point inflation rate[2] ($INF_{US}$) of 18.74% for the period 2019 March - 2023 March.
- A 21.09% increase in the Base Exchange Rate moving from J$128.00: US$1 to J$155.00.
- A Q-Factor of -0.25%.
- A Z-Factor adjustment of -0.57%.

4.3.2.3 The Q-factor is based on three quality of supply indices and was determined by the Office to be -0.25%. The details of the Q-Factor analysis are set out in Chapter 9 of this Determination Notice.

[1] Derived from the CPI data published by the Statistical Institute of Jamaica.

[2] Obtained from U.S. Bureau of Labor Statistics website, http://data.bls.gov/cgi-bin/surveymost

4.3.2.4 The Z-factor adjustment has been determined to be -0.57%. The adjustment is based on the evaluation and analysis of JPS's Capital Projects for the year 2022. The details of the review are outlined in Chapter 5 of this Determination Notice.

4.3.2.5 The approved rate of change of the Revenue Cap (dPCI) is the sum of the Q-factor adjustment, the Z-factor adjustment, and the Growth Rate (dI). The result is a dPCI adjustment of 38.72%.

4.3.2.6 Details of the dPCI computation are shown in Table 4.1 below.

**Table 4.1: The 2023 Growth Rate (dI) and the Rate of Change of the Revenue Cap (dPCI)**

| Line | Description | Formula | Value |
|---|---|---|---|
| L1 | Base Exchange Rate | | **128.00** |
| L2 | Adjusted Billing Exchange Rate | | 155.00 |
| L3 | Jamaican Inflation Index | | |
| L4 | CPI @ March 2023 | | 128.0 |
| L5 | CPI @ March 2019 | | **98.2** |
| L6 | US Inflation Index | | |
| L7 | CPI @ March 2023 | | 301.8 |
| L8 | CPI @ March 2019 | | **254.2** |
| L9 | | (L2-L1)/L1 | 21.09% |
| L10 | Jamaican Inflation Factor | (L4-L5)/L5 | 30.35% |
| L11 | US Inflation Factor | (L7-L8)/L8 | 18.74% |
| L12 | **The Growth Rate (dI)** | L9*{0.8+(0.8-0.0688)*L11}+(0.8-0.0688)*L11+(1-0.8)*L10 | **39.54%** |
| L13 | Q Factor | | **-0.25%** |
| L14 | Z Factor | | **-0.57%** |
| L15 | **The Rate of Change of the Revenue Cap (dPCI)** | **dI +/- Q +/- Z** | **38.72%** |

### 4.3.3 The Adjusted Revenue Cap

4.3.3.1 The Adjusted Revenue Cap for 2023 ($Adj.RC_{2023}$) = $RC_{2023}$ * (1 + dPCI)

= J$ 38,783,399,715 x (1 + 38.72%)
= J$ 53,798,835,746.00

**Determination 1**

Having reviewed JPS's proposal for the computation of the Growth Rate of Inflation and the Exchange Rate, and the Rate of Change of the Revenue Cap, the Office approves the following:

- A Growth Rate (dI) of 39.54%.
- A Rate of Change of the Revenue Cap (dPCI) of 38.72%.
- An Adjusted Revenue Cap of J$53,798,835,746.00.

### 4.4 The Revenue True-Up Mechanism

**4.4.1** The revenue true-up mechanism can be broken down into four main components:

1. *Revenue Surcharge* (): which is comprised of:
    a. The Volumetric Adjuster ($TUVol_{y-1}$)
    b. The System Losses Adjuster ($TULos_{y-1}$)
2. *Foreign Exchange (FX) Surcharge* ($SFX_{y-1}$)
3. *Interest Expense Surcharge* ($SIC_{y-1}$); and
4. *Opportunity Cost Adjuster* (1+WACC)

$$Revenue\ True\ Up = \left(RS_{y-1} + SFX_{y-1} - SIC_{y-1}\right) * (1 + WACC)$$

**4.4.2** In any given year, if the actual revenue registered by JPS exceeds the established revenue target, the difference in revenue, which is the 'Revenue True-up' would be negative. Consequently, there would be a reduction of the revenue requirement by the difference at the annual review period. On the other hand, a positive 'Revenue True-up' would lead to an increase in the revenue requirement by the difference.

### 4.5 The Revenue Surcharge ($RS_{2022}$)

**4.5.1** The Revenue Surcharge component is expressed as, ($RS_{y-1}$),

Where, $RS_{y-1} = TUVol_{y-1} + TULos_{y-1}$

$TUVol_{y-1}$, Volumetric adjuster

$TULos_{y-1}$, System Losses Adjuster

**4.5.2** In the 2021 Annual Review the OUR calculated the System Losses Incentive/Penalty adjustment exclusively based on JPS's Non-fuel costs. In its Reconsideration Decision document issued in 2021 December, the OUR signaled to JPS that the correct approach is

to also employ IPP Non-fuel cost in the calculation. In this context, the OUR in the 2022 Annual Review corrected the 2021 Annual Review calculation and also applied it to the System Losses Incentive/Penalty calculation that year.

**4.5.3** JPS has disagreed with the OUR's methodology in the System Losses Incentive/Penalty. Hence, the OUR has set out in Section 4.6 the reason for its decision.

## 4.6 Reasons for Including IPP Non-Fuel Cost in the System Losses Incentive/Penalty Mechanism

**4.6.1** The Office of Utilities Regulation (OUR) in its 2022 Annual Review Determination Notice paragraph 5.8.8 reiterated its conclusion as stated in the Reconsideration Decision 2021 as follows:

> *"[C]onsistent with the intent of the Licence, the computation of the system losses incentive/penalty has been based on the aggregation of JPS's and IPP's non-fuel costs. Therefore, the separation of the two cost categories for reasons of transparency and optics cannot be deemed as the basis of eliminating the IPP component from the equation."*

**4.6.2** Based on this conclusion, the annual system losses penalty for 2020 and 2021 was calculated using the Annual Revenue Target (ART) which included both JPS and the IPP non-fuel[3] costs reversing the approach adopted for the 2020 review and consistent with the approach signaled in a reconsideration notice shortly after the issuance of the determination notice. For 2020, the total system losses adjustment based on both JPS and IPP non-fuel revenue requirement was -$1,366,677,340. However, the incremental system losses adjustment required for the IPP non-fuel cost in the 2022 Annual Review Determination Notice was -$516,081,900 since an amount equal to -$850,595,440 was already accounted for in the 2021 Annual Review Determination Notice.

**4.6.3** For 2021, the combined effect of JPS and IPP non-fuel revenue requirement on system losses was -$1,763,956,626, of which -$687,040,746 was attributable to IPP non-fuel cost.

**4.6.4** In response, JPS appealed the OUR's decision, by way of a submission to the Electricity Appeals Tribunal in 2022 September, contending that:

1. The OUR breached JPS's legitimate expectation by including IPP revenues in the system loss calculations in circumstances where representations had been made in the Final Criteria that "*IPP revenues would be decoupled from other non-fuel revenue as a cost pass through*."
2. The OUR's proposal to adjust the 2022 Annual Revenue Target to include IPP revenues is unlawful because "*the cost of IPP generated energy is a component of the fuel cost pass through and therefore the revenue generated from the sale*

[3] See JPS Annual Review and Extraordinary Rate Review 2022, p.40-43.

*of such energy should not be treated as a component included in the formula set out in Schedule [3] of the Licence.*"

**4.6.5** The occasion of the 2023 Annual Tariff Adjustment has provided an opportunity for the OUR to further re-examine the conclusions arrived at in the Reconsideration Decision 2021 and the 2022 Annual Review Determination Notice and to set out the reasoning in support of, and the ramifications of its decision.

**The Engineering Perspective**

**4.6.6** In the Single Buyer model, the Single Buyer purchases energy from the IPPs at an interconnection point with these generators. Thereafter, ownership of the energy is transferred to the Single Buyer who is solely responsible for transporting this energy across its transmission and distribution (T&D) network to meet the demand of its customers. Therefore, the cost of system losses encountered on the grid, which comprises both JPS's and IPPs' costs, is within the domain of the Single Buyer. Given this, it is appropriate for IPPs' non-fuel cost and JPS's non-fuel cost to be captured in the System Losses Incentive/Penalty Mechanism since the losses occur on JPS's owned and operated network.

**The Prior Fuel Cost Mechanism**

**4.6.7** The question arises for consideration as to whether the application of IPPs cost and JPS's cost to the System Losses Incentive/Penalty Mechanism is a new construct. The answer is that it is not.

**4.6.8** Prior to the issuing of the Licence 2016, the System Losses Incentive/Penalty calculation was based on the total fuel cost instead of the total non-fuel cost. The total fuel cost includes both JPS's and IPPs' fuel costs[4]. In this regard, the System Losses Incentive/Penalty Mechanisms recognized that the total fuel used for generation (all other things being equal) varies directly with system losses. In other words, higher system losses lead to more energy generation to satisfy customers' demand, which translates to higher total fuel costs. Consequently, the System Losses Incentive/Penalty Mechanism computed all fuel costs regardless of their source. It is therefore evident that although there was a change in the System Losses Incentive/Penalty Mechanism in 2016, there was no indication of a derogation from this principle and so the responsibility still spans IPPs and JPS's cost elements.

[4] See Schedule 3, Exhibit 2 of the 2011 Licence

The Existing System Losses Mechanism: Continuity Amidst Change

**4.6.9** Consideration must be given to the question of what accounted for the change in the JPS system losses mechanism in 2016? In large measure, this is explained by two factors which are outlined below.

**4.6.10** Firstly, there was the view that because of Jamaica's high dependence on fossil fuels as the source of electricity generation, fuel rates tend to be volatile. This sometimes resulted in huge swings in the monthly fuel rates and consequently, the penalty paid out by JPS under this methodology was unstable.

**4.6.11** Secondly, it was argued that the system losses mechanism did not consider the reality of social losses, which could not be reversed solely by the effort of JPS. It was therefore posited that the reduction of social losses required a collaborative approach, and the government should take responsibility for such losses.

**4.6.12** Arising from a renegotiation of the Licence 2016 the following agreements were reached and codified in Exhibit 1 of Schedule 3 of the 2016 Licence:

1. *Volatile penalties*: To address this factor, the Licence 2016 is based on a revenue cap methodology which:
    a. Shifted the focus of the system losses mechanism from the fuel to the non-fuel component of JPS' revenue.
    b. Provided for an annual system losses adjustment via a revenue surcharge mechanism which replaced the mechanism based on monthly adjustments to the fuel rates.

    Further, as delineated in paragraphs 27, 28 and 31, Schedule 3 of the Licence 2016, the revenue requirement contains both JPS and the IPP non-fuel operating costs.

2. Social losses: To deal with social losses, the computation of the system losses rate was disaggregated to reflect the components of non-technical losses that are the responsibility of the GOJ separately and apart from JPS's responsibility.

**4.6.13** With these two major adjustments, the computation of the Annual Revenue Target ($ART_y$) in any given year is derived from the system losses performance in the previous year (i.e., $TULos_{y-1}$). In this regard, the system losses construct translates to the product of the system losses margin[5] (i.e., $Y_{y-1}$) and the Actual Revenue Target ($ART_{y-1}$). In this construct, the Annual Revenue Target contains both JPS and IPP non-fuel costs. As stated in Exhibit 1 of the Licence 2016, the System Losses Incentive/Penalty Mechanism is expressed as:

$$TULos_{y-1} = Y_{y-1} * ART_{y-1}$$

[5] By system losses margin we mean the deviation of the actual system lasses rate from the target system losses rate

**4.6.14** It is therefore clear that there has been a change in approach from the application of fuel cost to non-fuel cost in the System Losses Incentive/Penalty Mechanism since 2016. However, the principle that non-fuel IPP and JPS's non-fuel cost are integral to the mechanism has not changed. This is borne out in fact that in the years 2016 -2020 both IPP and JPS non-fuel costs were incorporated in the calculation of System Losses Incentive/Penalty Mechanism without dispute.

**Decoupling of Non-fuel IPP cost**

**4.6.15** A clear distinction is to be made between the Revenue Requirement and the billing process. Both are related and are sometimes confused, but each is different.

**4.6.16** The Revenue Requirement under the revenue cap principle, as defined in paragraph 27, Schedule 3 of the Licence 2016, represents the summation of (1) the return on investment, and (2) the "Recovery of **all** prudently incurred expenses of the Licensed Business. In the Jamaican context, a further distinction may be made between the Non-Fuel Revenue Requirement and the Fuel Revenue Requirement. As the name suggests the Fuel Revenue Requirement represents expenses that are recoverable but pertains exclusively to the company's fuel costs. In the Jamaican context, these costs are passed on fully to customers after being adjusted against generation efficiency targets. The Non-Fuel Revenue Requirement reflects all costs that are not fuel expenses and includes Non-fuel IPP costs.

**4.6.17** The Billing Construct on the other hand represents the vehicle used by JPS to recover its Revenue Requirement. Consequently, it is comprised of a set of rates and charges (e.g. Energy rate, Customer charge, Fixed IPP rate etc.) that are applied to customers' bills to facilitate the inflow of the revenue required by JPS to carry out its business. Given that decoupling in this instance operates at the Revenue Requirement and the Billing Construct levels the distinction between them is important to the appreciation of IPP cost decoupling.

Decoupling at the Level of Revenue

**4.6.18** The Annual Revenue Target in Exhibit 1, Schedule 3 of the Licence 2016 contains two basic components:

1. The revenue cap for the current year ($RC_y$); which is JPS's total revenue requirement is comprised of all of JPS's non-fuel revenues and all IPP non-fuel costs; and

2. The performance-based component[6], which adjusts JPS's total non-fuel revenue target on the basis of the previous year's performance. Included in the adjustment component is the System Losses Incentive/Penalty Mechanism[7].

**4.6.19** The full equation is:

$$ART_y = RC_y(1 + (dI + Q \pm Z)) + \left(RS_{y-1} + SFX_{y-1} - SIC_{y-1}\right) * (1 + WACC)$$

Where:

$ART_y$=Allowed Revenue Target for current year(i.e.,y)

$RC_y$=the Approved Revenue Cap for current year (i.e.,y)

dPCI =change in inflation

$RS_{y-1}$=Adjustment for previous year Revenue under/over-recovery

$SFX_{y-1}$=Adjustment for previous year Net Foreign Exchange Losses

$SIC_{y-1}$=Adjustment for Net Interest Income on unpaid Customer bills

WACC=the Weighted Cost of Capital

**4.6.20** Two factors which are mutually recognized by JPS and the OUR are[8]:

1. Non-fuel IPP cost is a part of the overall non-fuel requirement; and
2. The rigid application of the price adjuster ("dPCI") to the Revenue cap ($RC_y$) in the formula would lead to a distortion.

**4.6.21** This is evident in JPS's 2019 – 2024 Rate Review Application, in which it proposed that:

*(i) Base non-fuel [IPP] cost for the 2019-2023 period will be set based on the latest forecast available in 2019 and will be included in the non-fuel revenue requirement for each tariff year.*

*(ii) The base non-fuel [IPP] cost will not be subject to dPCI adjustment of the revenue cap at the annual adjustment periods (i.e., the base amount will stay constant in 2018 dollars).*

**4.6.22** Regarding JPS's first proposal above, the reality that non-fuel IPP cost is in the revenue requirement and is therefore embedded in the revenue cap is incontestable. Consequently, it is a part of the $ART_y$ equation which in any given year would have a precise value. That

[6] The performance-based component of $ART_y$ before the opportunity cost adjustment is ($RS_{y-1}$ + $SFX_{y-1}$ – $SIC_{y-1}$)
[7] The System Losses Incentive/Penalty Mechanism is in the adjustment for previous year Revenue under/over-recovery factor ($RS_{y-1}$)
[8] See p.287-288 of JPS's 2019-2024 Rate Review Application

said, decoupling in this instance means splitting the revenue cap into a JPS component and an IPP component. Hence, consistent with the associative laws of addition, changing the way variables are associated within an equation does not alter in any way the value of the equation. In this regard, the value of $ART_y$ or $ART_{y-1}$, for that matter would not change as a result of the decoupling exercise.

**4.6.23** The OUR in specifying JPS's revenue cap in 2019-2024 Rate Review Determination Notice stated in Determination 29 that:

> *Subject to the Z-Factor conditions set out in Schedule 3 the Licence and the Final Criteria the revenue caps ($RC_y$) for 2019 – 2023 are as follows:*
>
> - ***2020:*** *J$36,470M*
> - ***2021:*** *J$37,857M*
> - ***2022:*** *J$37,957M*
> - ***2023:*** *J$38,783M*

**4.6.24** However, the OUR did not explicitly state that these revenue caps solely captured JPS's non-fuel cost. Admittedly, this may have created an ambiguity that could have led JPS to incorrectly assume that IPP non-fuel cost is excluded from the System Losses Incentive/Penalty Mechanism. Notwithstanding, the OUR clearly showed in Table 11.40 of the 2019 -2024 Rate Review Determination Notice[9] that JPS's Total Revenue Requirement (non-fuel) consists of the company's Required Revenue plus Power Purchase Cost (excluding fuel). Additionally, it is critical to note that if a cost is a component of the revenue requirement it is a component of the revenue cap and as the law of equations confirms it must be a part of the $ART_y$ even if it is decoupled within the overall revenue cap.

Decoupling at the Level of the Billing Construct

**4.6.25** Criterion 4 (d) of the Final Criteria stipulates that JPS should:

*"Provide details on its power purchase costs which shall be decoupled from other operating expenses to allow for a direct pass-through to customers".*

**4.6.26** Further, in paragraph 3.7.8 of the Final Criteria it asserts that:

> *Given that the non-fuel power purchase cost is recognized as a part of JPS' OPEX[10], even though it is out of the control of JPS, it should be decoupled from other non-fuel costs and treated as a direct pass through on customers' monthly bill.*

**4.6.27** In both of these cases, the OUR was referring to the treatment of IPP non-fuel costs in JPS's 'Billing Construct'. The OUR took the view then, and still maintains, that separating non-fuel costs from JPS's non-fuel cost and showing it separately on the bill enhances transparency and contributes to cost reflectivity. Treating IPP non-fuel cost in this way

[9] See the JPS 2019-2024 Rate Review Determination Notice, p.269
[10] OPEX means operating expenditure.

simply allows that component of cost to be visible to customers in a similar manner to the pass-through treatment of fuel cost in the Billing Construct.

**4.6.28** Notwithstanding the decoupling of IPP non-fuel cost in the Billing Construct, it does not exempt JPS from its system losses obligation or benefit expressed in the formulation of the Annual Revenue Target. It is instructive for context and ought not to be overlooked that even though fuel cost was a pass-through in the Billing Construct prior to 2016, both IPP and JPS's non-fuel costs were components of the System Losses Incentive/Penalty Mechanism. Therefore, the fact that IPP non-fuel cost is now a pass-through in the Billing Construct does not translate to its removal from the revenues that form a part of the System Losses Incentive/Penalty Mechanism.

**Conclusion**

**4.6.29** In conclusion there are four clear reasons why IPP non-fuel cost must be included in the System Losses Incentive/Penalty Mechanism.

**4.6.30** Firstly, from an engineering perspective, JPS is responsible for transporting the energy it purchases from IPPs across its T&D grid in the same way it does for the energy it produces. Consequently, by being the owner and operator of the grid, the engineering construct makes it responsible for the proportion of system losses that it is assigned for both IPP non-fuel cost and its own non-fuel cost.

**4.6.31** Secondly, the System Losses Incentive/Penalty Mechanism employed total fuel cost (JPS and IPP) in its calculation prior to 2016. When the new Licence 2016 was published, a switch was made from the use of fuel cost to non-fuel cost as a component of the System Losses Incentive/Penalty Mechanism. However, amidst a change in methodology in the Licence 2016, there was the continuity principle in that the system losses calculation should include both JPS and IPP non-fuel costs was maintained. This is evident in the definitions of the revenue requirement and revenue cap and the procedure followed up to 2020.

**4.6.32** Thirdly, based on the laws of equations, the process of decoupling components of an equation cannot cause a change in the value of the equation. It is on this basis that the value of the Annual Revenue Target equation remains intact after the decoupling of JPS and IPP non-fuel costs. In this regard, the value of $ART_y$ applicable and by extension the System Losses Incentive/Penalty would not change after the decoupling procedure.

**4.6.33** Fourthly, the suggestion that if a component of JPS cost is a pass-through to customers it is insulated from the System Losses Incentive/Penalty Mechanism has no basis. The argument that IPP non-fuel cost should not be in the system losses calculation because it is pass-through has been premised on the current treatment of fuel cost. Currently, fuel cost is a pass-through and is not incorporated in the system losses calculation. However, the claim of exemption if a cost is a pass-through cannot be substantiated. As recently as 2015 fuel which is a pass-through and also a component of the System Losses Incentive/Penalty

Mechanism. This establishes that there is clear precedent for the inclusion of pass-through costs in the system losses calculation, where warranted.

**4.6.34** Against this backdrop, the decision to maintain IPP non-fuel cost was not arbitrary, but rather the outcome of sound reasoning and regulatory fairness.

## 4.7 Review of JPS Volumetric True-up Mechanism

**4.7.1** In reviewing the treatment of the System Losses Incentive/Penalty Mechanism (see Section 4.6) the OUR considered it prudent to revisit the Volumetric True-up mechanism (TUVoly-1) as well, since together they constitute the Revenue Surcharge for the previous year (RSy-1). As defined in Exhibit 1, Schedule 3 of the Licence 2016, the Revenue Surcharge is expressed as:

$$\mathrm{RS}_{y-1} = \mathrm{TUVol}_{y-1} + \mathrm{TULos}_{y-1}$$

Where: $\mathrm{TUVol}_{y-1}$ = the Volumetric True-up

$\mathrm{TULos}_{y-1}$ = the System Losses Incentive/Penalty Mechanism

**4.7.2** Resulting from the re-examination of the Volumetric True-up formula, the OUR's in its treatment of thee computation in the 2021 and 2022 Annual Rate Reviews did not include the IPP non-fuel revenues.

**4.7.3** The Volumetric True-up formula determines the revenue over or under-recovery by multiplying the percentage variance for each of the three (3) billing variables with the respective Non-fuel Revenue Target. In this respect, the applicable Volumetric True-up in any given year is the summation of the volumetric true-ups for energy, demand, and customer charges. Accordingly, the formulas for the calculation of the three Volumetric True-ups are as follows:

$$\boldsymbol{Energy\ True\ Up} = \left(\frac{kWh\ Target_{y-1} - kWh\ Sold_{y-1}}{kWh\ Target_{y-1}}\right) * Non\ Fuel\ Rev\ Target\ for\ Energy$$

$$\boldsymbol{Demand\ True\ Up} = \left(\frac{kVA\ Target_{y-1} - kVA\ Sold_{y-1}}{kVA\ Target_{y-1}}\right) * Non\ Fuel\ Rev\ Target\ for\ Demand$$

$$\boldsymbol{Customer\ True\ Up} = \left(\frac{Cust.Ch.Target_{y-1} - Cust.Billed_{y-1}}{Cust.Ch.Target_{y-1}}\right) * Non\ Fuel\ Rev\ Target\ for\ Cust.Ch.$$

**4.7.4** Where the Total Volumetric True-up is:

**$\mathrm{TUVol}_{y-1}$ = Energy True-up + Demand True-up + Customer True-up**

**4.7.5** It is important to note that the kWh Target and kWh Sold in the Energy True-up equation relate to all kWhs. In this regard, there is no distinction between JPS and IPP kWh. Consequently, the associated Non-Fuel Revenue Target should capture JPS and IPP Non-fuel Revenue Targets. The same is true for the Demand True-up, for which the Demand Non-Fuel Revenue Target should capture JPS and IPP Non-fuel Revenue Targets. This treatment of the Volumetric True-up is consistent with the Annual Revenue Target ($ART_y$) construct detailed in Exhibit 1, Schedule 3 of the Licence 2016. As demonstrated in Section 4.6, $ART_y$ is comprised of both JPS and IPP non-fuel costs, and the non-fuel Revenue Targets should not differ from this construct.

**4.7.6** Further, given that the IPP non-fuel cost is a pass-through in the current Billing Construct and the Revenue Surcharge calculation is done retrospectively (one year later) the IPP Non-fuel Revenue Target for energy and demand should be equivalent to the actual IPP Revenue. In this regard, Non Fuel Revenue Target for Energy and Demand may be defined as follows:

***Energy***

**Non Fuel Revenue Target for Energy $_{y-1}$ = JPS Non Fuel Revenue Target for Energy $_{y-1}$ + IPP Actual Non Fuel Energy Revenue $_{y-1}$**

***Demand***

**Non Fuel Revenue Target for Demand $_{y-1}$ = JPS Non Fuel Revenue Target for Demand $_{y-1}$ + IPP Actual Non Fuel Demand Revenue $_{y-1}$**

**4.7.7** Given that there are no IPP customer charges, the Non Fuel Rev Target for Customer charges is based entirely on JPS Non Fuel Revenue Target for Customer charge, and as such it may be expressed as follows:

***Customer***

**Non Fuel Revenue Target for Customer charge $_{y-1}$ = JPS Non Fuel Revenue Target for Charge $_{y-1}$**

**4.7.8** Given that the Volumetric True-up computation in the 2021 and 2022 Annual Reviews were based exclusively on JPS's Non Fuel Revenue Targets for both energy and demand, the OUR computed the incremental effect of including the IPP Non-fuel energy and demand revenues for the 2021, 2022 and 2023 Annual Reviews[11].

[11] The IPP adjustment in any given Annual Review is based on the IPP actual cost in the previous year.

**4.7.9** Table 4.2 shows that while the incremental IPP revenue adjustment for the 2021 Annual Review was an over recovery of $1.945 billion, there were under recoveries of $0.560 billion and $0.304 billion for the 2022 and 2023 Annual Reviews respectively. The total adjustment for IPP non-fuel revenue surcharge over the three (3) years is therefore $1.082 billion.

**4.7.10** Considering the fact that the $1.082 billion adjustment now required reflects a three-year period, the Office has determined that this adjustment should take place over a two-year period. This translates to an incremental volumetric adjustment of $540,889,049 in this Annual Review and the other half in the 2024-2029 Rate Review.

**Table 4.2: Incremental IPP Volumetric Adjustment**

| *COST COMPONENT* | *Unit* | ANNUAL REVIEW | | | |
|---|---|---|---|---|---|
| ***Energy*** | | **2021** | **2022** | **2023** | **TOTAL** |
| Energy Target$_{y-1}$ | kWh | 3,068,000,000 | 2,995,809,473 | 3,071,939,033 | 9,135,748,506 |
| Energy Actual$_{y-1}$ | kWh | 2,938,823,406 | 2,979,609,881 | 3,064,925,059 | 8,983,358,345 |
| Actual IPP Energy Revenue$_{y-1}$ | J$ | 8,048,589,858 | 9,975,161,857 | 11,440,860,299 | 29,464,612,014 |
| **Energy Surcharge $_{y-1}$** | **J$** | **338,881,821** | **53,939,863** | **26,122,231** | **418,943,915** |
| ***Demand*** | | | | | |
| Demand Target$_{y-1}$ | KVA | 4,700,980 | 5,345,185 | 5,299,408 | 15,345,573 |
| Demand Actual $_{y-1}$ | KVA | 5,312,587 | 5,198,593 | 5,223,344 | 15,734,524 |
| Actual IPP Demand Revenue $_{y-1}$ | J$ | 17,559,608,450 | 18,438,474,329 | 19,378,105,774 | 55,376,188,553 |
| **Demand Surcharge $_{y-1}$** | **J$** | **(2,284,539,648)** | **505,677,357** | **278,140,278** | **(1,500,722,013)** |
| ***Total*** | | | | | |
| Total IPP Cost$_{y-1}$ | J$ | 25,608,198,308 | 28,413,636,186 | 30,818,966,073 | 84,840,800,567 |
| **Total IPP Vol. Adjustmennt** | **J$** | **(1,945,657,827)** | **559,617,220** | **304,262,508** | **(1,081,778,099)** |
| **IPP Vol. Adjustment for 2023** | J$ | | | | **(540,889,049)** |
| **IPP Vol. Adjustment for 2024** | J$ | | | | **(540,889,049)** |

### The OUR Decision

**4.7.11** The Office after having reviewed the Volumetric True-up mechanism in Exhibit 1, Schedule 3 of the Licence 2016, has concluded that the Non-fuel Revenue Target in the mechanism also includes the IPP Non-fuel Revenue Target.

**4.7.12** Additionally, given that Volumetric True-ups are done retrospectively at which time the actual IPP Non-fuel revenues are known pass-through items, the actuals are to be applied in the Volumetric True-up calculation.

**4.7.13** Given that IPP Non-fuel revenues were not included in the Volumetric True-up calculations in the 2021 and 2022 Annual Reviews, the incremental IPP Non-fuel Revenue adjustment has been computed for Annual Reviews 2021, 2022 and 2023.

**4.7.14** The total incremental IPP Non-fuel Revenue adjustment for the three-year review period 2021-2023 is -$1,081,778,099. Given the effect this would have on JPS revenues stream the Office has determined that the adjustment should be done in two (2) equal tranches over a two (2) year period namely, the 2023 Annual Review and in the 2024-2029 Rate Review.

**Determination 2**

The Office having reviewed the Volumetric True-up mechanism in Exhibit 1, Schedule 3 of the Licence 2016, concludes that the Non-fuel Revenue Target in the mechanism also includes the IPP Non-fuel Revenue Target.

The total incremental Revenue Surcharge adjustment based on the inclusion of actual IPP Non-fuel Revenue in the calculation amounts to **negative $1,081,778,099.**

To reduce the immediate impact the incremental IPP Non-fuel Revenue adjustment would have on JPS, the Office approves the application of the adjustments in two tranches of $540,889,049. The first to be applied in this 2023 Annual Review and the second in the 2024-2029 Rate Review.

## 4.8 True-Up Volumetric Adjustment (TUVol2022)

**4.8.1** The volumetric adjustment for any year is dependent on the variance between the target billing determinants and actual results for the period under review.

**4.8.2** The billing determinants for the Volumetric Adjuster ($TUVol_{y-1}$) on which the true-up is based are, Energy (kWh), Demand (kVA) and Number of Customers. The formula for the computation of the adjustment is as follows:

$$\mathbf{(TUVol_{y-1}) = Energy\ True\text{-}up + Demand\ True\text{-}up + Customer\ True\text{-}up}$$

Where:

$$\boldsymbol{Energy\ True\ Up} = \left(\frac{kWh\ Target_{y-1} - kWh\ Sold_{y-1}}{kWh\ Target_{y-1}}\right) * Non\ Fuel\ Rev\ Target\ for\ Energy$$

$$\boldsymbol{Demand\ True\ Up} = \left(\frac{kVA\ Target_{y-1} - kVA\ Sold_{y-1}}{kVA\ Target_{y-1}}\right) * Non\ Fuel\ Rev\ Target\ for\ Demand$$

$$\boldsymbol{Customer\ True\ Up} = \left(\frac{Cust.Ch.Target_{y-1} - Cust.Billed_{y-1}}{Target_{y-1}}\right) * Non\ Fuel\ Rev\ Target\ for\ Cust.Ch.$$

**4.8.3** The non-fuel revenue targets for energy, demand and customer charge are matched to the respective components of the target billing determinants. The approved 2022 targets for the billing determinant components are as follows:

- Energy sales : 3,072 GWh
- Billing demand : 5,299,408 kVA
- Customer count forecast : 694,708

**4.8.4** The overall total annual revenue target for 2022 is $48,160,407,073 and the allocation based on the billing determinant components are as shown in Table 4.3 below:

**Table 4.3: Annual Revenue Target 2022**

| Component of Revenue | Target Value (J$) |
|---|---|
| Non-fuel revenue targets for energy | 30,951,845,753 |
| Non-fuel revenue targets for demand | 11,632,921,695 |
| Non-fuel revenue targets for customer charge | 5,575,639,625 |
| **Total** | **48,160,407,073** |

**4.8.5** As shown in Table 4.4 below, the volumetric adjustment based on actual 2022 billing determinants is -$280.09M. This is the aggregate of surcharge adjustments for Energy, Demand and Customer charges in the amounts of $70.7M, $167.0M, $23.2M respectively, and an adjustment of -540.89M, which is 50% of the amount relating to IPP Revenue Requirement for the years 2020, 2021 and 2022, which are now included in the Revenue Cap.

**Table 4.4: Computation of the Volumetric Adjustment ($TUVol_{2022}$)**

| Volumetric Adjustment for 2022 ($TUVol_{2022}$) | | | |
|---|---|---|---|
| **Line** | **Description** | **Formula** | **Value (J$)** |
| | **Energy Surcharge** | | |
| L1 | kWh $Target_{2022}$ | | **3,071,939,033** |
| L2 | kWh $Sold_{2022}$ | | 3,064,925,059 |
| L3 | Revenue Target for Energy | | **30,951,845,753** |
| L4 | kWh Surcharge | (L1-L2)/L1*L3 | 70,670,494 |
| | **Demand Surcharge** | | |
| L5 | kVA $Target_{2022}$ | | **5,299,408** |
| L6 | kVA $Sold_{2022}$ | | 5,223,344 |
| L7 | Revenue Target for Demand | | **11,632,921,695** |
| L8 | kVA Surcharge | (L5-L6)/L5*L7 | 166,970,616 |
| | **Customer Count Surcharge** | | |
| L9 | #Customer Charges Billed $Target_{2022}$ | | **694,708** |
| L10 | #Customer Charges $Billed_{2022}$ | | 691,823 |
| L11 | Revenue Target for Customer Charges | | **5,575,639,625** |
| L12 | Customer Charges Surcharge | (L9-L10)/L9*L11 | 23,153,694 |
| | **Adjustment Relating to IPP Costs** | | **(540,889,049)** |
| **L13** | **$TUVol_{2022}$** | **L4+L8+L12** | **(280,094,245)** |

**4.8.6** The result of the OUR's computation is at variance with JPS's computation. In its computation, JPS inadvertently used the Adjusted Revenue Cap amount of J$50,185,346,705.00 instead of the Annual Revenue Target amount of J$48,160,407,073.00. JPS proposed a volumetric adjustment amount of J$271.8M.

## 4.9 True-Up System Losses Adjustment (TULos2022)

**4.9.1** In computing the system losses true-up ($TULos_{2021}$), the disaggregation of system losses into its three (3) established components is required.

The components are as follows:
TL = Technical Losses
JNTL = Portion of Non-technical losses which is completely within JPS's control
GNTL = Portion of Non-technical losses which is not completely within JPS's control

**4.9.2** Each component is measured against a target that is established by the OUR, as shown in the following equations:

$Ya_{y-1}$ = Target System Loss "a" Rate%$_{y-1}$ – Actual System Loss "a" Rate%$_{y-1}$

$Yb_{y-1}$ = Target System Loss "b" Rate%$_{y-1}$ – Actual System Loss "b" Rate%$_{y-1}$

$Yc_{y-1}$ = (Target System Loss "c" Rate%$_{y-1}$ – Actual System Loss "c" Rate%$_{y-1}$) * RF

Where:

RF = The responsibility factor determined by the Office, which is a percentage from 0% to 100%.

**4.9.3** The variances of the three losses components from the target are used to compute a total variance $Y_{y-1}$ in year "y-1" as shown below:

$Y_{y-1} = Ya_{y-1} + Yb_{y-1} + Yc_{y-1}$

**4.9.4** $TULos_{y-1}$ for year "y-1" (the year preceding the adjustment year) is computed as:

$TULos_{y-1} = Y_{y-1} * ART_{y-1}$

**4.9.5** JPS proposed total actual system losses of 28.36% should be allocated as follows:

- Technical losses (TL) : 7.77%
- Non-technical losses (NTL) : 20.59%
  - JNTL : 3.85%
  - GNTL : 16.74%

**4.9.6** JPS proposed system losses performance adjustment of negative $437.3 million, which represents $Y_{2022}$ of -0.91%.

**4.9.7** The OUR's assessment results in a true-up system losses adjustment of negative $2.195B, which represents the product of a $Y_{2022}$, of -2.77% and the combination of the $ART_{2022}$ plus IPP Costs.

**4.9.8** The complete system losses adjustment for 2022 is shown in Table 4.5 below.

**Table 4.5: Computation of the 2022 System Losses Adjustment**

| System Losses Adjusment ($TULos_{2022}$) | | | |
|---|---|---|---|
| **Line** | **Description** | **Formula** | **Value (J$)** |
| | **Losses Surcharge** | | |
| L14 | Actual $TL_{2022}$ | | **7.77%** |
| L15 | Target $TL_{2022}$ | | **7.67%** |
| L16 | $Ya_{2021}$ | (L15-L14) | -0.10% |
| L17 | Actual $JNTL_{2022}$ | | **6.18%** |
| L18 | Target $JNTL_{2022}$ | | **4.24%** |
| L19 | $Yb_{2022}$ | (L18-L17) | -1.94% |
| L20 | Actual $GNTL_{2022}$ | | **14.41%** |
| L21 | Target $GNTL_{2022}$ | | **10.75%** |
| L22 | RF | | **20.00%** |
| L23 | $Yc_{2022}$ | (L21-L20)*L22 | -0.7320% |
| L24 | $Y_{2022}$ | L16+L19+L23 | -2.77% |
| L25 | **$ART_{2022}$ + IPP Costs** | | 79,166,286,483 |
| **L25** | **$TULos_{2022}$** | **L24*L25** | **(2,194,489,461)** |

## 4.10 The Foreign Exchange and Interest Surcharges ($SFX_{2022}$ - $SIC_{2022}$)

**4.10.1** Paragraph 55, Schedule 3 of the Licence 2016, makes provision for JPS to adjust the revenue requirement for foreign exchange (FX) loss/ (gain), provided they are prudently incurred costs. The provisions are as follows:

*"The Licensee shall be entitled to an adjustment to the non-fuel rate, based on the difference between the anticipated foreign exchange result loss/(gain) in the Revenue Cap for the previous year and the actual foreign exchange result incurred in the prior year related to Working Capital and Debt Service driven by JMD to USD foreign exchange results."*

**4.10.2** In accordance with the provisions of the Licence 2016, the OUR, in the 2019-2024 Rate Review Determination Notice, established the anticipated foreign exchange result loss/gain (TFX) in the Revenue Cap for the years 2020 to 2023. The TFX amount is set at J$280 million (2019 dollars) for each year of the Rate Review period. The J$280M is based on the actual foreign exchange loss/gain balance for the year 2018, as was recorded in the JPS 2018 audited accounts.

**4.10.3** JPS in its submission presented $TFX_{2022}$ = J$280M (2019) and stated that when adjusted for the 2022 growth rate (dI) of 33.02%, the approved FX losses provision for 2022 is J$372.5M. The computation was verified by the OUR.

**4.10.4** In making its claim for 2022 actual foreign exchange adjustment ($AFX_{2022}$), JPS continued to argue that the amount applicable should be the "actual (realised) FX loss".

**4.10.5** However, paragraph 55, Schedule 3 of the Licence 2016, provides for foreign exchange adjustments based on "*the anticipated foreign exchange result loss/ (gain) in the Revenue Cap for the previous year and the actual foreign exchange result incurred in the prior year"*. In this respect, *'anticipated'* means an amount which may include *'unrealised'* sums, and *'actual'* refers to what has occurred. It is therefore evident that the Foreign Exchange Result loss/(gain) or AFX as specified in the Licence 2016 encompasses both "unrealised foreign exchange loss/(gains)" and "realised foreign exchange losses", for which the summation of the two is the "net foreign exchange losses/(gain).

**4.10.6** Since the introduction of the revenue cap adjustment mechanism in 2016, in the Foreign Exchange Surcharge calculation and the establishment of the revenue caps for 2019-2023, the OUR has applied the "net foreign exchange losses" as it was reflected in the JPS's Audited Financial Accounts and consistent with Licence 2016. Furthermore, the "net foreign exchange losses" represents a fair treatment of JPS's foreign exchange exposure.

**4.10.7** Considering this, the OUR has not accepted JPS's claim that the "net foreign exchange losses" methodology should be changed to the use of "realised foreign exchange losses". Accordingly, the "net foreign exchange losses" approach has been applied in establishing the AFX.

**4.10.8** JPS proposed an $AFX_{2022}$ adjustment of J$1.27B. The OUR's assessment indicates that the actual amount is J$369.4M. This was derived by converting the "net foreign exchange losses" of US$2.407M to the Jamaican dollar, equivalent at the average 2022 exchange rate provided by JPS (i.e., J$153.48:US$1.00).

**4.10.9** JPS proposed a $TIC_{2022}$ provision of J$136.5M, when adjusted for the 2022 growth rate (dI) of 33.02%. This value for the $TIC_{2021}$, JPS explained, was derived from a formulation of Interest on Customer Deposits, Debt Issuance Costs and Expense/Income Annual Adjustment.

**4.10.10** In establishing the $TIC_{2022,}$ the OUR referred to paragraph 4.9.2 of 2021 Annual Review Determination Notice, which states that the 2019-2024 Rate Review Determination Notice made provisions for *"FX losses and Interest Surcharges (Expense/Income Annual Adjustment) in the amount of J$280Million and J$50 million respectively"*. Even though this was not explicitly stated in the 2019-2024 Rate Review Determination Notice, the supporting revenue requirement model confirms this. Accordingly, the OUR approved

$TIC_{2022}$ is the Interest Surcharge provision of J$50M plus the 2022 growth rate (dI) of 33.02%. This translates to the final $TIC_{2022}$ of J$66.5M.

**4.10.11** In its 2022 audited accounts, JPS reported total Interest Income of US$5.923M. Additionally, JPS provided the breakdown components of total Interest Income, which showed the total amount of US$2.361M for Interest Income on Government accounts and Interest Income on Other Commercial Accounts (See details in Table 4.6 below).

**Table 4.6: Interest Income and Net Late Payment Fees for 2022**

| Interest Income Breakdown | Amount (US$'000) 2022 |
|---|---|
| Interest Income on Government Accounts | 234 |
| Interest Income on Other Commercial Customers Accounts | 2,127 |
| Interest Income on Deposits and Bank Accounts | 3,562 |
| **Total Interest Income** | **5,923** |
| | |
| | **J$** |
| Early Payment Incentive | 906,827,325 |
| Late Payment Fee | (821,324,500) |
| **Net Late Payment Fees** | **85,502,825** |

**4.10.12** JPS also provided information, which shows that the total Net Late Payment Fees for 2022 is J$85.5M (See Table 4.2 above for details).

**4.10.13** Using the foregoing data analysis, the OUR's computation shows $TIC_{2022}$ of J$66.51M when adjusted for the 2022 growth rate (dI) of 33.02% and $AIC_{2022}$ of J$276.86 (See Table 4.7 below for details).

**Table 4.7: Computation of the Target and Actual Net Interest Expenses for 2022**

| 2023 Annual Adjustment | | | | | |
|---|---|---|---|---|---|
| | Target Interest Cost (TIC) | | | Actual Interest Cost (AIC) | |
| | JPS | OUR | | JPS Data | |
| | J$'000' Gross up @33.02% | J$'000' | J$'000' Gross up @33.02% | US$'000' | J$'000' |
| Interest on Government and Commercial Accounts | - | | | (2,361) | (362,367) |
| Net Late Payment Fees | | | | 557 | 85,503 |
| Net Interest Expense/(Income)-Annual Adjustment | (119,189) | (50,000) | (66,508) | | |
| **Total** | **(119,189)** | **(50,000)** | **(66,508)** | **(1,804)** | **(276,864)** |

**4.10.14** Based on the foregoing, the OUR's approved amount for FX Surcharge and Interest Surcharge offset adjustment is -$213.4 million. Details of the computation are shown in Table 4.8 below.

**Table 4.8: Computation of the FX Surcharge and Interest Surcharge offset ($SFX_{2022}$ - $SIC_{2022}$)**

| FX and Interest Surcharge for 2022 ($SFX_{2022}$ - $SIC_{2022}$) | | | |
|---|---|---|---|
| **Line** | **Description** | **Formula** | **Value (J$)** |
| | **FX Surcharge** | | |
| L1 | $TFX_{2022}$ | | 372,446,252 |
| L2 | $AFX_{2022}$ | | 369,426,360 |
| **L3** | **$SFX_{2022}$** | **L2-L1** | **(3,019,892)** |
| | **Interest Surcharge** | | |
| L4 | Actual Interest on Government and Commercial Accounts for 2022 | | (362,367,201) |
| L5 | Actual Net Late Payment fees for 2022 | | 85,502,825 |
| L6 | $AIC_{2022}$ | L4+L5 | (276,864,376) |
| L7 | $TIC_{2022}$ | | (66,508,259) |
| **L8** | **$SIC_{2022}$** | **L6-L7** | **(210,356,117)** |
| | | | |
| **L9** | **$SFX_{2022}$ offset $SIC_{2022}$** | **L3 offset L8** | **(213,376,008)** |

## 4.11 The 2022 Revenue True-Up and the 2023 Annual Revenue Target excluding Non-fuel IPP Cost ($ART_{2023}$)

**4.11.1** In accordance with the Licence 2016, the WACC, which is the weighted average cost of capital (opportunity cost) adjustment, was applied to the 2022 true-ups. The applicable WACC for the 2023 Annual Adjustment is 11.87%. As shown in Table 4.9 below, the total revenue true-up for 2022 is -$3,007.02 million inclusive of the WACC. This represents a net reduction to the 2023 Adjusted Revenue Cap ($Adj.RC_{2023}$) instead of the JPS proposed $968.1 million increase.

**Table 4.9: Computation of the 2022 Revenue True-Up**

| 2022 Revenue True-Up | | | | |
|---|---|---|---|---|
| **Line** | **Description** | **Formula** | **JPS Value (J$)** | **OUR Value (J$)** |
| L1 | Revenue Surcharge 2022 ($RS_{2022}$ = $TUVol_{2022}$ +$TULos_{2022}$) | | (165,536,383) | (2,474,583,706) |
| L2 | FX and Interest Surcharge ($SFX_{2022}$ offset $SIC_{2022}$) | | 1,030,950,090 | (213,376,008) |
| L3 | Weighted Average Cost of Capital (WACC) | | 11.87% | 11.87% |
| **L4** | **2022 Revenue True-Up** | **(L1+L2)x(1+L3)** | **968,138,314** | **(3,007,020,533)** |

**4.11.2** As a result of the computations set out above, the $ART_{2023}$ (excluding IPP Non-fuel cost) is J$50.79B. This is J$4.3B less than the $ART_{2023}$ (excluding IPP Non-fuel cost) of J$55.08B proposed by JPS. See Table 4.10 below for details.

**Table 4.10: Computation of the 2023 Annual Revenue Target ($ART_{2023}$) excluding IPP Non-fuel cost**

| 2023 Annual Revenue Target (J$) | | |
|---|---|---|
| **Description** | **Formula** | **Value** |
| Approved Revenue Cap | $RC_{2023}$ | 38,783,399,715 |
| Annual Rate of Change | dPCI | 38.72% |
| Adjusted Revenue Cap | $RC_{2023}$ * (1 + dPCI) | 53,798,835,746 |
| Revenue Surcharge | $RS_{2022}$ | (2,474,583,706) |
| FX Surcharge | $SFX_{2022}$ | (3,019,892) |
| Interest Surcharge | -$SIC_{2022}$ | (210,356,117) |
| WACC | | 11.87% |
| 2022 Adjustments | ($RS_{2022}$ + $SFX_{2022}$ - $SIC_{2022}$) * (1 + WACC) | (3,007,020,533) |
| **2023 Annual Revenue Target** | **$ART_{2023}$** | **50,791,815,213** |

**Determination 3**

Consistent with the methodology outlined in the Licence 2016, the Office has determined the following:

1 Revenue True-up for 2022 shall be negative $3,007,020.533.00 inclusive of the application of the weighted average cost of capital (WACC).

2 JPS Non-fuel Annual Revenue Target for 2023 ($ART_{2023}$) excluding IPP Non-fuel cost is J$50,791,815,213.00.

### 4.12 The Annual True-up Summary

**4.12.1** As pointed out earlier the OUR omitted to indicate that the Annual Revenue Target (non-fuel) continues to include both the Revenue cap for JPS and IPP even after the decision to decouple these two cost components in the 2019-2024 Rate Review. However, with decoupling the Revenue Cap for the IPP Non-fuel cost, this amount would logical be the actual IPP Non-fuel cost incurred. This is necessary to ensure that there is neither over nor under-recovery of a pass-through cost.

**4.12.2** Additionally, as previously indicated for regulatory consistency and in keeping with the Licence 2016, the decision was taken that all Non-fuel revenues should be subjected to the Volumetric True-up. Consequently, it was necessary to include IPP Non-fuel cost in the calculation. Arising from that decision, it was determined that over the 2021-2023 review period, JPS over-recovered J$1.082 billion, which should be returned to customers over a two-year period in equal tranches amounting to approximately J$0.541 billion. The details of the adjustments effected in relation to the Annual Revenue Target for 2022 and 2023 are shown in Table 4.11.

**Table 4.11: Annual Revenue Target and its Components (2022 & 2023)**

| | Annual Review | |
|---|---|---|
| | **2022** | **2023** |
| JPS' Non-Fuel ($RCJ_y$) Cap | 37,956,729,824 | 38,783,399,715 |
| | | |
| **Total Revenue Cap (RCJy)** | **37,956,729,824** | **38,783,399,715** |
| | | |
| Price Adjustor (dPCI) | 32.22% | 38.72% |
| | | |
| Sys. Losses Adjustment ($TULos_{y-1}$)-JPS | (1,076,752,716) | (1,340,804,101) |
| Sys. Losses Adjustment ($TULos_{y-1}$)-IPP | (688,203,910) | (853,685,360) |
| Volumetric Adjuster ($TUVol_{y-1}$)-JPS | 464,631,375 | 260,794,804 |
| Volumetric Adjuster ($TUVol_{y-1}$) -IPP | - | (540,889,049) |
| Foreign Exchange Surcharge (SFXy-1) | 558,630,725 | (3,019,892) |
| Interest Expense Surcharge (SICy-1) | (371,774,709) | (210,356,117) |
| **Sur-Charge (Including WACC)** | **(1,245,638,033)** | **(3,007,020,533)** |
| | | |
| Reconsideration of SIC (Decision#1) | (263,219,698) | |
| Reconsideration of Sys. Losses | (516,081,901) | |
| **IPP Non-Fuel ($RCIP_y$) Actual** | **30,818,966,073** | **30,936,854,141** |
| | | |
| **Current -Annual Revenue Target (ARTy)** | **79,758,674,745** | **81,728,669,354** |
| | | |
| **JPS Revenue Cap Adjusted for dPCI** | **50,185,346,705** | **53,798,835,746** |
| | | |
| WACC | 11.87% | 11.87% |
| Sys. Losses Margin ($Y_{y-1}$) | -2.42% | -2.77% |

**4.12.3** It should be noted that the Annual Revenue Target for 2022 and the estimated Annual Revenue Target 2023, which includes IPP Non-fuel costs are J$79.76 billion and J$81.73 billion. The actual Annual Revenue Target will be confirmed at the end of 2023 because all actual IPP costs will be known at that time.

# 5 Capital Projects Assessment – Z-Factor Adjustment

## 5.1 Introduction

**5.1.1** The 2019 – 24 Rate Review was the first instance in which JPS's capital investment plan was done on a forecast basis, in accordance with the new revenue cap regime. Consequently, the budget for each project in the capital investment plan has been allocated for each year of the 2019 – 2024 tariff period. The overall cost of the capital investment plan approved by the OUR for 2019 – 2024, along with the three most recent years of the plan, is presented in Table 5.1 below.

**Table 5.1: Summary of Capital Projects for the Tariff Period 2019-2024**

| Summary of the Project Areas for the Tariff Period 2019-2024 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project Areas** | **Total Cost Approved (2019-2024)** | **Annual Approval** | | | **Actual Cost** | **2022 Variance** | |
| | | **2020** | **2021** | **2022** | **2022** | | |
| | (US$'000) | (US$'000) | (US$'000) | (US$'000) | (US$'000) | (US$'000) | % |
| Generation | 78,808 | 15,503 | 12,784 | 20,854 | 24,154 | 3,300 | 15.8% |
| Transmission | 69,746 | 9,514 | 11,543 | 15,930 | 6,781 | -9,149 | -57.4% |
| Distribution | 144,840 | 31,259 | 30,849 | 26,689 | 30,691 | 4,002 | 15.0% |
| System Losses Mitigation | 89,930 | 12,199 | 19,568 | 15,695 | 16,379 | 684 | 4.4% |
| Information Technology | 26,481 | 6,050 | 7,181 | 7,070 | 3,092 | -3,978 | -56.3% |
| General Plant | 14,184 | 3,532 | 2,083 | 2,464 | 3,918 | 1,454 | 59.0% |
| **Totals** | **423,989** | **78,057** | **84,008** | **88,702** | **59,712** | **-28,990** | **-32.7%** |

**5.1.2** In accordance with Schedule 3, Paragraph 46.d of the Licence 2016, the annual variances from the capital investment budget are captured by way of the Z-Factor adjustment provision in the revenue requirement. The rules governing the Z-Factor adjustment are delineated in the *Final Criteria Jamaica Public Service Company Limited 2019 – 2024 Rate Review Process* published by the OUR in 2019 March.

## 5.2 JPS's Z-Factor Adjustment Proposal

*Project Overview*

**5.2.1** For the year 2022, JPS stated that it received approval for fifty-one (51) projects amounting to US$88.7M. Eleven (11) of these projects were categorized as Major/Extraordinary Maintenance projects and forty (40) minor projects.

**5.2.2** In its 2023 Annual Review Application, JPS indicated the following:

- A sum of US$85.1M was spent towards its capital investment plan, of which US$52.9M was apportioned towards the Major/Extraordinary Maintenance projects and US$32.2M for Minor projects.
- The implementation of the Hunts Bay GT10 Major Overhaul and the Corporate Area 40 MVAR Bulk Capacitor Bank projects were completed in 2022. In this regard, JPS has applied for the incremental revenue requirement associated with these projects.
- The Major/Extraordinary Maintenance projects had an overall 11% of the approved cost un-spent. Nine (9) of these projects were completed and one (1) was delayed due to issues experienced with the procurement of key inputs. The eleventh project, Old Harbour – Hunts Bay 138kV transmission line remains on hold. Table 5.2 below shows the breakout of the 2022 expenditure for the Major and Extraordinary Maintenance projects.
- There was an overspend of 7% of the approved budget in 2022 for Minor projects. The break-out of the minor projects is shown below in Table 5.3.
- The impacts of the COVID-19 pandemic and the Russia-Ukraine conflict continue to affect the ability of the company to attain the necessary supplies to implement the various projects.

**Table 5.2: JPS's Major and Extraordinary Maintenance Projects in 2022**

| Major and Extraorindary Maintenance Projects | 2022 Actual (US$ '000) |
|---|---|
| Combined Cycle Plant | 10,046 |
| Critical Capital Spares-Generation | 3,448 |
| Customer Growth (CCMA) | 6,750 |
| Old Harbour - Hunt's Bay 138 kV Line | 105 |
| Voltage Standardization Program (VSP) | 368 |
| Distribution Line Structural Integrity | 5,206 |
| Meters & Service Wires (Replacement and Growth) | 5,579 |
| Smart Meter Program | 12,711 |
| Rami Projects | 3,458 |
| Grid Modernization Program (FCI, DA, Trip Savers) | 2,452 |
| Smart Streetlight | 2,750 |

**Table 5.3: JPS's Minor Projects in 2022**

| Minor Projects | 2022 Actual (US$ '000) |
|---|---|
| Interbus Transformers | 2,063 |
| Tools and Equipment | 189 |
| Distribution Transformers | 4,100 |
| Capital Spares T&D (CKT Breaker, Recloser, DA switch, etc) | 524 |
| Grid Interconnection | 202 |
| Replace Padmounted Transformers | 164 |
| Battersea Operations Building | 429 |
| Bulk Capacitor Banks (40 MVARS) | 1,396 |
| Metering Infrastructure Replacements | 210 |
| Sub Station Structural Integrity | 1,470 |
| Transmission Line Structural Integrity | 1,820 |
| N-1 Protection Upgrade | 1,134 |
| Replace Pole Mounted Transformers | 1,683 |
| Rockfort Major Overhaul - RF 2 | 4,273 |
| Renewables - Woodstave Pipeline Repairs Program | 553 |
| Renewables - Turbine & Generator Overhaul | 428 |
| Renewables Equipment Procurement and Replacement | 574 |
| Hunt's Bay - GT10 and GT 5 Hot Gas Path Inspection | 2,552 |
| GT 5 Combustion Inspection | 739 |
| Hunt's Bay - Plant Auxiliaries Rehabilitation | 70 |
| Bogue Peaking-Plants | 580 |
| Bogue - Inlet Air Chiller Major Overhaul | 437 |
| Bogue - HRSG Cleaning (Reduced Scop) | 454 |
| Install Charging Stations ( Electric Vehicle Roll out) | 81 |
| Analytical software procurement and Development | - |
| Expansion of Enterprise Architecture, Business Intelligence and Analytics Capability | 236 |
| Information Technology Security Program | 5 |
| Business Efficiency | 240 |
| Upgrade CS | 789 |
| IT Infrastructure Modernization | - |
| Data Centre Operations Modernization | - |
| Oracle Modification Project (Seperation of Accounts) | - |
| Purchase of laptops, desktops, Tablets | 394 |
| Electric Grid Communication Network Rehabilitation and Upgrade | 1,072 |
| Video Wall Upgrade | 295 |
| Facilities Improvements | 1,113 |
| SCADA Upgrade | 750 |
| Introduce DERMS | - |
| Security Cameras and Systems | 291 |
| Distribution Line Reconductoring and Relocation | 913 |

*Proposed Z-factor Adjustment Treatment*

**5.2.3** JPS maintained its position, that in the treatment of the variances of the major projects, the methodology of evaluating the major projects individually should not be used in the 2023 Annual Review period. This aspect is an element of JPS's appeal to the Electricity Appeals Tribunal. The OUR, as stated in the Final Criteria, takes the position that where major capital expenditures (US$10M and more), special focus should be given to projects consistent with the objective of efficiency.

**5.2.4** Additionally, JPS has specifically requested that there be "**no Z-Factor adjustment**" to:

1. *The Old Harbour – Hunts Bay 138kV Line.*
   This project remains on hold due to inflation challenges at the procurement stage of the project. As such, the cost for 2022 is reflecting an underspend of the approved budget.
2. *The Voltage Standardization Program.*
   The cost associated with 2022 currently has an underspend, as there were issues in procuring conductors, insulators, poles, and transformers due to disruptions in the global supply chain.

**5.2.5** JPS has also proposed that the two projects above that would result in a Z-factor adjustment according to the stipulation of the Final Criteria, be treated in a manner where the OUR would assess the overall spend of US$85.1M against the approved budget of US$88.7M. This results in a variance of 4% and would not trigger a Z-factor adjustment.

**5.2.6** JPS also proposed that except for the Hunts Bay 138kV transmission line, which is now projected to be completed by 2025, it would endeavor to complete all the approved projects within the 2023 regulatory window.

## 5.3 OUR's Decision

*Z-Factor Adjustment Procedures and Principles*

**5.3.1** The e OUR's decisions concerning JPS's capital investment projects for the 2022 expenditure in this Determination Notice, are guided by the Final Criteria derived from the Z-Factor clauses of Schedule 3 of the Licence 2016. Criterion 13 of the Final Criteria states:

> *In the treatment of these special circumstances, the following procedures shall be observed:*
>
> *a) Delays in the implementation of specified capital projects (Major Projects or Extraordinary Maintenance Projects) that result in a variation in expenditure of 5% or more of the annual expenditure for the project category in any given year, shall trigger a commensurate Z-Factor adjustment to the tariff in the following year.*
>
> *b) If for any reason, JPS does not undertake an approved capital project in the Business Plan, a Z-Factor adjustment shall be made to remove the associated project cost from the Revenue Requirement.*
>
> *c) Should a Major Project or an Extraordinary Maintenance Project arises and JPS demonstrates that such an expenditure could not have been reasonably anticipated, and the cost is greater than 10% of the projected capital expenditure for any given year relative to the previously agreed Business Plan, a commensurate adjustment to the tariff in the following year shall be made with the Office approval.*

d) *In the event of a change in the scope of a Major Project or an Extraordinary Maintenance Project in any given year that results in at least a 10% reduction in the original capital cost, the savings derived shall be shared in a 50:50 ratio with customers. Accordingly, this shall trigger a commensurate reduction in the tariff via the Z-Factor mechanism. Any change in scope of a project shall be subject to the OUR's approval.*

**5.3.2** These Capex Criterion are specifically designed this way to encourage timely project execution and cost saving, while disincentivizing project cost overspends. In this regard, the Z-Factor adjustments are asymmetrical in their treatment of the deviations from the OUR's approved costs. In other words, if the actual expenditure is zero or at least 5% below the approved budget each year, the revenue requirement is adjusted to reflect that gap. On the other hand, should JPS's actual capital expenditure exceed the approved cost, for individual major projects and the minor projects, no adjustments are required to the revenue requirement.

**5.3.3** In the OUR's view, this approach is logical due to the forward-looking revenue cap regulation employed, since the computation includes the cost of JPS's capital expenditure in its revenue requirement before the projects are implemented. Hence, when any of the major projects were not implemented or the expenditure is below 5% of the approved expenditure, the revenue requirement should be adjusted downwards to reflect this level of underspending. If this was not so, then, regardless of the reason for the delay or underspend, JPS would be rewarded with additional revenues for investments that were not actually made. This principle informed the OUR's Z-Factor adjustment decisions detailed below.

**Major Projects**

*Smart Meter Program*

**5.3.4** The approved budget for 2022 as specified in the 2019 - 2024 Rate Review Determination Notice for the Smart Meter Program project was US$12.51M. As reported by JPS, the expenditure for this project in 2022 amounted to US$12.71M, resulting in a variance of 1.6%. In accordance with the Final Criteria, no Z-Factor adjustment is warranted.

*Old Harbour - Hunt's Bay 138 kV Line*

**5.3.5** As stated in the 2022 Annual Review Determination Notice, this project was placed on hold at the procurement phase. JPS had informed the OUR of a 67% increase in cost above the previously approved cost due to the adverse effect of the COVID-19 pandemic. The OUR determined that the pandemic had also negatively impacted the demand for electricity, as such the peak demand on the grid was still below the pre-pandemic level. The absence of this line was not expected to increase the risks to the overall security and stability of the grid. Hence, the OUR indicated to JPS that other options should be examined. However, JPS has

indicated its intention to make a submission to the OUR, in relation to the proposed Hunts Bay 138kV Line in 2023 October.

**5.3.6** For the year 2022, the approved budget for this project was US$10.8M. As reported in the 2023 Annual Review Application, only US$0.105M of this amount was spent. Consequently, there is a -99% variance from the approved budget. Consistent with the Final Criteria, as such, a Z-Factor adjustment is deemed applicable.

*Voltage Standardization Program (VSP)*

**5.3.7** In the 2019 - 2024 Annual Review Determination Notice, a budget of US$4.17M was approved for the Voltage Standardization Program project. JPS has reported in its 2023 Annual Review Application that the expenditure for 2022 was US$0.37M, resulting in an underspend of 91.2%.

**5.3.8** JPS elaborated in its 2023 Annual Review Application, that it continues to experience difficulties in procuring the key inputs essential for this project, resulting in the underspend. However, as provision was already made to the rate base for the approved amount, the OUR has a responsibility to adjust JPS's revenue requirement based on the procedures set out in the Final Criteria. In this regard, a Z-Factor adjustment has been deemed applicable.

*Rami Projects*

**5.3.9** The approved budget for the Rami Projects for 2022 was US$3.0M. JPS has reported an expenditure of US$3.46M. This has resulted in an overspend variance of 15.2%, therefore, in accordance with the Final Criteria, the expenditure will not be subjected to a Z-Factor adjustment.

*Grid Modernization Program*

**5.3.10** The Grid Modernization project had an approved budget of US$2.41M in 2022. The reported expenditure for 2022 was US$2.45M, which has resulted in an overspend with a variance of 1.7%. In accordance with the Final Criteria, the expenditure will not be subjected to a Z-factor adjustment.

*Critical Capital Spares-Generation*

**5.3.11** The 2019 - 2024 Determination Notice for the Critical Capital Spares-Generation project, approved budget was US$3.13M. JPS has reported an expenditure of US$3.45M for this project in 2022. This resulted in a variance of 10.2%. As such, there will not be a Z-factor adjustment.

*Distribution Line Structural Integrity*

**5.3.12** For 2022, the approved budget for this project was US$4.76M. JPS in its annual tariff adjustment application has reported that there was an overspend for the year, which

amounted to US$5.21M. This is a 9.3% increase over the approved budget. In accordance with the Final Criteria, no Z-Factor adjustment will be applied.

*Customer Growth (CCMA)*

**5.3.13** The Customer Growth project had an approved budget of US$6.88M for 2022, JPS has however reported an expenditure of US$6.75M, which is 1.8% below the budget. As such, following the principles in the Final Criteria, there will be no Z-factor adjustment applied.

*Combined Cycle Plant*

**5.3.14** For 2022, the Combined Cycle Plant project had an approved budget of US$8.8M. JPS has indicated an expenditure of US$10.05M, which has resulted in an overspend that is 14.2% above the approved budget. The company further stated that this increase in the project cost was due to the deterioration in the seals being greater than their original expectation. In accordance with the Final Criteria, this project expenditure will not have a Z-factor adjustment applied.

*Meters & Service Wires (Replacement and Growth)*

**5.3.15** The Meter & Service Wires (Replacement and Growth) project had an approved budget of US$2.81M for 2022. As presented in *Table 7.49* of the 2019 - 2024 Determination Notice, the approved budget represented the acceptance of JPS's proposed cost and allocation. However, JPS's expenditure has exceeded the approved budget by 98.8%, which would suggest that the original expectation of the company was underestimated.

**5.3.16** While the OUR is mindful that JPS is mandated to connect customers to the distribution grid, an underestimation of the project scope by JPS is not the fault of its customers. In accordance with the Final Criteria, this project shall not have a Z-Factor adjustment.

*Smart Streetlight*

**5.3.17** In the 2019 - 2024 Determination Notice Smart Streetlight project, the budget approved was for allocated costs in 2019 to 2021, as such, there is no approved budget for 2022. JPS reported an expenditure of US$2.75M, this is an overspending as there was no approved budget. In alignment with the Final Criteria, there will not be a Z-factor adjustment for this project.

**5.3.18** The decisions relating to the Major and Extraordinary projects, which will have a Z-Factor adjustment are summarized in Table 5.4 below.

**Table 5.4: Summary of all the Major and Extraordinary Projects for 2022**

| Summary of the Major and Extraordinary Maintenance Projects | | | | | |
|---|---|---|---|---|---|
| | 2022 Approved | 2022 Actuals | Variance | | Z-Factor Adjustment |
| | (US$'000) | (US$'000) | (US$'000) | (%) | |
| Combine Cycle Plant | 8,794 | 10,046 | 1,252 | 14.2% | No |
| Critical Capital Spares-Generation | 3,129 | 3,448 | 319 | 10.2% | No |
| Old Harbour - Hunt's Bay 138 kV Line | 10,796 | 105 | -10691 | -99.0% | Yes |
| Distribution Line Structural Integrity | 4,763 | 5,206 | 443 | 9.3% | No |
| Customer Growth (CCMA) | 6,876 | 6,750 | -126 | -1.8% | No |
| Smart Streetlight | - | 2,750 | 2,750 | | No |
| Voltage Standardization Program (VSP) | 4,165 | 368 | -3,797 | -91.2% | Yes |
| Meters & Service Wires | 2,806 | 5,579 | 2773 | 98.8% | No |
| Grid Modernization Program | 2,410 | 2,452 | 42 | 1.7% | No |
| Smart Meter Program | 12,511 | 12,711 | 200 | 1.6% | No |
| Rami Projects | 3,001 | 3458 | 457 | 15.2% | No |
| **Totals** | **59,251** | **52,873** | **-6,378** | **-10.8%** | |

### Minor Projects

**5.3.19** As stipulated in the Final Criteria, Minor Projects are evaluated as a whole. In its 2023 Annual Review Application, JPS indicated an expenditure of US$32.3M for its Minor Projects. However, the OUR has made an adjustment to this amount by reviewing the projects identified. It was noticed that the following projects should not have been included in this amount, namely.

- *Corporate Area Bulk Capacitor Banks (40 MVAR): US$1.4M*
- *Hunts Bay – GT10 Hot Gas Path Inspection: US$2.55M*
- *Hunts Bay GT 5 Combustion Inspection: US$0.74M*

**5.3.20** The approved budget for all the minor projects slated for 2022 was US$29.45M. This approved amount would not have contained the approved amount for the above-mentioned projects, as these projects were given approval outside of the 2019 - 2024 Determination Notice. As such, JPS cannot lump these projects in the minor Projects against an approval that excludes these projects.

**5.3.21** A new expenditure was calculated which amounted to US$27.54M. This resulted in a variance of 6.49% when all of the minor projects are examined as a whole, as such, there shall be a Z-factor adjustment for the minor projects. This is shown in Table 5.5 below.

**Table 5.5: The Approved 2022 Budget for the Minor Projects Against the Actual Expenditure for 2022**

| Summary of the Minor Projects (US$'000) | | | | | |
|---|---|---|---|---|---|
| | 2022 Approved | 2022 Actuals | Variance | | Z-Factor Adjustment |
| | (US$'000) | (US$'000) | (US$'000) | (%) | |
| Interbus Transformers | - | 2,063 | 2,063 | | |
| Tools and Equipment | 294 | 189 | -105 | -35.71% | |
| Distribution Transformers | 1,606 | 4,100 | 2494 | 155.29% | |
| Capital Spares T&D (CKT Breaker, Recloser, DA switch, etc) | 455 | 524 | 69 | 15.16% | |
| Grid Interconnection | 361 | 202 | -159 | -44.04% | |
| Replace Padmounted Transformers | 214 | 164 | -50 | -23.36% | |
| Battersea Operations Building | - | 429 | 429 | | |
| Metering Infrastructure Replacements | 183 | 210 | 27 | 14.75% | |
| Sub Station Structural Integrity | 1,798 | 1,470 | -328 | -18.24% | |
| Transmission Line Structural Integrity | 1,858 | 1,820 | -38 | -2.05% | |
| N-1 Protection Upgrade | 1,183 | 1,134 | -49 | -4.14% | |
| Replace Pole Mounted Transformers | 995 | 1,683 | 688 | 69.15% | |
| Rockfort Major Overhaul - RF 1 | 357 | - | -357 | -100.00% | |
| Rockfort Major Overhaul - RF 2 | 4,359 | 4,273 | -86 | -1.97% | |
| Renewables - Woodstave Pipeline Repairs Program | 1,688 | 553 | -1135 | -67.24% | |
| Renewables - Turbine & Generator Overhaul | 920 | 428 | -492 | -53.48% | |
| Renewables Equipment Procurement and Replacement | - | 574 | 574 | | |
| Hunt's Bay - Plant Auxiliaries Rehabillitation | 85 | 70 | -15 | -17.65% | |
| Bogue Peaking-Plants | 491 | 580 | 89 | 18.13% | |
| Bogue - Inlet Air Chiller Major Overhaul | 529 | 437 | -92 | -17.39% | |
| Bogue -HRSG Cleaning (Reduced scope) | 500 | 454 | -46 | -9.20% | |
| Install Charging Stations (Electric Vehicle Roll out) | - | 81 | 81 | | |
| Analytical software procurement and Development | - | - | 0 | | |
| Expansion of Enterprise Architecture, Business Intelligence and Analytics Capability | 815 | 236 | -579 | -71.04% | |
| Information Technology Security Program | 286 | 5 | -281 | -98.25% | |
| Business Efficiency | 422 | 240 | -182 | -43.13% | |
| Upgrade CS | 1,179 | 789 | -390 | -33.08% | |
| IT Infrastructure Modernization | 296 | - | -296 | -100.00% | |
| Data Centre Operations Modernization | 205 | - | -205 | -100.00% | |
| Oracle Modification Project (Seperation of Accounts) | - | - | 0 | | |
| Purchase of laptops, desktops, Tablets | 440 | 394 | -46 | -10.45% | |
| Electric Grid Communication Network Rehabilitation and Upgrade | 1,130 | 1,072 | -58 | -5.13% | |
| Video Wall Upgrade | 287 | 295 | 8 | 2.79% | |
| Facilities Improvements | 1,492 | 1,113 | -379 | -25.40% | |
| SCADA/EMS Project Upgrade | 2,037 | 750 | -1287 | -63.18% | |
| Introduce DERMS | 700 | - | -700 | -100.00% | |
| Security Cameras and Systems | 246 | 291 | 45 | 18.29% | |
| Distribution Line Reconductoring and Relocation | 2,037 | 913 | -1124 | -55.18% | |
| **Total** | **29,448** | **27,536** | **(1,912)** | **-6.49%** | **Yes** |

### Projects Approved in the 2022 Extraordinary Review

**5.3.22** Following the 2022 Extraordinary Review, JPS was given approval for the implementation of the extraordinary projects shown in Table 5.6 below. Due to the challenges associated with the implementation of the Minister's Schedule, the retirement of the 171.5 MW of generating capacity was postponed from 2023 to 2026. Additionally, given the retirement of the 68.4MW Hunt Bay B6 unit, and the lack of adequate generating capacity on the North Coast, the OUR recognized that these circumstances were extraordinary. In this regard, the risk of an adverse impact to the reliability of the electricity system would be increased.

Consequently, the projects submitted were deemed necessary. In light of this, JPS was given the OUR's approval for capital expenditure for the following projects allocated to 2023 and 2024, as shown in Table 5.6 below.

**Tablie 5.6: Approved Projects from the 2022 Extraordinary Review**

| Projects Approved in 2022 Extraordinary Review | | | |
|---|---|---|---|
| **Project Description** | **2023** | **2024** | **Total** |
| | (US$'000) | | |
| Generating Plant Rehabilitation | **4663** | **6298** | 10961 |
| *Rockfort Major Overhaul - RF1* | 3363 | | |
| *Rockfort Major Overhaul - RF2* | 150 | 4028 | |
| *Hunt Bay GT5 HGPI* | 300 | 2270 | |
| *Hunts Bay GT10* | | | |
| *Bogue GT 3 HGPI* | 2050 | | |
| *Bogue GT 6 GGOH* | 1500 | | |
| *Bogue GT 7* | | | |
| *Bogue GT 9* | | | |
| *Bogue GT HIS&CCR* | -2700 | | |
| Generation Plants Extra-ordinary Maintenance | **1022** | **993** | 2015 |
| Rockfort Major Overhaul - RF1 | 367 | 261 | |
| Rockfort Major Overhaul - RF2 | 239 | 351 | |
| Hunt Bay GT 5 | 106 | 46 | |
| Hunts Bay GT 10 | 310 | 45 | |
| Bogue GT 3 | | 50 | |
| Bogue GT 6 | | 80 | |
| Bogue GT 7 | | 80 | |
| Bogue GT 9 | | 80 | |
| Corporate Area 40 Mvar Capacitor Banks Installation | 1340 | | 1340 |
| Hot Gas Path GT10 | 2000 | | 2000 |
| North East Voltage Security Improvement Project 2022/2023 | 6182 | | 6182 |

**5.3.23** In the 2023 Annual Review Application, JPS requested that the intended revenue adjustment, which was slated for the 2023 Annual Review, be shifted to 2024 instead, no explanation was provided for this request.

**5.3.24** Regarding an Extraordinary Rate Review application, Schedule 3, paragraphs 59 to 61 of the Licence 2016, outline the circumstances under which an application can be permitted. The OUR, in the 2022 Extraordinary Rate Review Application, reviewed and determined that these projects were necessary. Consequently, the OUR has no objection to the rescheduling of these projects to 2023 and 2024. In this context, the appropriate adjustment to JPS's revenue requirement would be required during the Annual Review/Rate Review consistent with implementation of the projects.

## 5.4 Capital Projects Z-Factor Assessment Summary

**5.4.1** Based on the OUR's evaluation of the projects, a Z-Factor adjustment commensurate to JPS's capital project activities is required to the 2023 revenue requirement amounting to US$1.544, before the application of the WACC. The major projects accounted for an amount of US$1.421M to the overall total and the remaining US$0.123M is attributed to the minor projects (see Table 5.7 below).

**Table 5.7: Computation of Z-Factor Adjustment for Annual Revenue Requirements**

| Capital Projects | Asset Life | 2022 Approved CAPEX | CAPEX SPLIT | | 2021 Actual CAPEX | CAPEX Gap | | CAPEX Over-Recovery | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | CWIP | Capital Transfer | | CWIP | Capital Transfer | ROI | Depr | Total |
| | Years | US $'000 | % | % | US$'000 | US$'000 | US$'000 | US$'000 | US$'000 | US$'000 |
| Combine Cycle Plant | 3 | 8,794 | 29.6% | 70.4% | 10,046 | -370.3 | -881.7 | N/A | N/A | N/A |
| Critical Capital Spares-Generation | 30 | 3,129 | 0.0% | 100.0% | 3,448 | 0.0 | -319.0 | N/A | N/A | N/A |
| Old Harbour - Hunt's Bay 138 kV Line | 25 | 10,796 | 100.0% | 0.0% | 105 | 10,691.0 | 0.0 | 1,269.0 | 0.0 | 1,269.0 |
| Distribution Line Structural Integrity | 30 | 4,763 | 0.0% | 100.0% | 5,206 | 0.0 | -443.0 | N/A | N/A | N/A |
| Customer Growth (CCMA) | 25 | 6,876 | 33.7% | 66.3% | 6,750 | 42.4 | 83.6 | 5.0 | 3.3 | 8.4 |
| Smart Streetlight | 15 | 0 | 56.2% | 43.8% | 2,750 | -1,545.0 | -1,205.0 | N/A | N/A | N/A |
| Voltage Standardization Program (VSP) | 25 | 4,165 | 0.0% | 100.0% | 368 | 0.0 | 3,797.0 | 0.0 | 151.9 | 151.9 |
| Meters & Service Wires | 20 | 2,806 | 0.0% | 100.0% | 5,579 | 0.0 | -2,773.0 | N/A | N/A | N/A |
| Grid Modernization Program | 30 | 2,410 | 98.4% | 1.6% | 2,452 | -41.3 | -0.7 | N/A | N/A | N/A |
| Smart Meter Program | 10 | 12,511 | 100.0% | 0.0% | 12,711 | -200.0 | 0.0 | N/A | N/A | N/A |
| Rami Projects | 10 | 3,001 | 47.6% | 52.4% | 3,458 | -217.5 | -239.5 | N/A | N/A | N/A |
| **Major Project Sub-total** | | **59,251** | | | **52,873** | **8,359.3** | **-1,981.3** | **1,274.1** | **155.2** | **1,429.3** |
| **Minor Projects** | **15.82** | **29,448** | **5%** | **95%** | **27,536** | **95.6** | **1,816.4** | **11.3** | **114.8** | **126.2** |
| **TOTAL** | | **88,699** | | | **80,409** | **8,454.9** | **-164.9** | **1,285.4** | **270.0** | **1,555.4** |

**5.4.2** As indicated above, the OUR has computed the adjustment to the revenue requirements based on its capital project assessment based on JPS's performance against the 2022 approved Capital Project budgets. In addition to the adjustment to the 2022 revenue requirement to derive the final Z-Factor adjustment, the conversion of the US$ over-recovery to J$ and the application of a WACC of 11.87% to account for the opportunity cost of capital is also required.

**5.4.3** As summarized in Table 5.8 below, the Z-Factor adjustment outcome inclusive of the WACC amounts to J$221.1M. This translates to a relative Z-Factor adjustment of -0.57%.

**Table 5.8: Computation of JPS's Capital Projects Z-Factor adjustment**

| Project Category | 2022 OUR | 2022 JPS | Capex Over - Recovery | | |
|---|---|---|---|---|---|
| | Approved CAPEX | Actual Capex | ROI | Depreciation | Total |
| | US$'000' | US$'000' | US$'000' | US$'000' | US$'000' |
| Major Project | 59,251 | 52,873 | 1,274 | 155 | 1,429 |
| Minor Project | 29,448 | 27,536 | 11 | 115 | 126 |
| Total US$ | 88,699 | 80,409 | 1,285 | 270 | 1,555 |
| **Total J$'000'** | | | | | **199,097** |
| **Total adjusted for WACC (J$'000)** | | | | | **222,730** |
| **Z-Factor (Capital Projects)** | | | | | **-0.57%** |

***Calculation Parameters***

| Parameter | Unit | Value |
|---|---|---|
| Base Exch. Rate | J$:US$ | 128.00 |
| WACC | % | 11.87% |
| Revenue Cap 2023 | J$'M | 38,783 |

**Determination 4**

Having reviewed JPS's performance regarding the Approved Capital Projects for 2022, the Office has determined the following:

a) The Major Projects, the Old Harbour – Hunts Bay 138kV line and the Voltage Standardization Program had a Z-factor adjustment. Both projects had an underspend and a variance of 99% and 91.2% respectively. Given that these investments were not made, the OUR has adjusted the 2022 revenue requirement downwards by US$1.421M (before the application of WACC) to reflect the associated over-recovery of revenue.

b) A Z-factor adjustment was applied to the Minor projects as there was a budget variance of 6.49% for this category. This translates into a downward revenue adjustment of US$0.123M (before the application of WACC).

c) The OUR has no objection to JPS's request that the revenue adjustment for the projects from the 2022 Extraordinary Project Review be done in 2024, instead of in the 2023 Annual Review. In this regard, no Z-Factor adjustment is required at this point.

d) Based on the above decisions, the required Z-Factor adjustment outcome and considering the WACC amounts to J$221.1M. This translates to a relative Z-Factor adjustment of -0.57%.

# 6 Tariff Design

## 6.1 Revenue Basket Compliance

**6.1.1** Under the revenue cap regime, the revenue basket is compliant if for a given target demand (quantity demand), and the price of electricity (within the basket of rates) is set so that the product of the two, yield the approved Revenue Target for 2023 excluding IPP Non-fuel cost ($ART_{2023}$).

**6.1.2** The COVID-19 pandemic had a significant impact on Jamaica's electricity sector. Considering this, the five-year demand forecast developed for the 2019 - 2024 review period had to be adjusted to reflex the pandemic's impact. As such, JPS submitted an adjusted demand forecast in its 2023 Annual Review Application. In developing the 2023 Demand Forecast, JPS applied the SARIMAX models, while the OUR applied the ARIMA and SARIMA models. The methodology and outcome are set out in Section 6.7 below.

**6.1.3** The existing rates, shown in Table 6.1 below, were approved in the 2022 Annual Review Determination Notice and were set to allow the JPS to recover the 2022 Approved Revenue Target excluding IPP Non-fuel cost of J$48,160,407,073.00.

**Table 6.1: 2022 Approved Non-Fuel Rates**

| Class | | Customer Charge | Energy-J$/kWh | | | | Demand-J$/KVA | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Std. | Off-Peak | Part Peak | On-Peak | Std. | Off-Peak | Part Peak | On-Peak |
| **Current Rates** | | | | | | | | | | |
| Rate 10 | LV < 100 | 575.72 | 7.93 | | | | | | | |
| Rate 10 | LV > 100 | | 22.76 | | | | | | | |
| Rate 20 | LV | 1,227.56 | 9.78 | | | | | | | |
| | | | | | | | | | | |
| Rate 40 | LV - Std | 8,648.74 | 6.59 | | | | 2,962.42 | | | |
| Rate 40 | LV - TOU | 8,648.74 | | 5.54 | 5.68 | 6.35 | | 353.97 | 1,219.48 | 1,652.34 |
| Rate 50 | MV - Std | 8,648.74 | 4.67 | | | | 2,052.65 | | | |
| Rate 50 | MV - TOU | 8,648.74 | | 4.60 | 4.72 | 5.27 | | 336.89 | 944.15 | 1,274.13 |
| Rate 70 | MV -STD | 8,648.74 | 4.66 | | | | 2,720.58 | | | |
| Rate 70 | MV -TOU | 8,648.74 | | 5.01 | 5.15 | 5.75 | | 338.23 | 942.24 | 1,443.65 |
| Rate 60 | S | 3,487.40 | 13.41 | | | | | | | |
| Rate 60 | T | 3,487.40 | 12.93 | | | | | | | |

**6.1.4** For JPS to recover the approved $ART_{2023}$ (excluding IPP Non-fuel cost) of J$50,791,815,213.00, the tariff structure approved in the 2019 - 2024 Rate Review Determination Notice has been maintained. The 2022 basket of rates were evenly adjusted by a derived factor of 14.77%.

**6.1.5** The product of the revised 2023 Target Billing Determinants and the Approved Non-Fuel rates for 2023, yields the approved $ART_{2023}$ (excluding IPP Non-fuel cost) of J$50,791,815,213.00, which was derived as set out in Section 4.8 above.

**6.1.6** Tables 6.2, 6.3 and 6.4 below, show the details of the Target Billing Determinants 2023 (revised), the 2023 Approved Non-Fuel Tariffs and the $ART_{2023}$ (excluding IPP Non-fuel cost ) Revenue Basket, respectively.

**Table 6.2: Target Billing Determinants 2023 (Revised)**

| Class | | Average 2023 Customer | Energy kWh | | | | Demand-KVA | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Std. | Off-Peak | Part Peak | On-Peak | Std. | Off-Peak | Part Peak | On-Peak |
| Rate 10 | LV < 100 | 619,431 | 532,999,472 | - | - | - | - | - | - | - |
| Rate 10 | LV > 100 | - | 556,610,302 | - | - | - | - | - | - | - |
| Rate 20 | LV | 70,659 | 605,237,296 | - | - | - | - | - | - | - |
| | | - | - | - | - | - | - | - | - | - |
| Rate 40 | LV - STD | 1,823 | 675,714,046 | - | - | - | 2,252,770 | - | - | - |
| Rate 40 | LV - TOU | 109 | - | 53,364,250 | 48,308,736 | 12,589,466 | - | 288,936 | 273,177 | 220,316 |
| Rate 50 | MV -STD | 122 | 229,376,020 | - | - | - | 660,257 | - | - | - |
| Rate 50 | MV -TOU | 26 | - | 17,255,753 | 16,779,748 | 6,110,431 | - | 193,064 | 188,498 | 147,626 |
| Rate 70 | MV -STD | 19 | 275,294,111 | - | - | - | 729,446 | - | - | - |
| Rate 70 | MV -TOU | 5 | - | 22,735,279 | 21,432,266 | 5,642,969 | - | 152,762 | 156,201 | 135,736 |
| Rate 60 | S | 189 | 39,228,580 | - | - | - | - | - | - | - |
| Rate 60 | T | 321 | 534,498 | - | - | - | - | - | - | - |
| **TOTAL** | | **692,705** | **2,914,994,326** | **93,355,283** | **86,520,750** | **24,342,865** | **3,642,473** | **634,762** | **617,876** | **503,678** |

**Table 6.3: Approved Non-Fuel Rates for 2023**

| Class | | Customer Charge | Energy-J$/kWh | | | | Demand-J$/KVA | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Std. | Off-Peak | Part Peak | On-Peak | Std. | Off-Peak | Part Peak | On-Peak |
| **Current Rates** | | | | | | | | | | |
| Rate 10 | LV < 100 | 603.54 | 8.31 | | | | | | | |
| Rate 10 | LV > 100 | | 23.86 | | | | | | | |
| Rate 20 | LV | 1,286.87 | 10.25 | | | | | | | |
| | | | | | | | | | | |
| Rate 40 | LV - Std | 9,066.66 | 6.91 | | | | 3,105.57 | | | |
| Rate 40 | LV - TOU | 9,066.66 | | 5.81 | 5.96 | 6.66 | | 371.07 | 1,278.40 | 1,732.18 |
| Rate 50 | MV - Std | 9,066.66 | 4.90 | | | | 2,151.84 | | | |
| Rate 50 | MV - TOU | 9,066.66 | | 4.82 | 4.95 | 5.52 | | 353.17 | 989.77 | 1,335.70 |
| Rate 70 | MV -STD | 9,066.66 | 4.89 | | | | 2,852.04 | | | |
| Rate 70 | MV -TOU | 9,066.66 | | 5.26 | 5.39 | 6.03 | | 354.57 | 987.77 | 1,513.41 |
| Rate 60 | S | 3,655.91 | 14.06 | | | | | | | |
| Rate 60 | T | 3,655.91 | 13.55 | | | | | | | |

**Table 6.4: Revenue Basket - Approved Revenue Target for 2023 ($ART_{2023}$) excluding IPP Non-fuel cost**

| Class | | Customer Revenue | Energy Revenue | | | | Demand (KVA) revenue | | | | Total Revenue |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Std. | Off-Peak | Part Peak | On-Peak | Std. | Off-Peak | Part Peak | On-Peak | |
| Rate 10 | LV < 100 | 4,486,189,083 | 4,429,008,466 | - | - | - | | | | | 8,915,197,548 |
| Rate 10 | LV > 100 | - | 13,281,492,925 | - | - | - | | | | | 13,281,492,925 |
| Rate 20 | LV | 1,091,151,328 | 6,203,236,038 | - | - | - | | | | | 7,294,387,366 |
| | | - | - | - | - | - | | | | | - |
| Rate 40 | LV - Std | 198,323,052 | 4,668,749,832 | - | - | - | 6,996,141,291 | - | - | - | 11,863,214,175 |
| Rate 40 | LV - TOU | 11,911,239 | - | 309,914,643 | 287,762,502 | 83,806,259 | - | 107,216,713 | 349,230,716 | 381,626,905 | 1,531,468,976 |
| Rate 50 | MV - Std | 13,274,137 | 1,124,131,332 | - | - | - | 1,420,766,802 | - | - | - | 2,558,172,272 |
| Rate 50 | MV - TOU | 2,828,253 | - | 83,181,046 | 83,004,925 | 33,733,241 | - | 68,184,132 | 186,569,932 | 197,183,800 | 654,685,328 |
| Rate 70 | MV -STD | 2,067,199 | 1,346,008,139 | - | - | - | 2,080,409,079 | - | - | - | 3,428,484,416 |
| Rate 70 | MV -TOU | 544,000 | - | 119,510,738 | 115,613,118 | 34,002,288 | - | 54,164,736 | 154,291,489 | 205,424,484 | 683,550,854 |
| Rate 60 | LV | 8,301,709 | 551,543,591 | - | - | - | | | | | 559,845,299 |
| Rate 60 | LV | 14,071,076 | 7,244,979 | - | - | - | | | | | 21,316,055 |
| **TOTAL** | | **5,828,661,074** | **31,611,415,300** | **512,606,427** | **486,380,545** | **151,541,787** | **10,497,317,173** | **229,565,581** | **690,092,138** | **784,235,189** | **50,791,815,213** |

## 6.2 Prepaid-Rates: Residential Customers (Rate 10)

**6.2.1** The OUR's computation of prepaid rates remains consistent with the approach taken in the 2019 - 2024 Rate Review Determination Notice. Table 6.5 below, shows the revenue comparisons of the prepaid and post-paid rates, using the assumption that all post-paid

customers migrate to pre-paid metering. The analysis shows that benefits would accrue only to prepaid customers, whose consumption levels are 117.0kWh/month and below. The aggregate benefit to this group of customers would be approximately J$40.7M/month and this is due to the discounted lifeline rate, which is allowed to all residential customers.

**Table 6.5: Comparison of prepaid and post-paid non-fuel bills for average consumption in intervals (OUR) – Two-Tiered**

| Customer Bands | Customer Count | 2014 Test Year Demand (MWh) | Average Consumption (kWh/month) | Post-paid Rate | Pre-paid Rate | Monthly Post-paid Revenue | Monthly Pre-paid Revenue | Monthly Variance | Annual Variance |
|---|---|---|---|---|---|---|---|---|---|
| 0-50 kWh | 82,440 | 23,081 | 23.33 | 34.18 | 15.72 | 65,739,255.34 | 30,234,672.14 | (35,504,583.20) | (426,054,998.40) |
| 50-100 kWh | 111,262 | 103,177 | 77.28 | 16.12 | 15.72 | 138,605,037.04 | 135,165,706.10 | (3,439,330.94) | (41,271,971.28) |
| 100-200 kWh | 203,929 | 354,278 | 144.77 | 17.29 | 17.29 | 510,449,235.00 | 510,449,235.00 | - | - |
| 200-300 kWh | 80,328 | 232,621 | 241.32 | 19.92 | 19.92 | 386,144,278.96 | 386,144,278.96 | - | - |
| 300-400 kWh | 27,945 | 114,811 | 342.37 | 21.08 | 21.08 | 201,683,525.02 | 201,683,525.02 | - | - |
| 400-500 kWh | 11,225 | 59,760 | 443.67 | 21.72 | 21.72 | 108,165,033.43 | 108,165,033.43 | - | - |
| 500-1000 kWh | 12,396 | 97,893 | 658.10 | 22.41 | 22.41 | 182,816,468.32 | 182,816,468.32 | - | - |
| >1000 kWh | 3,540 | 86,835 | 2,044.14 | 23.39 | 23.39 | 169,256,018.48 | 169,256,018.48 | - | - |
| **Total** | | | | | | **1,697,119,596** | **1,693,680,265** | **(38,943,914)** | **(467,326,970)** |

**6.2.2** In deriving the pre-paid rates, the discount benefit of the lifeline rate is preserved. The approved non-fuel pre-paid rates for RT10 customers are as follows:

(i) J$15.72/kWh for the first 117kWh within a thirty (30)-day consumption cycle.

(ii) J$23.86/kWh for each additional kWh, thereafter, within that thirty (30)-day consumption cycle.

**Determination 5**

The approved non-fuel pre-paid rates for RT10 customers are as follows:

(i) J$15.72/kWh for the first 117kWh within a thirty (30)-day consumption cycle.

(ii) J$23.86/kWh for each additional kWh thereafter within that thirty (30)-day consumption cycle.

Additionally:

- The IPP rate shall be displayed in a separate line item on the customer bill.
- The prepaid rates shall be reviewed at the next Tariff Review.

## 6.3 Pre-Paid Rates: Small Commercial Customers (Rate 20)

**6.3.1** The OUR's computation of prepaid rates remains consistent with the approach taken in the 2019 - 2024 Rate Review Determination Notice. Table 6.6 below, shows the revenue comparisons of the prepaid and post-paid rates. The rates for this service shall remain revenue-neutral when compared to post-paid Rate 20 rates.

**Table 6.6: Comparison of Prepaid and Postpaid Non-Fuel Revenues for Average Consumption in Intervals – Rate 20 Customers**

| Customer Bands | Customer Count | Test Year Demand (MWh) | Average Consumption (kWh/month) | Post-paid Rate | Pre-paid Rate | Monthly Post-paid Revenue | Monthly Pre-paid Revenue | Monthly Variance | Annual Variance |
|---|---|---|---|---|---|---|---|---|---|
| (0-50] kWh | 10,940 | 2,778 | 21.16 | 71.07 | 71.07 | 16,452,023 | 16,452,023 | - | - |
| (50-100] kWh | 7,781 | 6,982 | 74.78 | 27.46 | 27.46 | 15,977,963 | 15,977,963 | - | - |
| (100-1000] kWh | 30,850 | 128,470 | 347.03 | 13.96 | 13.96 | 149,454,022 | 149,454,022 | - | - |
| (1000-7500] kWh | 9,482 | 283,614 | 2,492.56 | 10.77 | 10.77 | 254,543,069 | 254,543,069 | - | - |
| >7500 kWh | 1,002 | 218,449 | 18,172.28 | 10.32 | 10.32 | 187,866,121 | 187,866,121 | - | - |
| **Total** | | | | | | **607,841,175** | **607,841,175** | **-** | **-** |

**6.3.2** The rates to be charged are as follows:

- First 10kWh J$138.94/kWh
- Additional kWhs J$10.25/kWh

**Determination 6**

The approved non-fuel pre-paid rate, when compared with the post-paid rate, shall be revenue-neutral for services to Rate 20 customers. The prepaid rates are as follows:

(i) First 10kWh J$138.94/kWh

(ii) Each additional kWh J$10.25/kWh

Additionally:

- The IPP rate shall be displayed in a separate line item on the customer bill.
- The prepaid rates shall be reviewed at the next Tariff Review.

## 6.4 The 2023 Non-Fuel Rate Schedule

**6.4.1** Table 6.7 below shows the rate schedule, which sets out the approved rates and charges by customer categories for the 2023 Annual Review.

**Table 6.7: JPS Rate Schedule 2023**

| RATE SCHEDULE -2023 Non-Fuel Rates (Base Exchange Rate J$155.00:US$1:00) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rate Category | Blocks | Customer Charge (J$/Month) | Energy Charge (J$/kWh) | | | | Demand Charge (J$/kVA) | | | |
| | | | STD | Peak | Partial Peak | Off Peak | STD | Peak | Partial Peak | Off Peak |
| Rate 10 STD | 0 - 100 | 603.54 | 8.31 | | | | | | | |
| | > 100 | | 23.86 | | | | | | | |
| Rate 10 Pre-Paid | 0 - 117 | | 15.72 | | | | | | | |
| | > 117 | | 23.86 | | | | | | | |
| Rate 20 STD | | 1,286.87 | 10.25 | | | | | | | |
| Rate 20 Pre-Paid | 0 - 10 | | 138.94 | | | | | | | |
| | > 10 | | 10.25 | | | | | | | |
| Rate 40 STD | | 9,066.66 | 6.91 | | | | 3,105.57 | | | |
| Rate 40 TOU | | 9,066.66 | | 6.66 | 5.96 | 5.81 | | 1,732.18 | 1,278.40 | 371.07 |
| Rate 50 STD | | 9,066.66 | 4.90 | | | | 2,151.84 | | | |
| Rate 50 TOU | | 9,066.66 | | 5.52 | 4.95 | 4.82 | | 1,335.70 | 989.77 | 353.17 |
| Rate 60 Streetlight | | 3,655.91 | 14.06 | | | | | | | |
| Rate 60 Traffic Signal | | 3,655.91 | 13.55 | | | | | | | |
| Rate 70 STD | | 9,066.66 | 4.89 | | | | 2,852.04 | | | |
| Rate 70 TOU | | 9,066.66 | | 6.03 | 5.39 | 5.26 | | 1,513.41 | 987.77 | 354.57 |

## 6.5 Demand Forecast

**6.5.1** The COVID-19 pandemic had a significant impact on Jamaica's electricity sector. Considering this, the five-year demand forecast developed for the 2019 - 2024 review period had to be adjusted to reflect the pandemic's impact. As such, JPS submitted an adjusted demand forecast in its 2023 annual review application. In developing the 2023 Demand Forecast, JPS applied the **SARIMAX** models, while the OUR applied the **ARIMA** and **SARIMA** models. The **ARIMA/SARIMA(X)** methodology was advantageous because extensive time-series data was available, and it provided a better understanding of time-series patterns. Secondly, with so little knowledge of the relationship between the variables impacted by the pandemic, the methodology gets around the problems associated with multivariate models. Further, the method gave a more robust estimate when compared to a constant increase. In addition, these models are suitable for non-stationary time series; they deliver stable and relatively accurate short to medium-term forecasts.

**6.5.2** The models show that there were minor variances in the energy sales, demand (KVA), and customer count. As such, the OUR used the decision criteria developed in 2021 to derive the final forecast.

**6.5.3** The rule that governed the energy sales and the demand (KVA) had two criteria stated below:

1. If the variation between the OUR and JPS forecasts for both energy sales and the demand (KVA) were less than **± 3%,** then JPS's forecast would be accepted.

2. If the variation between the OUR and JPS forecasts for energy sales and the demand (KVA) was more than **± 3%.** The mean value of the forecast would be used as the final forecast.

**The Actual Performance for 2022**

Energy Sales (GWh)

**6.5.4** A review of the 2022 models utilized by the OUR's was done.

**Table 6.8: Shows OUR Forecasted/Approved and Actual Sales for 2022**

| | Units | Actual Energy Sales | OUR's Initial Forecast (ARIMA) | Variance | OUR's Approved Forecast | Variance |
|---|---|---|---|---|---|---|
| **Rate 10** | *GWh* | 1081 | 1094 | -1.2% | 1090 | -0.8% |
| **Rate 20** | *GWh* | 589 | 588 | 0.2% | 591 | -0.3% |
| **Rate 40** | *GWh* | 775 | 774 | 0.2% | 792 | -2.1% |
| **Rates 50 & 70** | *GWh* | 578 | 553 | 4.5% | 553.75 | 4.4% |
| **Rate 60** | *GWh* | 41 | 45 | -6.9% | 45 | -7.9% |
| **Total** | ***GWh*** | **3,065** | **3,054** | **0.36%** | **3,072** | **-0.22%** |

**6.5.5** Table 6.8 shows the actual energy consumption vs OUR's Initial and Approved forecast for 2022. The OUR used the ARIMA models to generate its initial estimates. OUR's initial estimate was 3,054 GWh, while the actual sales were **3,065 GWh** for 2022, which was **11 GWh (0.36%)** higher than initially predicted. In addition, the OUR approved sales were 3**,072 GWh** for 2022, which was **0.22%** higher than actual sales. The OUR applied the above decision criteria to arrive at the final forecast.

**6.5.6** Actual sales for 2022 grew by approximately **2.9% (from 2980 MWh to 3,065 MWh)** relative to 2021. Rates 20, 40, 50, and 70 experienced an increase in 2022. This increase can be attributed to a return to near-normal economic activities after the COVID-19 pandemic. On the other hand, Rates 10 and 60 experienced declines in consumption; due to workers returning to the office and JPS LED streetlighting project respectively. Table 6.9 below shows performance by rate class for 2021 vs 2022.

**Table 6.9: Energy Sales by Rate Class for 2021 vs 2022**

| | 2,021 | 2,022 | Change % |
|---|---|---|---|
| *Rate 10* | 1,123,328 | 1,080,876 | -3.8% |
| *Rate 20* | 545,915 | 589,455 | 8.0% |
| *Rate 40* | 742,629 | 775,117 | 4.4% |
| *Rate 50* | 236,497 | 255,987 | 8.2% |
| *Rate 60* | 49,432 | 41,454 | -16.1% |
| *Rate 70* | 281,809 | 322,033 | 14.3% |
| ***Total*** | **2,979,610** | **3,064,922** | **2.9%** |

Billed Energy Demand ("Energy Demand") (KVA)

**6.5.7** For 2022, the total energy demand was approximately **5,223 MWA**, a **0.5%** increase from **2021 (5,199 MVA)**. There was a ***decline*** in energy demand for **Rates 40 and 50** by **3.5%** and **3.7%**, respectively. On the other hand, there was a **17.2%** increase in energy demand for Rate 70. See Table 6.10 below for additional information.

**Table 6.10: Energy Demand by Rate Class for 2021 vs 2022**

| | Mode | Unit | Actual 2021 | Actual 2022 | FCST 2022 | Growth (Actual 2022 vs Actual 2021) | Actual 2022 vs FCST 2022 |
|---|---|---|---|---|---|---|---|
| ***Rate 40*** | *STD* | *KVA* | 2,280,965 | 2,188,020 | 2,317,231 | -4.1% | -5.6% |
| | *TOU* | *KVA* | 778,974 | 764,665 | 791,937 | -1.8% | -3.4% |
| | ***Total*** | ***KVA*** | **3,059,939** | **2,952,685** | **3,109,168** | **-3.5%** | **-5.0%** |
| ***Rate 50*** | *STD* | *KVA* | 647,615 | 644,158 | 657,344 | -0.5% | -2.0% |
| | *TOU* | *KVA* | 486,861 | 448,750 | 492,328 | -7.8% | -8.9% |
| | ***Total*** | ***KVA*** | **1,134,476** | **1,092,908** | **1,149,672** | **-3.7%** | **-4.9%** |
| ***Rate 70*** | *STD* | *KVA* | 661,594 | 748,814 | 699,779 | 13.2% | 7.0% |
| | *TOU* | *KVA* | 343,344 | 428,938 | 340,789 | 24.9% | 25.9% |
| | ***Total*** | ***KVA*** | **1,004,938** | **1,177,751** | **1,040,568** | **17.2%** | **13.2%** |
| **Grand Total** | | | **5,199,353** | **5,223,344** | **5,299,408** | **0.5%** | **-1.4%** |

**6.5.8** Actual energy demand for 2022 was approximately **1.4%** less than expected. Energy demand for Rates 40 and 50 was around **5%** less than the anticipated demand for 2022. While energy demand for Rate 70 was **13.2%** higher than expected.

**JPS Proposal and OUR's Decision for 2023**

Energy Sales

**6.5.9** In the 2023 Annual Review Application, JPS proposed **3,105 GWh** for energy sales for the 2023 regulatory year. JPS performed a disaggregated short-term forecast at the feeder level to develop this forecast using the **SARIMAX** model. A **SARIMAX** model is simply a seasonal ARIMA model with exogenous variables. JPS's proposal represents an increase of **1.3% (40 GWh)** over 2022 energy sales.

**6.5.10** The OUR also did an independent forecast using the ARIMA model. According to the OUR's methodology, energy sales for 2023 are expected to be approximately **3,114 GWh,** representing a **1.6% (49 GWh)** increase over 2022. (See Table 6.11 below)

**Table 6.11: OUR decision for Energy Sales 2023**

| | Actual | Forecast | | | Approved Forecast 2023 | Growth |
|---|---|---|---|---|---|---|
| | 2022 | JPS 2023 | OUR 2023 | % Variance | | 2022 vs. 2021 |
| | (GWh) | (GWh) | (GWh) | (GWh) | (GWh) | (%) |
| Rate 10 | 1081 | 1,090 | 1,078 | 1.1% | 1,090 | 0.8% |
| Rate 20 | 589 | 605 | 604 | 0.2% | 605 | 2.6% |
| Rate 40 | 775 | 790 | 787 | 0.4% | 790 | 1.9% |
| Rate 50 | 256 | 270 | 267 | 1.0% | 270 | 5.5% |
| Rate 60 | 41 | 41 | 38 | 7.3% | 40 | -4.5% |
| Rate 70 | 322 | 310 | 340 | -8.9% | 325 | 1.0% |
| **Total** | **3,065** | **3,106** | **3,114** | **-0.3%** | **3,120** | **1.8%** |

**6.5.11** The OUR and JPS generated similar forecasts for most of the Rate Classes. However, there is a **30 GWh** difference in **Rate 70**. Following the **3%** decision criterion established in 2021, the OUR took the average of the two forecasts. The OUR also applied this criterion to Rate 60.

Energy Demand

**6.5.12** JPS expects energy demand in **2023** to increase by **1.6%** from the **2022** actual demand. The company expects a **3.52%** and **4.9%** increase in demand for **Rates 40 and 50**, respectively. In addition, **Rate 70** is expected to see a decline of **6.26%** in energy demand. On the other hand, the OUR is expecting an increase in energy demand across **Rates 40, 50, and 70** compared to 2022. Keeping in line with the **3%** decision criteria, the OUR took the average of both demands that vary by **±3%**. Tables 6.11 above and 6.12 below show OUR's decision for the energy demand forecast. Table 6.12 below shows the actual energy demand forecast for each rate class, while Table 6.13 below shows the change in demand for JPS and OUR relative to 2022.

**Table 6.12: Showing OURs decision for Energy Demand**

| | Mode | Unit | Actual 2022 | OUR 2023 | JPS 2023 | % Criteria | OUR Decision |
|---|---|---|---|---|---|---|---|
| Rate 40 | STD | KVA | 2,188,020 | 2,218,683 | 2,252,770 | 1.5% | 2,252,770 |
| | TOU | KVA | 764,665 | 761,152 | 803,706 | 5.6% | 782,429 |
| | **Total** | **KVA** | **2,952,685** | **2,979,835** | **3,056,476** | **2.6%** | **3,035,199** |
| Rate 50 | STD | KVA | 644,158 | 643,880 | 660,257 | 2.5% | 660,257 |
| | TOU | KVA | 448,750 | 572,210 | 486,165 | -15.0% | 529,188 |
| | **Total** | **KVA** | **1,092,908** | **1,216,090** | **1,146,422** | **-5.7%** | **1,189,444** |
| Rate 70 | STD | KVA | 748,814 | 791,079 | 667,814 | -15.6% | 729,446 |
| | TOU | KVA | 428,938 | 453,148 | 436,250 | -3.7% | 444,699 |
| | **Total** | **KVA** | **1,177,751** | **1,244,227** | **1,104,064** | **-11.3%** | **1,174,146** |
| **Grand Total** | | | **5,223,344** | **5,440,153** | **5,306,962** | **-2.4%** | **5,398,789** |

**Table 6.13: Showing percentage change for JPS. OUR and OUR's decision for the demand forecast**

| | Mode | Unit | JPS 2023 vs Actual 2022 | OUR 2023 vs Actual 2022 | OUR Decision vs Actual 2022 |
|---|---|---|---|---|---|
| Rate 40 | STD | KVA | 2.96% | 1.4% | 3.0% |
| | TOU | KVA | 5.11% | -0.5% | 2.3% |
| | **Total** | **KVA** | **3.52%** | **0.9%** | **2.8%** |
| Rate 50 | STD | KVA | 2.50% | 0.0% | 2.5% |
| | TOU | KVA | 8.34% | 27.5% | 17.9% |
| | **Total** | **KVA** | **4.90%** | **11.3%** | **8.8%** |
| Rate 70 | STD | KVA | -10.82% | 5.6% | -2.6% |
| | TOU | KVA | 1.70% | 5.6% | 3.7% |
| | **Total** | **KVA** | **-6.26%** | **5.6%** | **-0.3%** |
| **Grand Total** | | | **1.60%** | **4.2%** | **3.4%** |

**6.5.13** The OUR used a metrics approach to convert KWH to KVA. A conversion from KWH to KVA was done using the formula ***KW = KVA * PF.***

*Assumptions:*

1. To convert from KWH to KW, the OUR used the time associated with TOU peak, partial peak, and off-peak and assumed a five (5)-day work week for each category for Rates 40, 50, and 70.
2. The power factors for 2022 were calculated, and the OUR applied these power factors to the 2023 forecasts.

*Customer Number*

**6.5.14** The OUR expects the number of customers to remain **constant** throughout **2023.** Hence, the OUR used the last customer count data set ***(May 2023)*** provided by JPS for its forecast. From Table 6.14 below, the decision criteria were satisfied for all rate classes except Rate 50. The OUR accepted JPS's forecast for 2023 and took the average of the two forecasts for Rate 50.

**Table 6.14: Showing Customer forecast for 2023 and OUR's decision.**

| Rate Class | 2022 Actual | JPS 2023 Forecast | OUR 2023 Forecast | % Criteria | OURs Decision |
|---|---|---|---|---|---|
| ***Rate 10*** | 619,176 | 619,431 | 615,399 | -0.7% | 619,431 |
| ***Rate 20*** | 70,088 | 70,659 | 70,091 | -0.8% | 70,659 |
| ***Rate 40*** | 1,892 | 1,932 | 1,901 | -1.6% | 1,932 |
| ***Rate 50*** | 149 | 144 | 151 | 4.9% | 148 |
| ***Rate 60*** | 495 | 510 | 497 | -2.5% | 510 |
| ***Rate 70*** | 24 | 24 | 24 | 0.0% | 24 |
| ***TOTAL*** | **691,824** | **692,701** | **688,063** | **-0.7%** | **692,704** |

# 7 H-Factor and Fuel Cost Adjustment Mechanism

## 7.1 Introduction

### Background

**7.1.1** In accordance with the provisions of the Licence applicable to the Fuel Rate Adjustment aspect of JPS's price control regime, at each Annual Review during a five (5)-year revenue cap period, the Office is required to determine the H-Factor, as necessary, to reflect the applicable Heat Rate (whether thermal, system, individual JPS plants, or other such methodology, as per Schedule 3 (40) of the Licence 2016) versus the pre-established yearly targets in the Rate Review Determination Notice. Where the relevant heat rate target is applied in the defined Fuel Cost Adjustment Mechanism (FCAM) used to determine the monthly fuel rate (J$/kWh) during each Annual Review adjustment period. Specifically, the approved 2022-2023 heat rate target would be applicable for the 2022 – 2023 rate adjustment period.

### Regulatory Principles for Setting Heat Rate Targets

**7.1.2** As defined in previous Office Determination Notices, the heat rate target is a key efficiency measure that incentivizes efficient conversion of input fuel energy (BTU or kJ) to electrical energy (kWh) in the power generation process. Thereby, ensuring the efficient pass-through of fuel cost incurred by JPS, in relation to the "Licensed Business" to customers. As stipulated by the Licence 2016, the targets are set by the Office normally at the Five-Year Rate Review. The relevant annual target is, however, reviewed at each subsequent Annual Review to consider the effects of material changes in system configuration and energy efficiency (EE) developments, not planned or forecasted during the Rate Review process.

**7.1.3** In addition to the fuel conversion efficiency dimension, another strategic objective of the heat rate target is to encourage JPS to consistently optimize its generation operations to minimize total variable operating costs. In reference to these overarching objectives, the OUR, in consultation with JPS, has adopted the following key principles to guide the heat rate target setting and application process:

1) The targets should hold JPS accountable for the factors which are under its direct control.
2) The targets should encourage optimal generation dispatch of the available generating units to minimize the total cost of electricity generation.
3) The targets should consider legitimate system constraints, provided that JPS is taking reasonable action to mitigate these constraints.
4) The targets should normally be set at the Five-Year Rate Review and reviewed at each Annual Review, and adjusted, if necessary.
5) The targets should be reasonable and achievable and consistent with the existing configuration/capabilities of the generation and transmission systems, during the applicable review period.

**Regulatory Objectives and Approach**

**7.1.4** Although the OUR had conducted a comprehensive heat rate evaluation/analysis during the 2019 - 2024 Rate Review Process, and subsequent interim reviews during the 2021 and 2022 Annual Review proceedings, there has been some system developments since the 2022 Annual Review. These system developments have signaled the need for a deeper review of the generation system orientation and operations, and JPS's projected/actual heat rate performance since the start of the 2019-2024 review period, to provide a basis to determine the reasonableness of the proposed heat rate forecast and pre-established target for the 2023-2024 regulatory period.

**7.1.5** Given these developments, the OUR conducted a heat rate evaluation, specifically covering the 2023-2024 review period, taking into consideration, the historical performance since 2021 January, to among other things, determine whether the pre-established 2023-2024 heat rate target remains representative and reasonable to ensure the efficient pass-through of JPS's electricity generation related fuel costs to ratepayers, during the subject period. The scope of this heat rate evaluation is outlined below.

**Scope of 2023-2024 Heat Rate Review**

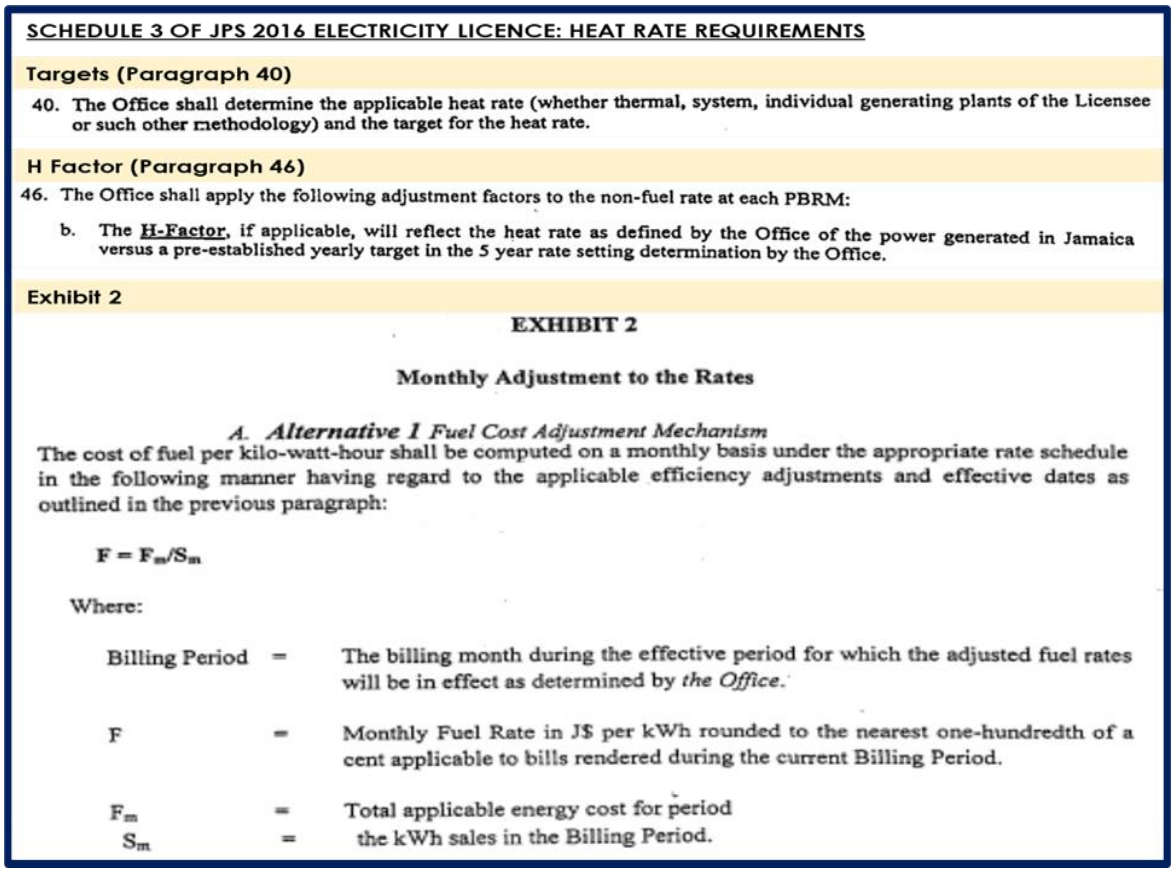
**7.1.6** The scope of OUR's 2023-2024 heat rate evaluation at this 2023 Annual Review, encompasses, among other things, the following activities:

1) Technical evaluation of JPS's 2023-2024 heat rate proposals (including all supporting schedules and data submitted by JPS up to 2023 June 23).
2) Develop the heat rate forecast for 2023-2024 tariff period.
3) Scenario analysis to assess the effects of the operational dynamics and output variations of the available generating plants (considering transmission system operating constraints) on JPS heat rate performance, during the 2023-2024 review period.
4) Re-examination of the 2023-2024 heat rate target approved in the 2019 - 2024 Rate Review Determination Notice and reset the target if deemed necessary.
5) Review and determine the heat rate methodology, H-Factor and FCAM for the 2023-2024 review period.

## 7.2 Licence Requirements Applicable to Heat Rate And FCAM

**7.2.1** For reference, the provisions of the Licence 2016 applicable to the FCAM and H-Factor are covered under Schedule 3, (Paragraphs 37, 39, 40, 46(b), and Exhibit 2) of the Licence 2016, and are also covered in the Legal and Regulatory Framework set out in this Determination Notice. The Licence 2016 provisions as per the references cited are highlighted in Figure 7.1 below.

**Figure 7.1: Licence Provisions - Heat Rate Target, H-Factor and FCAM**



SCHEDULE 3 OF JPS 2016 ELECTRICITY LICENCE: HEAT RATE REQUIREMENTS

**Targets (Paragraph 40)**

40. The Office shall determine the applicable heat rate (whether thermal, system, individual generating plants of the Licensee or such other methodology) and the target for the heat rate.

**H Factor (Paragraph 46)**

46. The Office shall apply the following adjustment factors to the non-fuel rate at each PBRM:

b. The **H-Factor**, if applicable, will reflect the heat rate as defined by the Office of the power generated in Jamaica versus a pre-established yearly target in the 5 year rate setting determination by the Office.

**Exhibit 2**

**EXHIBIT 2**

**Monthly Adjustment to the Rates**

*A.* ***Alternative 1*** *Fuel Cost Adjustment Mechanism*

The cost of fuel per kilo-watt-hour shall be computed on a monthly basis under the appropriate rate schedule in the following manner having regard to the applicable efficiency adjustments and effective dates as outlined in the previous paragraph:

$$F = F_m/S_m$$

Where:

| | | |
|---|---|---|
| Billing Period | = | The billing month during the effective period for which the adjusted fuel rates will be in effect as determined by *the Office*. |
| F | = | Monthly Fuel Rate in J$ per kWh rounded to the nearest one-hundredth of a cent applicable to bills rendered during the current Billing Period. |
| $F_m$ | = | Total applicable energy cost for period |
| $S_m$ | = | the kWh sales in the Billing Period. |

## 7.3 Approved Heat Rate Target

**7.3.1** As stipulated in paragraph 39, Schedule 3 of the Licence 2016, the heat rate targets set by the Office shall normally be done at the Rate Review for each of the five (5) years and broken out year by year.

**Pre-established 2023-2024 Heat Rate Target**

**7.3.2** During the 2019-2024 Rate Review Process, the Office set the heat rate targets to be applied in the FCAM each month over the 2019-2024 review period. The targets approved by the Office in the 2019 - 2024 Rate Review Determination Notice, are described in Table 7.1 below.

**Table 7.1: Office Pre-established Heat Rate Targets for JPS (2019-2024 Determination Notice)**

| OFFICE APPROVED HEAT RATE TARGETS FOR JPS (2019-2024 RATE REVIEW DETERMINATION NOTICE) | | | | |
|---|---|---|---|---|
| **Annual Review Year** | **Rate Adjustment Period** | **Heat Rate Modality** | **OUR Approved Heat Rate Target (kJ/kWh)** | **Remarks** |
| 2021 | 2021-2022 | JPS Thermal Plants | 9,667 | |
| 2022 | 2022-2023 | JPS Thermal Plants | 9,495 | |
| **2023** | **2023-2024** | **JPS Thermal Plants** | **9,470** | To be applied in the FCAM for each applicable month in the 2023-2024 review period. |

**7.3.3** As shown, the pre-established 2023-2024 target for JPS is **9,470 J/kWh**. Subject to any revision by the Office, this target is to be applied to the defined FCAM over the 2023-2024 price control period.

**7.3.4** On the matter of the reasonableness of the annual heat rate targets, the OUR's assessment of the heat rate performance and projections during the 2019-2024 Rate Review Process, and subsequent Annual Reviews, has concluded that the targets set are "reasonable and prudent", and are in keeping with the requirements of the Licence and established regulatory precedence.

## 7.4 Fuel Cost Adjustment and Recovery Mechanism

### Approved FCAM for 2019-2024 Price Control Period

**7.4.1** In keeping with the provisions of Schedule 3, paragraph 40 of the Licence 2016 and established regulatory precedence, among other things, the Office in the 2019-2024 Rate Review Determination Notice, determined that the 2021-2024 Heat Rate targets shall be based on a "thermal plant methodology" (encapsulating only "JPS thermal plants") for the purpose of determining the applicable H-Factor. Based on the Licence 2016 provisions, the logical interpretation is that this thermal plant Heat Rate construct would automatically be aligned to the option defined as **"Alternative 1"** in EXHIBIT 2 of Schedule 3 of the Licence 2016. On that basis, the Office determined that the FCAM to be utilized by JPS for the monthly Fuel Rate adjustments over the 2021-2024 regulatory period shall be the formulae defined in Figure 7.2 below.

**Figure 7.2: Office Approved FCAM for JPS**

***Allowed Fuel Cost = IPPs Fuel Cost + [JPS Fuel Cost x H-Factor (Thermal)]***

[OUR Approved FCAM: 2021 – 2024]

Where: *H-Factor (thermal) = [JPS Heat Rate Target (thermal)/ JPS Actual Heat Rate (thermal)]*

**7.4.2** In practice, this mechanism allows JPS to recover prudently incurred system fuel costs on a dollar-for-dollar basis through the monthly fuel rates, subject to efficiency adjustment by the H-Factor. As indicated, the H-Factor adjustment is restricted to fuel costs associated with JPS's thermal plants, with the applicable Heat Rate targets regulating the level of JPS fuel costs allowed for pass-through. It is notable that the H-Factor as currently structured, has an embedded incentive scheme that intrinsically awards financial benefits/penalties to JPS to the extent that there is any over-achievement or under-achievement of the determined Heat Rate target, respectively. In context, this feature also provides an incentive to JPS to improve the overall efficiency of its generation operations, with the aim of minimizing total variable generation costs through prudent "Merit Order" and optimal generation dispatch operations.

**Factors Contributing to System Fuel Cost**

**7.4.3** In the operation of the "Licensed Business", a significant portion of its total annual "Cost of Service" is the costs of fuel consumed by JPS/IPPs generating plants in the production of electricity supplied to the grid. Where, such fuel costs are largely dependent on the following factors:

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

**7.4.4** These linkages infer that system fuel cost in a given month is likely to change whenever one or more of the above factors are altered. Intuitively, this means that any resulting variations in monthly fuel cost will be reflected in the adjusted monthly fuel rates.

## 7.5 Overview of Generation System Performance

**System Developments**

**7.5.1** Since 2016, the electricity sector has made significant advances toward achieving a more sustainable, secure, and cost-effective supply energy mix, to ensure optimal utilization of generation assets, to produce the least-cost electricity for delivery to ratepayers. A chronology of the major system developments up to the end of 2022 is set out below:

1) The commissioning of Eight Rivers Energy Company Limited's (EREC's) 37MW Solar PV Generation facility at Paradise Park, Westmoreland, in 2019 June.

2) The commissioning of JPS's 24.5MW/16.6MWh Hybrid Energy Storage System (HESS), in 2019 December.
3) The Commissioning of the South Jamaica Power Company's (SJPC) 194MW NG/ADO fired CCGT plant, in 2019 December.
4) Commissioning of the NFE-JAMALCO 94MW NG/ADO Combined Heat & Power (CHP) plant, in 2020 February.
5) Commissioning of JPS/CB 10MW CHP DG plant at Hill Run, Catherine, and declaration of Commercial Operations Date (COD), on 2021 December 17.
6) The commencement of the Corporate Area 40MVAR Capacitor Bank project in 2022.
7) The upgrading of some segments of the Transmission and Distribution (T&D) System up to the end of 2022.

**7.5.2** Notwithstanding these advances, it should be noted that decisions regarding the development/expansion of the electricity system, including RE resources reside with the Ministry with responsibility for energy. Based on the existing electricity sector governance framework, this Ministry also has the responsibility for the development of the Integrated Resource Plan (IRP), required to determine the schedule and quantity of generating capacity needed to meet future electricity demand, and to contribute system reliability and stability at least-cost to ratepayers. The mechanics of this process is such that after the generation capacity requirements are identified in the IRP, the Generation Procurement Entity (GPE), subject to the provisions of the Electricity Act, 2015 would then initiate the process for the procurement of the new generation capacity identified for addition to the electricity system. It is important to note the role of the OUR in these processes is to ensure that the projects and solutions pursued reflect the lowest possible economic cost, and that the interest of the ratepayers is protected.

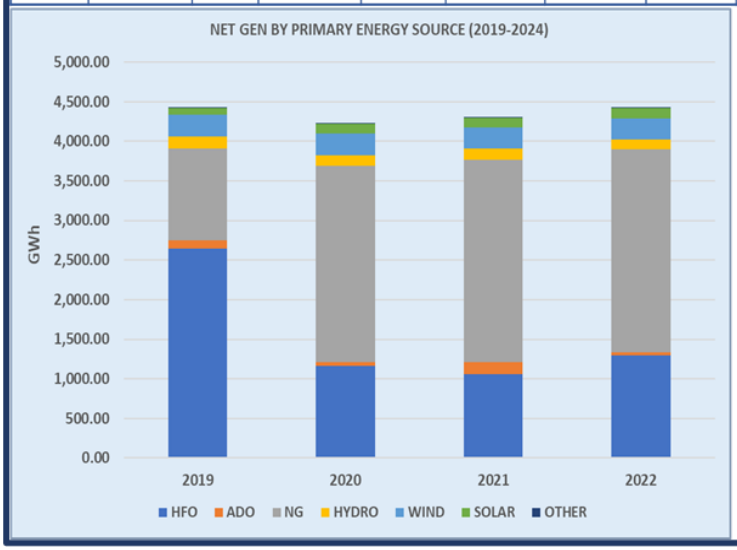
**Energy Supply Mix and Net Generation**

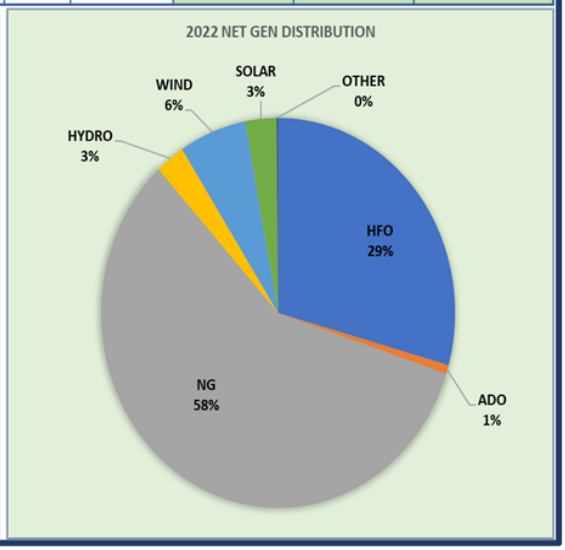
**7.5.3** Based on the existing energy matrix, the primary energy sources used to produce electricity supplied to electricity grid are: Heavy Fuel Oil (HFO), Automotive Diesel Oil (ADO), Natural Gas (NG) and Renewable Energy (RE) resources. The contribution of these primary energy sources to annual system net generation, over the period 2019 – 2022 (Jan-June) is represented is in Figure 7.3 below.

**Figure 7.3: System Annual Net Generation by Primary Energy Source (2019-2022)**

ANNUAL NET GENERATION BY PRIMARY ENERGY SOURCE (GWH) – [2019-2022]

| YEAR | HFO | ADO | NG | HYDRO | WIND | SOLAR | NET BILLING | OTHER | TOTAL | HFO % of NET GEN | NG % of NET GEN | RE % of NET GEN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2019 | 2,647.27 | 103.04 | 1,162.36 | 152.71 | 274.51 | 86.23 | 3.67 | 0.04 | 4,429.83 | 59.80% | 26.20% | 11.67% |
| 2020 | 1,167.55 | 38.31 | 2,481.19 | 134.48 | 281.42 | 119.93 | 4.18 | 0.37 | 4,227.43 | 27.60% | 58.70% | 12.77% |
| 2021 | 1,054.25 | 152.09 | 2,563.17 | 137.69 | 264.55 | 127.06 | 4.85 | 0.31 | 4,303.97 | 24.50% | 59.60% | 12.41% |
| 2022 | 1,297.63 | 32.78 | 2,571.48 | 118.93 | 272.33 | 126.2 | 5.09 | 0.28 | 4,424.77 | **29.33%** | **58.12%** | **11.81%** |




**7.5.4** For 2022, the relative contributions to system annual net generation were:

- 58.12% from NG.
- 29.33% from HFO.
- 0.74 %from ADO.
- 11.81% from RE sources.
- 0.01% from other sources.

## RE Generation

**7.5.5** The annual generation (GWh) from RE sources reported over the 2019 - 2022 period, is shown in Table 7.2 below. As indicated, RE generation supplied to the grid in 2022 (522.60 GWh) was 11.55 GWh lower than the 2020 level (534.15 GWh). This appears to be due to lower than expected solar and wind resources at some RE plant sites and operational issues, limiting the level of net energy output (NEO) to the power grid.

**Table 7.2: Net Generation from RE Sources (2019 - 2022)**

| GENERATION FROM RE SOURCES (2019-2022 MAY) | | | | | |
|---|---|---|---|---|---|
| **Components** | **2019** | **2020** | **2021** | **2022** | **Remarks** |
| RE Generation GWh) | 517.12 | 540.01 | 534.15 | 522.60 | |
| System Net Generation (GWh) | 4,429.83 | 4,227.43 | 4,303.96 | 4,424.77 | |
| **RE % of Net Generation** | **11.67%** | **12.77%** | **12.41%** | **11.81%** | |
| NEP RE Target (%) | - | **15.00%** | - | | 2020 RE Target not yet achieved. |

**7.5.6** While the RE generation is invaluable (due to its direct environmental benefits), it should be noted that all the existing grid-connected RE generation facilities supply (NEO) to the electricity system on an "as-available" basis, due to the inherent intermittency of the RE resources being utilized. However, this dynamic often creates the need for energy balancing requirements that are mostly supplemented by firm capacity dispatchable thermal plants, which has ramifications for their overall operating efficiency and heat rate performance. This situation is considered in the heat rate evaluation process.

**7.5.7** Notably, the 2019-2022 generation data shows that the 2020 RE target of 15% established in the NEP, is yet to be achieved.

**Fuel Supply and Price Dynamics**

**7.5.8** While there have been major shifts in the energy supply matrix since 2016 with the introduction of NG, the electricity sector remains highly dependent on imported primary energy (fuel oil and NG) for electricity production. With the current energy mix, it is arguable that there may be less exposure to exogenous factors, however, there are still embedded vulnerabilities as all fuel requirements for electricity production are imported. This means that the sector continues to be exposed to international fuel markets activities and geopolitical events. And, considering that NG imported from a single supplier now contributes to almost 60% of total annual net generation, which introduces other elements of risk. For liquid-based fossil fuels, their prices are directly linked to international oil markets, which are characterized by high price volatility and unpredictability, as well as geopolitical issues. As it relates to NG, although it is a traded commodity that is also influenced by international fuel market dynamics, the pricing mechanisms defined in the existing Gas Sales Agreements (GSAs), allow for slightly more stable NG prices to JPS and IPPs. Notwithstanding, it should be recognized that based on factors such as, unpredictable market conditions, fuel supply logistics/ supply arrangements, the prices of these fuels are largely outside the control of JPS and IPPs. The movement in prices of fuel utilized in the production of electricity supplied to the grid since the start of the 2019-2024 period, is represented in Figure 7.4 below.

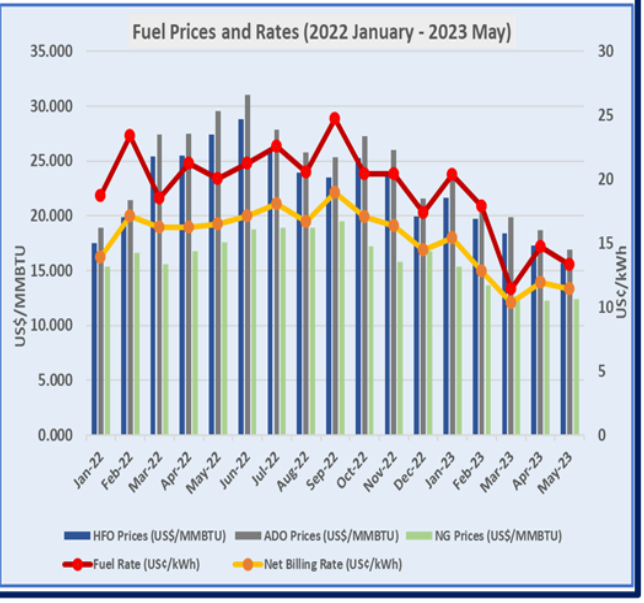
**Figure 7.4: Average Price of Fuels used for Electricity Generation (2019 - 2023 May)**

FUEL PRICES AND RATES – [2019-2023]

| YEAR | AVG. HFO PRICES | | AVG. ADO PRICES | | AVG. NG PRICES | AVG BILLED FUEL RATE | AVG. NET NET BILLING |
|---|---|---|---|---|---|---|---|
| | US$/BBL | US$/MMBTU | US$/BBL | US$/MMBTU | US$/MMBTU | US¢/kWh | US¢/kWh |
| 2019 | 67.19 | 10.69 | 96.35 | 16.54 | 12.66 | 14.09 | 10.28 |
| 2020 | 47.65 | 7.58 | 64.87 | 11.14 | 11.82 | 14.43 | 9.50 |
| 2021 | 72.99 | 11.61 | 95.09 | 16.33 | 14.25 | 15.89 | 10.96 |
| 2022 | 86.90 | 23.91 | 150.32 | 25.81 | 17.30 | 20.77 | 16.56 |
| 2023 Jan - May | 68.55 | 18.56 | 116.68 | 20.03 | 13.28 | 15.55 | 12.38 |

FUEL PRICES AND RATES (2022 – 2023)

| Month/ Year | HFO Prices (US$/MMBTU) | ADO Prices (US$/MMBTU) | NG Prices (US$/MMBTU) | Fuel Rate (US¢/kWh) | Net Billing Rate (US¢/kWh) |
|---|---|---|---|---|---|
| Jan-22 | 17.536 | 18.93 | 15.33 | 18.708 | 13.898 |
| Feb-22 | 19.86 | 21.43 | 16.60 | 23.406 | 17.158 |
| Mar-22 | 25.39 | 27.41 | 15.56 | 18.524 | 16.223 |
| Apr-22 | 25.47 | 27.49 | 16.80 | 21.257 | 16.229 |
| May-22 | 27.40 | 29.57 | 17.61 | 20.066 | 16.489 |
| Jun-22 | 28.77 | 31.06 | 18.75 | 21.233 | 17.124 |
| Jul-22 | 25.79 | 27.83 | 18.90 | 22.545 | 18.104 |
| Aug-22 | 23.90 | 25.80 | 18.89 | 20.563 | 16.666 |
| Sep-22 | 23.47 | 25.33 | 19.47 | 24.711 | 18.939 |
| Oct-22 | 25.25 | 27.25 | 17.21 | 20.416 | 17.082 |
| Nov-22 | 24.10 | 26.01 | 15.77 | 20.444 | 16.345 |
| Dec-22 | 19.98 | 21.56 | 16.75 | 17.409 | 14.463 |
| Jan-23 | 21.68 | 23.40 | 15.40 | 20.384 | 15.424 |
| Feb-23 | 19.70 | 21.27 | 13.66 | 17.890 | 12.822 |
| Mar-23 | 18.42 | 19.89 | 12.71 | 11.419 | 10.347 |
| Apr-23 | 17.29 | 18.66 | 12.24 | 14.74 | 11.909 |
| May-23 | 15.69 | 16.94 | 12.40 | 13.32 | 11.404 |




**7.5.9** As shown, average fuel prices have fluctuated significantly during the 2022 January to 2023 May timeframe, with the highest recorded average monthly price for each fuel type highlighted. Over the period, the average price of HFO supplied to JPS's generating plants varied widely within the range of US$15.69 to US$28.77/MMBTU (peaking in 2022 June), which was reflected in the monthly system fuel cost and fuel rates for the applicable months. Similarly, ADO prices also fluctuated considerably between a low of US$16.94/MMTU and a high of US$31.06/MMBTU. Plant gate prices for NG also exhibited some variation but within a narrower range was of US$12.24 to 19.47/MMBTU during the period.

**7.5.10** The increases in input fuel prices in 2022 relative to the previous, were likely influenced by the continuing global effects of the COVID-19 Pandemic and resulting impacts on international fuel markets and fuel supply logistics, which was further compounded by the conflict in eastern Europe, which started in early 2022.

**7.5.11** Regarding the effects on fuel charges, given that input fuel prices are a key determinant of the fuel rates, the indicated changes in the fuel prices over the period, were directly reflected in the monthly fuel charges calculated by JPS for billing purposes.

## System Fuel Costs

**7.5.12** The system fuel costs (related to the use of HFO, ADO and NG) reported by JPS in the monthly "Fuel Rate Calculation" submissions that are passed on to customers are assessed to ascertain that they are reasonable and have been prudently incurred.

**7.5.13** A breakdown of the system fuel cost for each year, from the start of the 2019-2024 review period, is provided in Table 7.3 below.

**Table 7.3: System Fuel Cost by Fuel Type (2019 - 2023 June)**

| SYSTEM FUEL COST BY FUEL TYPE 2019 – 2023 JUNE | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Year** | **HFO (J$B)** | **ADO (J$B)** | **NG (J$B)** | **Total Fuel Cost (J$B)** | **HFO Cost (% of Total FC)** | **ADO Cost (% of Total FC)** | **NG Cost (% of Total FC)** |
| 2019 | 40,937 | 3,659 | 16,353 | **60,949** | 67.17% | 6.00% | 26.8% |
| 2020 | 13,931 | 1,183 | 41,822 | **56,936** | 24.47% | 2.08% | 73.5% |
| 2021 | 18,237 | 3,467 | 49,963 | **71,667** | 25.45% | 4.84% | 69.7% |
| 2022 | 28.752 | 12.174 | 57.109 | **98.036** | **29.33%** | **12.42%** | **58.25%** |
| 2023 (Jan-Jun) | 11.068 | 1.304 | 23.559 | **35.930** | 30.80% | 3.63% | 58.30% |

**7.5.14** The data indicates that for 2022, total annual NG cost accounted for 58.3% of the total fuel cost, which is more than 11 percentage points down from the 2021 level (69.7%). However, this outcome was expected because of the relocation of NFE's critical LNG infrastructure facilities at the Montego Bay port terminal, during the period 2021 November to 2022 April. This execution of the project disrupted the supply of NG to the JPS Bogue CCGT units, occasioning a switch to operation on ADO. At the time, the OUR after examining the specific "terms and conditions" in the Bogue GSA (section 8.2) covering such circumstances, determined that the effects of the NFE LNG infrastructure relocation project, should not have any material effect on the monthly fuel rates and fuel cost pass-through for the applicable billing months, during the period of the relocation project.

**7.5.15** As can be seen, total ADO cost for 2022 increased considerably relative to that for 2021. This was primarily due to the use of ADO to operate the Bogue CCGT plant, during the months of 2022 January – early May. Notwithstanding, the difference between the price NG (that would have been used in the plant) and the actual price of ADO paid to the supplier by JPS, was absorbed by the NG supplier (NFE). These settlements were reflected in Debit Notes from JPS to NFE, during the period of the LNG infrastructure relocation project.

## JPS & IPPs Contributions to System Generation and Total Fuel Cost

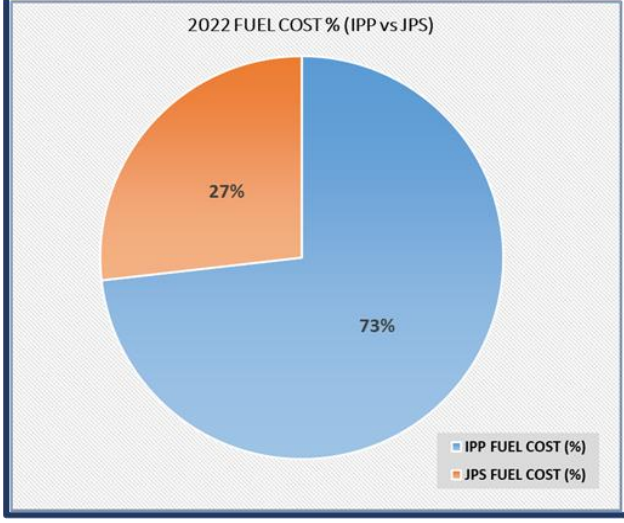
**7.5.16** Based on historical generation data, prior to 2020, the proportions of the annual total system fuel cost (JPS & IPPs) were approximately 65% and 35%, respectively, as indicated in Figure 7.5 below. However, as the data indicates, since 2021, this allocation has effectively been reversed, with the IPPs accounting for ~73%, which was maintained at this level up to

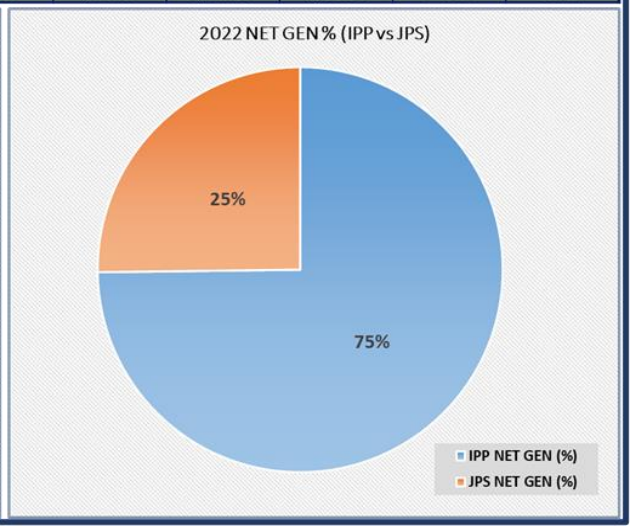
the end of 2022. This result is mainly due to the large displacement of fuel oil-based electricity generation by the new large-scale generation facilities operating on NG. In terms of actual costs, the 2022 net generation ratio translates to annual fuel costs of approximately J$71.771Billion and JS$26.261Billion, attributable to IPPs and JPS, respectively.

**Figure 7.5: JPS and IPPs Proportions of Net Generation and Fuel Cost**

JPS AND IPP PROPORTIONS OF FUEL COST AND NET GENERATION

| YEAR | FUEL COST | | | | | NET GENERATION | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | TOTAL (J$B) | IPP (J$B) | JPS (J$B) | IPP (%) | JPS (%) | TOTAL (GWH) | IPP (GWH) | JPS (GWH) | IPP (%) | JPS (%) |
| 2019 | 60.949 | 21.541 | 39.408 | 35.3% | 64.7% | 4,429.83 | 1,990.34 | 2,439.49 | 44.9% | 55.1% |
| 2020 | 56.936 | 37.828 | 19.108 | 66.4% | 33.6% | 4,227.43 | 2,831.90 | 1,395.53 | 67.0% | 33.0% |
| 2021 | 71.667 | 52.289 | 19.379 | 73.0% | 27.0% | 4,303.96 | 3,156.98 | 1,146.98 | 73.4% | 26.6% |
| 2022 | 98.035 | 71.774 | 26.261 | 73.2% | 26.8% | 4,424.77 | 3,311.89 | 1,112.88 | 74.8% | 25.2% |




**7.5.17** With respect to system annual net generation, for 2022, the relative contributions from IPPs' generation facilities and JPS plants were at approximately 74.8% and 25.2%, respectively, which are in the same range as the proportions for the annual fuel costs. This indication infers that the coverage of the system load is dominated by IPP plants.

## Fuel Rate

**7.5.18** The Fuel Rate is calculated each month on a US¢/kWh basis and represents the cost of fuel (JPS and IPPs) used for producing each kWh of electricity supplied to the grid. Based on the relationship between input fuel prices and fuel rates, the effects of fuel price variations are usually manifested in the monthly fuel rates that are applied in the billing process. The plot in Figure 7.4 above shows the relative movement in the billed monthly fuel rate over the observation period (2022 January – 2023 May). As shown, the monthly fuel rate varied significantly from month to month during the period, with a profile that largely tracks the movement in fuel prices (US$/MMBTU). As revealed from the review of JPS's monthly

Fuel Reports, the indicated variations in the fuel rate, were mainly due to fluctuations in input fuel prices, generation dispatch profile, and changes in electricity sales volumes recorded for each applicable month. As indicated in the chart, the highest and lowest fuel charge applied over the period, were 24.711 US¢/kWh (2022 September) and 11.419 US¢/kWh (22023 March), respectively. To put things into perspective, the fuel charge currently represents approximately 40% of the average residential customer's electricity bill.

**Net Billing Rate**

**7.5.19** The "Net Billing" rate is a volumetric-based rate (US¢/kWh) calculated each month to determine the energy payments to Net Billing customers/Self-generators for excess energy supplied to the grid via the Standard Offer Contracts "SOC" (approved under the Net Billing Programme). As with the fuel rate, the Net Billing rate followed a similar trend over the review period. This was expected because the Net Billing rate is indexed to the fuel rate, and as such, would therefore be largely influenced by the same factors impacting fuel prices and the related fuel rates.

## 7.6 JPS 2021-2023 Heat Rate Performance

**JPS Monthly Heat Rate Performance (2021–2023 Review Period)**

**7.6.1** As previously indicated, the heat rate target for the 2022-2023 review period was set at 9,495 kJ/kWh. Using the monthly heat rates (JPS actual) reported since the effective date of the 2022 Annual Review Determination Notice (2022 September 1 up to 2023 June), the OUR compared the monthly average heat rate for the period against the approved target. This comparison together with the outcome for the 2021 January – 2022 August period, is shown in Table 7.4 below.

**Table 7.4: Summary of JPS Monthly Heat Rate Performance (2022-2023 Review Period)**

| JPS AVERAGE MONTLY HEAT RATE vs TARGETS (2021 JANAUARY - 2023 JUNE) | | | | | |
|---|---|---|---|---|---|
| **Description** | **Performance Period** | **Approved Heat Rate Target (kJ/kWh)** | **Average Actual Heat Rate (kJ/kWh)** | **Average Difference (Actual – Target) (kJ/kWh)** | **Remarks** |
| 2021-2022 Rate Period | 2021Jan- 2021Aug | 9,675 | 9,440 | -235 | Overachievement of target - benefit to JPS. |
| 2022-2023 Rate Period | 2021Sep-2022Aug | 9,667 | 9,423 | -245 | Overachievement of target - benefit to JPS. |
| 2023-2024 Rate Period | 2022Sep-2023Jun | 9,495 | 9,812 | 317 | Underachievement of target up to 2023 June. |

**7.6.2** As indicated, JPS's average monthly heat rate (actual) for the period 2022 September – 2023 June was 9,812 kJ/kWh. This means that up to 2023 June, there was an under-achievement of the heat rate target (9,495 kJ/kWh) by JPS, with a deficit of 317 kJ/kWh. However, by the end of the rate adjustment period, the monthly heat rate performance may improve to a

degree that is sufficient to nullify this deficit, which would eliminate the possibility of heat rate related financial penalty to the company.

**JPS Monthly Heat Rate Performance versus Target (2021 January – 2023 June)**

**7.6.3** To provide a more detailed analysis of JPS's heat rate performance outcome since the 2019-2024 Rate Review Determination Notice came into effect, the OUR compared the historical heat rates (actual) reported by JPS for each month over the period 2021 January - 2023 June, against the applicable targets approved by the OUR, and determined the respective gains and deficits. This analysis is presented in Table 7.5 below.

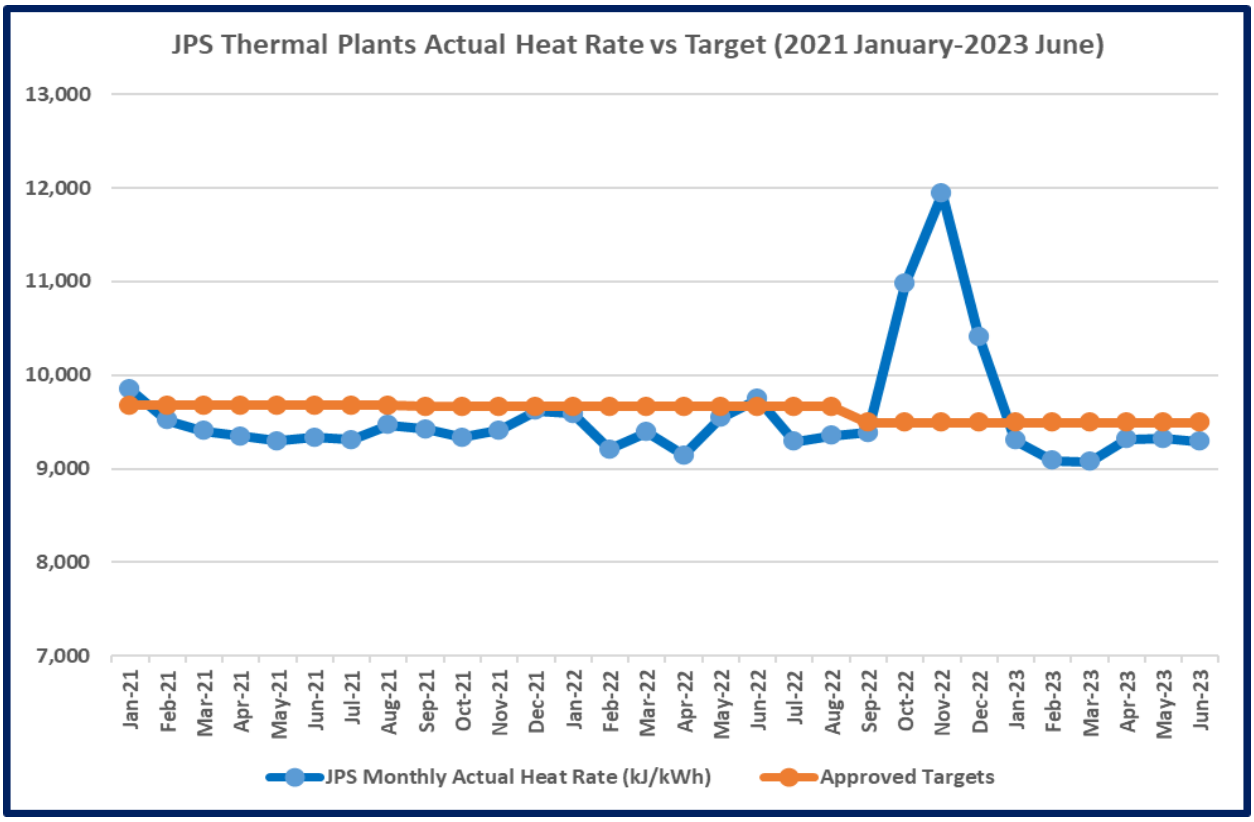
**Table 7.5: JPS Heat Rate Performance versus Targets (2021 January – 2022 June)**

| JPS ACTUAL HEAT RATE VERSUS TARGET (2021 JAN – 2022 JUNE) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JPS HEAT RATE (KJ/KWH) | 2020 JUL | 2020 AUG | 2020 SEP | 2020 OCT | 2020 NOV | 2020 DEC | 2021 JAN | 2021 FEB | 2021 MAR | 2021 APR | 2021 MAY | 2021 JUN | **AVG** |
| 2020-2021 Heat Rate | | | | | | | 9,846 | 9,516 | 9,403 | 9,350 | 9,294 | 9,336 | **9,458** |
| 2020-2021 Target | | | | | | | 9,675 | 9,675 | 9,675 | 9,675 | 9,675 | 9,675 | - |
| Change (Actual-Target) | | | | | | | 171 | -159 | -272 | -325 | -381 | -339 | **-218** |
| | | | | | | | | | | | | | |
| JPS HEAT RATE (KJ/KWH) | 2021 JUL | 2021 AUG | 2021 SEP | 2021 OCT | 2021 NOV | 2021 DEC | 2022 JAN | 2022 FEB | 2022 MAR | 2022 APR | 2022 MAY | 2022 JUN | **AVG** |
| 2021-2022 Heat Rate | 9,308 | 9,466 | 9,426 | 9,337 | 9,409 | 9,618 | 9,590 | 9,208 | 9,393 | 9,146 | 9,546 | 9,746 | **9,433** |
| 2021-2022 Target | 9,675 | 9,675 | 9,667 | 9,667 | 9,667 | 9,667 | 9,667 | 9,667 | 9,667 | 9,667 | 9,667 | 9,667 | - |
| Change (Actual-Target) | -367 | -209 | -241 | -330 | -258 | -49 | -77 | -459 | -274 | -521 | -121 | 79 | **-236** |
| | | | | | | | | | | | | | |
| JPS HEAT RATE (KJ/KWH) | 2022 JUL | 2022 AUG | 2022 SEP | 2022 OCT | 2022 NOV | 2022 DEC | 2023 JAN | 2023 FEB | 2023 MAR | 2023 APR | 2023 MAY | 2023 JUN | **AVG** |
| 2022-2023 Heat Rate | 9,289 | 9,355 | 9,383 | 10,985 | 11,943 | 10,415 | 9,304 | 9,086 | 9,072 | 9,313 | 9,324 | 9,290 | **9,730** |
| 2022-2023 Target | 9,667 | 9,667 | 9,495 | 9,495 | 9,495 | 9,495 | 9,495 | 9,495 | 9,495 | 9,495 | 9,495 | 9,495 | - |
| Change (Actual-Target) | -378 | -312 | -112 | 1,490 | 2,448 | 920 | -191 | -409 | -423 | -182 | -171 | -205 | **206** |

**7.6.4** The data indicates that over the period, JPS achieved the respective heat rate targets for 27 of the 30 months under observation, with margins (benefits) ranging between 49 kJ/kWh and 521 kJ/kWh.

**7.6.5** Figure 7.6 below further illustrates the profile of JPS's heat Rate performance, during the 2021 January – 2023 June period.

**Figure 7.6: JPS's Heat Rate Performance Profile (2021 January – 2023 June)**




**7.6.6** As demonstrated, there was wide variation in the monthly heat rates over the 2021 January – 2023 June period.

## Statistical Analysis – Historical Heat Rates (2021 January – 2023 June)

**7.6.7** In the process of evaluating JPS's 2021 January – 2023 June heat rate performance, the OUR also conducted statistical analyses on the submitted historical heat rate data, which generated the summary statistics presented in Table 7.6 below.

**Table 7.6: Summary Statistics - JPS Actual Heat Rates (2021 January – 2023 June)**

| SMMUARY STATISTICS: JPS ACTUAL HEAT RATES (2021 JAN – 2023 JUN) | | | |
|---|---|---|---|
| **Statistic** | **Heat Rate (kJ/kWh) [with outliers]** | **Heat Rate (kJ/kWh) [without outliers]** | **Remarks** |
| COUNT | 30 | 24 | |
| MIN | 9,072 | 9,208 | Recorded 2023 March. |
| MAX | 11,943 | 9,846 | Extreme Value: 11,943kJ/kWh - 2022 Nov (MOH of BO ST14). |
| MEAN | 9,557 | 9,419 | |
| MEDIAN | 9,369 | 9,369 | |
| STD DEV | 590 | 155 | |

**7.6.8** The results of the analysis indicate that despite a few extreme values (outliers) the mean and median statistic for the 2021 January – 2023 June heat rate distribution show reasonable alignment, inferring that the heat rate performance profile over the period is symmetrical, and depicts a normal distribution of the heat rate data. With the outliers removed from the dataset, there was closer convergence in the summary statistics. For this scenario, the summary statistics indicate that mean heat rate value over the period is 9,419 kJ/kWh with standard deviation (SD) of 155 kJ/kWh, which means that 95% of the monthly heat rates lie within 2 SDs of the mean value. In the OUR's view, this analysis provides clear validation that the heat rate targets set by the Office for JPS are reasonable and reside within statistical confidence limits.

**Outliers in 2022-2023 Heat Rate Performance Data**

**7.6.9** According to JPS, the high heat rate values reported for 2022 October – December (10,985 kJ/kWh, 11,943 kJ/kWh and 10,415 kJ/kWh, respectively) were due to the removal of its Bogue ST14 unit for major overhaul (MOH), which was scheduled to be executed in forty-five (45) days (2022 September 31 - November 14). The OUR's comments on this situation are as follows:

- On this particular matter, it should be noted that the OUR in the 2022 Annual Review Determination Notice, commented that JPS's heat rate forecast for 2022 October and November (planned outage period for Bogue ST14), presented in the 2022 Annual Review Filing were 11,923 kJ/kWh and 10,272 kJ/kWh, respectively, were found to be excessive and reflective of optimal/economic generation dispatch.
- In in reviewing the actual heat rate performance for the period of the major overhaul, the OUR found that the project was delayed by an additional twenty-seven (27) days, with the unit returning to service on 2022 December 18, further exacerbating the heat rate situation.
- The OUR's further review of the "merit order" and generation scheduling/dispatch for the period in question, indicate that dispatch operation was suboptimal, which would have contributed the reported poor heat rate performance for JPS's thermal generating units for the months of 2022 October – December.
- These findings suggest that the heat rate performance for 2022 October – November relative to target could be better controlled by JPS. As such, any resulting underachievement of the target accruing up to the end the 2022-2023 rate period (2023 August) will have to be absorbed by JPS.

**Review Summary – JPS Heat Rate Performance (2021 January – 2023 June)**

**7.6.10** The highlights from the OUR's review of JPS's 2021 January – 2023 June heat rate performance are as follows:

1) Except for the five cases (highlighted in Table 7.5 above), the heat rate targets have been reasonably achieved by JPS over the 30-month period, with resulting financial benefits to the company.

2) The data and analyses show that despite instances of relatively high heat rates in 2022, overall, it can be deduced that the OUR's determined heat rate targets are "reasonable and achievable" and are consistent with the configuration/capability of the generation system and are in accordance with the requirements of the Licence 2016.

## 7.7 JPS's 2023 Annual Review Heat Rate Proposals

**7.7.1** As stipulated in the "Final Criteria" (Criterion 14 and ANNEX 4), approved for the 2019-2024 Rate Review Process and related Annual Reviews, JPS is required to submit its heat rate proposals, supported by the required schedules, models and generation system data, for regulatory evaluation and determination by the OUR. In adherence to these requirements, JPS in its 2023 Annual Review Application, presented its 2023-2024 heat rate proposals along with the associated, models, schedules, inputs, assumptions, and forecasts. The details of JPS's heat rate proposal and supporting schedules/data for the 2023-2024 regulatory period are outlined below.

### JPS 2023-2024 Heat Rate Forecast

**7.7.2** The basis of JPS's heat rate projections for the 2023-2024 review period, presented in the submission, are provided in the sections below.

### JPS Heat Rate Forecast Model

**7.7.3** In the 2023 Annual Review Application, JPS indicated that following from the 2019-2024 Rate Review Process, it continued the use of the PLEXOS simulation software to model its generation system operations and develop its heat rate forecast for the 2023-2024 review period. As described by JPS, its heat rate modelling process covers the following elements:

- The maximum capacity rating (MCR) of each generating unit/facility in the system.
- The forecasted net energy output (NEO) and capacity factor (CF) of each generating unit/facility derived from simulated generation dispatch.
- Fuel price forecasts (ADO, HFO and NG) for 2019-2024.
- The average heat rate of each generating unit/facility to be utilized during the review period.
- The heat rate forecast for each month in the regulatory period.

### JPS 2023-2024 Generating Plants NEO/CF Forecast

**7.7.4** As described by JPS, the grid-connected generating units (facilities) NEO/CF forecast for the 2022-2023 review period was first developed using the PLEXOS software, and then these parameters were used to estimate their corresponding heat rates. These individual plant heat rates were then used to develop the heat rate forecast for JPS's thermal plant combined

for the 2023-2024 regulatory period. A summary of the generation plants NEO/CF and heat rate projections for 2023-2024 developed by JPS is provided in Table 7.7 below.

**Table 7.7: JPS Generation Plants NEO/CF and Heat Rate Forecast for 2023-2024**

| JPS FORECASTS: GENERATION PLANT NEO, CAPACITY FACTORS AND HEAT RATES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PLANT OWNER | 2023 JULY – 2024 JUNE DATA | | | | | | | |
| | 2019-2024 Rate Review Application | | | | 2023 Annual Review Filing | | | |
| JPS: | MCR (MW) | NEO (GWh) | CF (%) | Heat Rate (kJ/kWh) | MCR (MW) | NEO (GWh) | CF (%) | Heat Rate (kJ/kWh) |
| RF1 | 20.0 | 145.62 | 82.90% | 9,076 | 20.0 | 145.35 | 82.77% | 9,169 |
| RF2 | 20.0 | 132.19 | 75.22% | 9,076 | 20.0 | 131.62 | 74.84% | 9,186 |
| HBGT5 | 21.5 | 7.77 | 4.12% | 14,974 | 21.5 | 3.82 | 2.02% | 17,894 |
| HBGT10 | 32.5 | 20.92 | 7.33% | 13,173 | 32.50 | 11.72 | 4.10% | 16,539 |
| BOGT3 | 21.5 | 5.62 | 2.97% | 15,386 | 21.5 | 0.21 | 0.11% | 19,625 |
| BOGT6 | 18.0 | 0.01 | 0.01% | 17,809 | 18.0 | 0.02 | 0.01% | 21,772 |
| BOGT7 | 18.0 | 0.05 | 0.03% | 18,200 | 18.0 | 0.31 | 0.19% | 20,296 |
| BOGT9 | 20.0 | 5.29 | 3.01% | 14,782 | 20.0 | 0.77 | 0.40% | 19,994 |
| BOGT11 | 20.0 | 87.17 | 49.61% | 11,990 | 20.0 | 36.81 | 20.90% | 12,211 |
| BOCCGT | 120.0 | 889.63 | 84.38% | 8,932 | 120.0 | 718.42 | 68.25% | 9,119 |
| JPS MUNRO | 3.0 | 3.62 | 12.79% | - | 3.0 | 0.30 | 1.13% | - |
| MGGTY6.3 | 7.2 | 44.14 | 69.69% | - | 7.2 | 35.21 | 55.83% | - |
| JPS HYDRO | 22.4 | 97.46 | 49.67% | - | 22.4 | 93.13 | 46.49% | - |
| IPPs: | | | | | | | | |
| JEP | 124.5 | 119.81 | 11.01% | 8,616 | 124.5 | 184.48 | 16.83% | 8,620 |
| JPPC | 60.0 | 301.09 | 57.10% | 8,145 | 60.0 | 174.01 | 32.98% | 8,731 |
| WKPP | 65.5 | 218.73 | 38.16% | 8,569 | 65.5 | 395.89 | 68.77% | 8,569 |
| SJPC | 190.0 | 1,375.76 | 82.44% | 8,861 | 194.0 | 1,340.49 | 78.62% | 8,132 |
| NFE 94MW | 94.0 | 467.76 | 56.66% | 10,964 | 94.0 | 774.21 | 93.74% | 11,303 |
| JPS/CB CHP DG | 10.0 | 116.83 | 95.00% | 9,150 | 10.0 | 47.64 | 54.24% | 9,150 |
| WIGTON I | 20.0 | 55.75 | 31.69% | - | 20.0 | 59.97 | 29.00% | - |
| WIGTON II | 18.0 | 55.88 | 35.31% | - | 18.0 | 52.12 | 32.95% | - |
| WIGTN III | 24.0 | 53.99 | 25.57% | - | 24.0 | 46.89 | 22.24% | - |
| BMRJW | 34.0 | 112.09 | 37.41% | - | 34.0 | 117.99 | 39.50% | - |
| CSL | 20.0 | 42.41 | 24.15% | - | 20.0 | 42.47 | 24.18% | - |
| EREC | 37.0 | 63.61 | 19.58% | - | 37.0 | 79.66 | 24.51% | - |

**7.7.5** As shown, some of the parameters presented in the original forecast (2019-2024 Rate Review Application), such as the dispatch levels and plants' NEO, have been adjusted to a significant degree. This was quite noticeable for the IPPs generating plants. The issue is that the original forecast of the capacity factors (CF) and NEO for the generation facilities were not reflective of optimal/economic generation dispatch, however the revised forecast (2023 Annual Review) appears to be more representative. Notwithstanding, there were other factors such as changes in system demand and fuel prices that may have influenced the realignment of the CF, NEO, and average heat rate projections for the 2023-2024 regulatory period.

**JPS Thermal Plants Heat Rate Projections for 2023-2024 (Revised)**

**7.7.6** In the 2023 Annual Review Application, JPS posited that the heat rate performance of its thermal generating plants, over the 2023-2024 tariff period will depend on several factors that typically affect economic generation dispatch, including:

1) Growth in system demand.
2) The addition of more RE generation.
3) The addition of new generating units and the overall reserve capacity.
4) Heat rate improvements achieved for the existing generating units.
5) Availability and reliability of JPS generating plants.
6) Availability and reliability of IPP generating facilities.
7) Absolute and relative fuel prices for JPS and IPPs, and their impact on economic dispatch.
8) Spinning reserve policy; and
9) Network constraints and contingencies.

**7.7.7** JPS's heat rate projections for its thermal generating units for the 2023-2024 review period are shown in Table 7.8 below.

**Table 7.8 JPS 2023-2024 Heat Rate Forecast for its Thermal Generating Plants**

| JPS 2023-2024 HEAT RATE FORECAST BY PLANT (kJ/kWh)) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HEAT RATE BY PLANT** | **2023 JUL** | **2023 AUG** | **2023 SEP** | **2023 OCT** | **2023 NOV** | **2023 DEC** | **2024 JAN** | **2024 FEB** | **2024 MAR** | **2024 APR** | **2024 MAY** | **2024 JUN** | **AVG H/RATE** |
| RF1 | 9,130 | 9,230 | 9,140 | 9,130 | 9,150 | 9,130 | 9,150 | 9,180 | 9,260 | 9,190 | 9,170 | 9,170 | 9,169 |
| RF2 | 9,170 | 9,240 | 9,170 | 9,170 | 9,180 | 9,150 | 9,180 | 9,290 | 9,340 | 9,170 | 9,170 | 9,170 | 9,186 |
| **RF Units** | **9,150** | **9,235** | **9,155** | **9,150** | **9,165** | **9,140** | **9,175** | **9,215** | **9,282** | **9,180** | **9,170** | **9,170** | **9,177** |
| HB GT5 | 18,078 | 18,130 | 18,060 | 18,110 | 18,220 | 18,360 | 17,700 | 17,810 | 17,510 | 17,730 | 17,720 | 17,740 | 17,894 |
| HB GT10 | 16,520 | 16,540 | 16,540 | 16,500 | 16,700 | 16,800 | 16,500 | 16,500 | 16,400 | 16,600 | 16,500 | 16,500 | 16,539 |
| **HB GTs** | **17,333** | **16,971** | **17,378** | **17,370** | **17,743** | **17,770** | **17,629** | **17,308** | **17,022** | **17,543** | **17,405** | **17,401** | **17,413** |
| BO GT3 | 19,210 | 19,210 | 19,810 | 19,800 | - | 22,100 | 19,610 | 19,500 | 19,210 | 19,210 | 19,210 | 19,010 | 19,260 |
| BO GT6 | 21,080 | 22,110 | 22,680 | 22,420 | 22,740 | 22,740 | 21,080 | 21,080 | 21,080 | 21,080 | 21,080 | 21,080 | 21,772 |
| BO GT7 | 20,430 | 22,430 | 22,430 | 22,430 | 22,430 | 22,260 | 19,890 | 19,940 | 19,940 | 19,940 | 19,940 | 19,930 | 20,296 |
| BO GT9 | 20,260 | 20,290 | 20,180 | 20,210 | 20,220 | 20,050 | 19,230 | 19,390 | 18,960 | 19,240 | 19,290 | 19,380 | 19,944 |
| BO GT11 | 12,180 | 12,200 | 12,430 | 12,380 | 12,510 | 12,640 | 12,190 | 12,310 | 12,200 | 12,130 | 11,940 | 12,070 | 12,201 |
| **Bogue GTs** | **12,713** | **12,562** | **12,676** | **12,915** | **12,950** | **12,999** | **12,346** | **12,457** | **12,472** | **12,240** | **12,013** | **12,294** | **12,467** |
| BO CCGT | 9,039 | 9,357 | 9,052 | 9,034 | 9,087 | 9,272 | 9,091 | 9,092 | 9,098 | 9,093 | 9,321 | 9,088 | **9,119** |
| | | | | | | | | | | | | | |
| **JPS THERMAL** | **9,360** | **9,629** | **9,306** | **9,312** | **9,279** | **9,415** | **9,302** | **9,354** | **9,346** | **9,332** | **9,713** | **9,335** | **9,379** |

### JPS 2023-2024 Heat Rate Forecast

**7.7.8** In the 2023 Annual Review Application, JPS indicated that the results obtained from the update of its heat rate forecast model for the period 2023 July to 2024 June, indicate that the average thermal heat rate for the 12-month period is projected to be 9,379 kJ/kWh (revised value for the original forecast proposed in the 2019-2024 Rate Review Application), barring the impact of unforeseen events.

**7.7.9** The JPS revised 2023-2024 heat rate forecast included in the 2023 Annual Review Application, compared to the original forecast provided in the 2019-2024 Rate Review Application, is demonstrated in Table 7.9 below.

**Table 7.9**: **JPS Heat Rate Projections for 2023-2024 Rate Period (Original and Revised)**

| JPS HEAT RATE FORECAST (JPS THERMAL PLANTS) FOR 2023-2024 TARIFF PERIOD (ORIGINAL & REVISED) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HEAT RATE FORECAST (KJ/kWh)** | **2023 JUL** | **2023 AUG** | **2023 SEP** | **2023 OCT** | **2023 NOV** | **2023 DEC** | **2024 JAN** | **2024 FEB** | **2024 MAR** | **2024 APR** | **2024 MAY** | **2024 JUN** | **AVG** |
| Original (2019-24 Rate Rev) | 9,302 | 9,308 | 9,286 | 9,345 | 9,325 | 9,333 | 9,398 | 9,356 | 9,319 | 9,410 | 9,318 | 9,305 | **9,334** |
| Revised (2023 Annual Rev) | 9,360 | 9,629 | 9,306 | 9,312 | 9,279 | 9,415 | 9,302 | 9,354 | 9,346 | 9,332 | 9,713 | 9,335 | **9,379** |
| Change relative to Original | 58 | 321 | 20 | -33 | -46 | 82 | -96 | -2 | 27 | -78 | 395 | 30 | **45** |

### OUR Observations and Comments

**7.7.10** The OUR makes the following observations and comments:

- As indicated, the difference in the revised versus original heat rate for each month in the period varies in the range of [-2 kJ/kWh to 395 kJ/kWh].
- The 12-month average heat rate for the revised forecast is 9,379 kJ/kWh, with an average increase of 45 kJ/kWh above that of the original forecast (9,334 kJ/kWh). This suggests a significant degree of alignment with the forecasts (original and revised) assumptions and convergence on the expected heat rate performance outcome.
- The forecast assumptions indicate that all known factors, assumed operating conditions, and constraints were considered by JPS in developing its revised 2023-2024 heat rate forecast. This suggests that there should be no need for further consideration of these factors in the 2023-2024 heat rate target determination.

### JPS Revised Heat Rate Target Proposal for 2023-2024 Rate Period

**7.7.11** In the 2023 Annual Review Application, JPS proposed that its thermal heat rate target for 2023 July – 2024 June be maintained at the current target of 9,495 kJ/kWh, on the premise that it would provide slightly more latitude than the pre-established target of 9,470 kJ/kWh to absorb impacts from possible risks not included in the base projection.

**7.7.12** The margin between JPS's 2023-2024 heat rate forecast and proposed target for the tariff period is shown in Table 7.10 below.

**Table 7.10: JPS Revised 2023-2024 Heat Rate Target Proposal**

| JPS HEAT RATE FORECAST AND TARGET FOR 2023-2024 RATE ADJUSTMENT PERIOD (ORIGINAL & REVISED) | | | |
|---|---|---|---|
| **Description** | **JPS Proposed Target (kJ/kWh) [2023-2024 Review Period]** | | **Remarks** |
| Heat Rate based on Thermal Plant Methodology: | 2019-2024 Rate Review Application | 2023 Annual Review Filing | |
| Forecast (12-month avg. HR) | 9,334 | 9,379 | |
| Heat Rate Target | **9,530** | **9,495** | JPS proposed that OUR maintains current target of (4,495 kJ/kWh) for 2023-2024 period. |
| Margin = (Target – Forecast) | 196 | 96 | |

### Factors JPS claim should be considered in the 2023-2024 Heat Rate Target Determination

**7.7.13** Regarding the review of the 2023-2024 heat rate target, JPS asserted that the OUR should consider the following factors:

a) The most recent operating key performance indicators over the last year (Heat Rate, Capacity Factor, EFOR, EAF) of JPS key baseload units.
b) Planned Hot Gas Path Inspection (HGPI) on Bogue GT12 (23 days).
c) Major overhaul on Bogue GT13 (35 days).
d) Major overhaul on Rockfort Unit #2 (35 days).
e) Heat rate deterioration and reliability challenges of Rockfort units (RF1 and RF2).
f) Age of JPS's assets.
g) Reliability challenges faced by IPPs on the dispatch of gas turbines (GTs).
h) The impact of a wide fuel price gap between NG and HFO on Bogue GT11 dispatch.
i) Sufficient latitude to absorb uncertainties stemming from unforeseen reliability challenges on the system, a possible widening of the NG-HFO fuel price gap, a possible higher than expected load demand, and other factors. Consideration should be given to the higher impact of risks due to the smaller JPS thermal fleet (relative to the size of the fleet in 2019), which limits the ability to feasibly absorb these impacts. There are numerous potential occurrences such as major unit malfunctions to unfavourable environmental conditions that could lead to a worsening of JPS' aggregate thermal heat rate while operating as the system operator.

### OUR's Comments

**7.7.14** Based on the factors listed, JPS seems to be saying that there will be major constraints in the generation system operations during the 2023-2024 regulatory period, that will cause deviations in the heat rate performance outcome, and the company will be constrained to mitigate such effects. On that premise, JPS proposed that the pre-established 2023-2024 heat target (9,470 kJ/kWh) be adjusted upwards to 9,495 kJ/kWh to account for these factors and related effects. However, as previously indicated, these factors were already incorporated in the revised 2023-2024 heat rate forecast, and there is no need for further consideration of these factors in the target determination.

## 7.8 OUR's Review of JPS 2023-2024 Heat Rate Proposals

### Scope of 2023-2024 Heat Rate Review

**7.8.1** To support its determinations on JPS's revised 2023-2024 heat rate forecast and target proposals included in the 2023 Annual Review Application, the OUR pursuant to the legal and regulatory framework, carried out a comprehensive technical evaluation of the proposals, encompassing the scope outlined above.

### OUR's 2023-2024 Heat Rate Evaluation

**7.8.2** To appropriately assess JPS's revised 2023-2024 heat rate proposals (including all supporting schedules, data and assumptions submitted by JPS up to 2023 June 22), the OUR conducted its independent heat rate evaluation using its own system analysis/dispatch models and "Heat Rate Model", taking into consideration all the relevant Heat Rate inputs/assumptions utilized during the 2019-2024 Rate Review Process, and incorporating all available updated data/parameters.

### Specific Inputs/Assumptions for Heat Rate Evaluation

**7.8.3** The specific inputs/assumptions utilized in the OUR's 2023-2024 heat rate evaluation are described in detail in the Final Criteria (ANNEX 4) and the 2019 - 2024 Rate Review Determination Notice (Chapter 13). Details on some of the critical inputs/assumptions are provided below.

### System Load Data (2023-2024)

**7.8.4** In the 2023 Annual Review Application, JPS posited that the prevailing COVID-19 pandemic has suppressed its system load demand, and based on such impact, it has revised its system net generation (GWh) and peak demand (MW) downward relative to the projections in the 2019-2024 Rate Review Application. These system load assumptions in conjunction with elements of the OUR's revised 2021 demand forecast, were used in the OUR's Heat Rate evaluation. JPS's revised system load data included the 2022 Annual Review Application is shown in Table 7.11 below.

**Table 7.11: JPS System Net Generation and Peak Demand Forecast (2023-2024)**

| JPS SYSTEM NET GENERATION AND PEAK DEMAND FORECAST (2023-2024) | | | | | |
|---|---|---|---|---|---|
| **Submission** | **Review Period** | **Net Gen (GWh)** | **Peak Demand (MW)** | **Load Factor (%)** | **Remarks** |
| 2019-2024 Rate Review | 2023-2024 | 4,422.89 | 643.9 | 78.41 | JPS Projection |
| 2023 Annual Review | 2023-2024 | 4,482.63 | 657.77 | 77.80 | JPS Projection |

## Heat Rate Test Data

**7.8.5** No heat rate test data was submitted to support JPS's 2023-2024 heat rate forecast, so the OUR resorted to the previous heat rate test data submitted by JPS to gauge the generating plant heat rate values (full load heat rate, average incremental heat rate, and heat rate at minimum operating level) used in the OUR's heat rate evaluation. Notwithstanding, it is important for JPS to recognize that heat rate tests as specified in the Generation Code (included in Electricity Sector Codes), are critical for validating the current efficiency levels of existing generating units relative to established limits and are also necessary for recalibration of the heat rate models.

## Generating Plants Variable O&M Cost and Fuel Price Projections

**7.8.6** The updated variable O&M costs and fuel price projections for the generating plants to be utilized during the 2023-2024 regulatory period, provided by JPS were used in the OUR's 2023-2024 heat rate evaluation. The VOM cost and fuel price assumptions are presented in Table 7.12 below.

**Table 7.12: Generating Plants VOM Costs and Fuel Prices used in 2023-2024 Heat Rate Evaluation**

| GENERATING UNITS VOM AND FUEL COST DATA (FOR 2023-2024 HEAT RATE EVALUATION) | | | | | | |
|---|---|---|---|---|---|---|
| **GEN OWNER** | **UNIT** | **FUEL TYPE** | **MCR (MW)** | **VOM COST (US$/MWH)** | **FUEL PRICE US$/MMBTU** | **FUEL PRICE US$/BBL** |
| **JPS** | RF1 | HFO | 20.00 | 1.686 | 15.39 | 96.79 |
| | RF2 | HFO | 20.00 | 1.686 | 15.39 | 96.79 |
| | GT5 | ADO | 21.50 | 1.408 | 22.51 | 131.09 |
| | GT10 | ADO | 32.50 | 0.963 | 22.51 | 131.09 |
| | GT3 | ADO | 21.50 | 1.408 | 23.82 | 138.75 |
| | GT6 | ADO | 18.00 | 1.222 | 23.82 | 138.75 |
| | GT7 | ADO | 18.00 | 1.222 | 23.82 | 138.75 |
| | GT9 | ADO | 20.00 | 1.222 | 23.82 | 138.75 |
| | GT11 | NG | 20.00 | 1.222 | 13.67 | - |
| | BO CCGT | NG | 120.00 | 1.607 | 13.67 | - |
| | JPS/CB CHP | NG | 10.00 | - | 14.24 | - |
| **IPPs** | JPPC | HFO | 60.00 | 15.594 | 23.54 | 147.97 |
| | JEP | HFO | 124.36 | 25.911 | 17.98 | 113.02 |
| | WKPP | HFO | 65.50 | 16.612 | 18.57 | 116.78 |
| | SJPC (190MW) | NG/ADO | 194.00 | 14.938 | 12.14 | - |
| | NFE (94MW) | NG/ADO | 94.00 | 0.300 | 12.14 | - |

## Verification Check – JPS Heat Rate

**7.8.7** To validate that its analysis models for the generation system and heat rate model are properly calibrated and representative, the OUR simulated the generation system operating performance (including generation dispatch) for the period 2022 June – 2023 May, using actual system data reported by JPS for the stated period. The results of this validation test indicate that the OUR's system analysis models and heat rate model are highly representative

and reliable, as there was convergence with the simulated outputs and the actual system performance outcomes. After this validation check, the OUR proceeded with its detailed heat rate evaluation, the results of which were used to generate the OUR's revised 2023-2024 heat rate forecast.

## 7.9 OUR's Heat Rate Evaluation Results

**7.9.1** The results generated from the OUR's heat rate evaluation include: the annual heat rate projections for JPS's thermal plants, system heat rates, generation dispatch levels (CF), and net generation, for the 2023-2024 regulatory period. The results are summarized below.

**OUR 2023-2024Generation Dispatch Projections**

**7.9.2** The results of the generation system assessment indicate the utilization level (CF) of each available generating unit scheduled for operation during the 2023-2024 regulatory period. These plant dispatch levels were estimated based on economic/optimal generation dispatch, subject to credible system constraints, which were considered. Based on the operating characteristics of the thermal generating units in the system, their average heat rates for a given month of operation are largely influenced by dispatch levels. Following that logic, the dispatch levels of JPS's thermal generating plants are a critical determinant of JPS's overall monthly average heat rates, required for the H-Factor. Despite some alterations to the original inputs/assumptions, the revised 2023-2024 NEO and CF projections for the generating units/facilities, as simulated by the OUR's system analysis models were found to be largely consistent with the net-generation and CF projections set out under Chapter 13 of the 2019 – 2024 Rate Review Determination Notice. Notably, these parameters were used to derive the average heat rate for JPS's thermal plants combined for the 2023-2024 tariff period.

**OUR's 2023-204 Heat Rate Projections for JPS Thermal Plants**

**7.9.3** Applying the heat rate input data and the forecasted the generation system parameters for the 2023-2024 period in the OUR "Heat Rate Model", the 2023-2024 average heat rate for JPS's thermal generating plants, was estimated to be 9,213 kJ/kWh. A comparison of the 2023-2024 average heat rate and that estimated by the OUR is presented in Table 7.13 below.

**Table 7.13: OUR and JPS 2023-2024 Heat Rate Projections (JPS Thermal Plants)**

| OUR versus JPS 2023-2024 HEAT RATE PROJECTIONS (JPS THERMAL PLANTS) | | | | | | | |
|---|---|---|---|---|---|---|---|
| RATE AJUSTMENT PERIOD | HEAT RATE MODALITY | JPS HEAT RATE FORECAST (KJ/KWH) | | | OUR HEAT RATE FORECAST (KJ/KWH) | | |
| | | 2019-2024 Rate Review | 2023 Annual Review | Variance | 2019-2024 Rate Review | 2023 Annual Review | Variance |
| 2023-2024 | JPS Thermal Plants | 9,334 | 9,379 | 45 | **9,185** | **9,213** | **28** |

**Indications from OUR's 2023-2024 Heat Rate Evaluation**

**7.9.4** The OUR observes the following:

1) The evaluation results indicate that the OUR's forecasted 2023-2024 average heat rate for JPS of 9,213 kJ/kWh) is slightly higher than the corresponding value presented in the 2019 - 2024 Rate Review Determination Notice (9,185 kJ/kWh). This was largely due to small increases in the value of some of the inputs used to generate the revised forecast. Nonetheless, the OUR is of the view that this slight change in forecast does not warrant an adjustment to the target, as sufficient buffer has already been included.

2) The projected average heat rate performance of JPS's thermal plants during the 2023-2024 regulatory period is expected to be dominated by the operation of the Bogue CCGT, RF1 and RF2 units, with relatively high utilization levels. Conversely, JPS's open cycle gas turbine (OCGT) units (peaking units) that operates on ADO, are expected to operate at very low average capacity factors (CF ≤5%), with little contribution to the overall heat rate performance over the period, and therefore, should not impose any adverse effects that would derail the achievement of the established target.

3) The existing generation system configuration/capacity and forecasted system demand (MW) assumed for the 2023-2024 review period, indicate that the system reserve capacity/margin (MW) in each month of the period will be above the threshold prescribed by the Electricity Sector Codes. This implies that the respective capacity margins would be sufficient to address short-term generation/load imbalances, as well as to maintain system stability/security in the event of system contingencies and/or "exceptional conditions".

4) The 2023-2024 Generation Outage Schedule submitted as part of the 2023 Annual Review Application indicates that three (3) of JPS's generating units are scheduled for "major maintenance" during the 2023-2024 regulatory period. The specific units and maintenance scope, are listed below:
   i. Bogue GT12: HGPI scheduled for 2023 August 1-24 (23 days).
   ii. Bogue GT13: Major Overhaul (MOH) scheduled for 2024 April 26 – May 31 (35 days).
   iii. Rockfort Unit #2 (RF2): MOH scheduled for 2024 February 16 – March 22 (35 days).

**7.9.5** According to JPS, the outage of these plants will impact its overall heat rate performance over the 2023-2024 rate period. However, the OUR's heat rate evaluation found that while these planned maintenance activities may have some impact on JPS's heat rate contemporaneously, the revised forecast indicates that the outage of these generation facilities during the scheduled maintenance period, will not likely result in any deterioration

of JPS's overall heat rate performance over the subject review period. Although there may be potential short-term negative heat rate impacts at the time of the plant maintenance outages, this would be offset by the resulting improvement in plant efficiency after the completion of the respective major maintenance activities.

**Statistical Analysis – JPS Heat Rate Data**

**7.9.6** To test the reasonableness of JPS's revised 2023-2024 heat rate target of (9,495kJ/kWh), the OUR used the available heat rate data (historical and projected) to perform statistical analyses, which generated the summary statistics, presented in Table 7.14 below.

**Table 7.14: Summary Statistics - JPS Heat Rates (2021 January – 2024 June)**

| SMMUARY STATISTICS: JPS HEAT RATES (2021 JAN – 2024 JUN) | | | |
|---|---|---|---|
| **Statistic** | **Heat Rate (kJ/kWh)** (Scenario with Outliers) | **Heat Rate (kJ/kWh)** (Scenario without Outliers) | **Remarks** |
| COUNT | 42 | **36** | |
| MIN | 9,072 | **9,208** | Recorded 2023 March. |
| MAX | 11,943 | **9,846** | Outlier: 11,943kJ/kWh - 2022 Nov (MOH of BO ST14) |
| MEAN | 9,509 | **9,409** | |
| MEDIAN | 9,352 | **9,352** | |
| STD DEV | 507.2 | **147.6** | |
| BASED ON:<br>• Actual JPS Heat Rate Data (2021 January – 2022 June)<br>• JPS Heat Rate Forecast (2023 July – 2024 June) | | | |

**Key Observations and Deduction**

**7.9.7** The following are our observations and deduction:

1) The results for each defined scenario indicate that the center of the heat rate distribution (the median) is the same value 9,352 kJ/kWh, which is expected because the median is a robust statistic and not susceptible to the effects of extreme observations or outliers.

2) The statistics generated for the scenario with the outliers removed from the dataset ("trimmed distribution"), show that the mean heat rate value converges toward the median value. This result also indicates that the mean value (9,409 kJ/kWh) is lower than the pre-established 2023-2024 heat rate target of 9,470 kJ/kWh (2019-2024 Rate Review Determination Notice).

3) The summary statistics infer that a heat rate target that is within the vicinity of the median and mean value: 9,352 – 9,409 kJ/kWh), is statistically representative.

JPS's proposed new 2023-2024 heat rate target of 9,495 kJ/kWh is outside of this range, which means that it should not be allowed.

**Scenario Analysis**

**7.9.8** To further validate the robustness of the 2023-2024 heat rate target approved in the 2019-2024 Rate Review Determination Notice, the OUR performed sensitivity/scenario analysis around the target using JPS/OUR revised 2023-2024 heat rate forecast, the results of the statistical analysis, and other relevant parameters. This process involved the evaluation of a series of "operating scenarios", to ascertain whether the pre-established 2023-2024 target is still representative and reasonable for H-Factor adjustment during the subject review period. The results of this sensitivity analysis indicate that the 2023-2024 heat rate target of 9,470 kJ/kWh is sufficiently robust, representative, and reasonable for application during the 2023-2024 price control period. This means that no adjustment to this target is warranted.

## 7.10 OUR's 2023-2024 Heat Rate Target For JPS

**7.10.1** Based on the results of OUR's heat rate evaluation/analysis, it was determined that the 2023-20243 heat rate target of 9,470 kJ/kWh, previously approved for JPS in the 2019-2024 Rate Review Determination Notice will be maintained (refer to Table 7.15 below). Accordingly, this target shall be applied to the H-Factor for efficiency adjustment in the approved FCAM each billing month during the 2023-2024 rate adjustment period.

**Table 7.15: OUR Approved Heat Rate Target for JPS (2023-2024 Rate Period)**

| APPROVED HEAT RATE TARGET FOR JPS TO BE APPLIED DURING 2022-2023 RATE PERIOD | | | | | | |
|---|---|---|---|---|---|---|
| RATE ADJUSTMENT PERIOD | HEAT RATE METHODOLOGY | JPS PROPOSED TARGET (KJ/KWH) (2023-2024 Review Period] | | OUR APPROVED TARGET (KJ/KWH) [2023-2024 Review Period] | | JPS-OUR TARGET VARIANCE (KJ/KWH) |
| | | 2019-2024 Rate Review Application | 2023 Annual Review Filing | 2019-2024 Rate Review DET Notice | 2023 Annual Review DET Notice | |
| **2023-2024** | JPS Thermal Plants | 9,545 | 9,495 | **9,470** | **9,470** | **25** |

**7.10.2** In the OUR's view, this heat rate target level should serve to incentivize JPS to improve its fuel conversion efficiency and to minimize total variable generation cost through optimal generation dispatch operations.

**Target Achievement and Enabling Factors**

**7.10.3** On the matter of JPS's heat rate performance over the 2023-2024 tariff period, based on known system conditions, the generation plants operating capabilities, and the 2023-2024 heat rate assumptions and performance forecast, overall, it is expected that on average, the company will be able achieve the approved heat rate target (9,470 kJ/kWh), during the

subject rate adjustment period. Specifically, some of the enabling factors that should contribute to target achievement, include, among other things, the following:

1) The effects of recent efficiency improvement projects on some of JPS generating units.
2) The major overhaul of the RF2 unit in 2024 February - March, and the resulting improvement in operational efficiency.
3) The major overhaul of the Bogue GT13 unit in 2024 February - March, and the resulting improvement in operational efficiency.
4) Major maintenance of other JPS generating units during the 2023-2024 review period, with expected efficiency improvements, which should be sustained to end the period.
5) Expected benefits from other ongoing and planned generation efficiency improvement programmes.
6) Effective management of the generation dispatch process and system operating constraints.
7) The impact of the 24.5MW HESS on system operations, particularly, to mitigate intermittency effects caused by VRE generation, which could impose potential adverse effects on JPS's heat rate performance.
8) The predominance of IPP-based capacity (NG and HFO) in the system, which should economically displace some low-efficiency/high variable cost generating units in the generation dispatch process.
9) The upgrading/reinforcement of the T&D network consistent with JPS's 5-year (2019-2023) Business/Investment Plan, to facilitate optimal power flows in the transmission system and mitigate system constraints that would adversely impact the generation dispatch operations; and
10) The consideration of exceptional IPPs' forced outages in the setting of the heat rate target.

**JPS 2023-2024 Heat Rate Projections versus OUR Target**

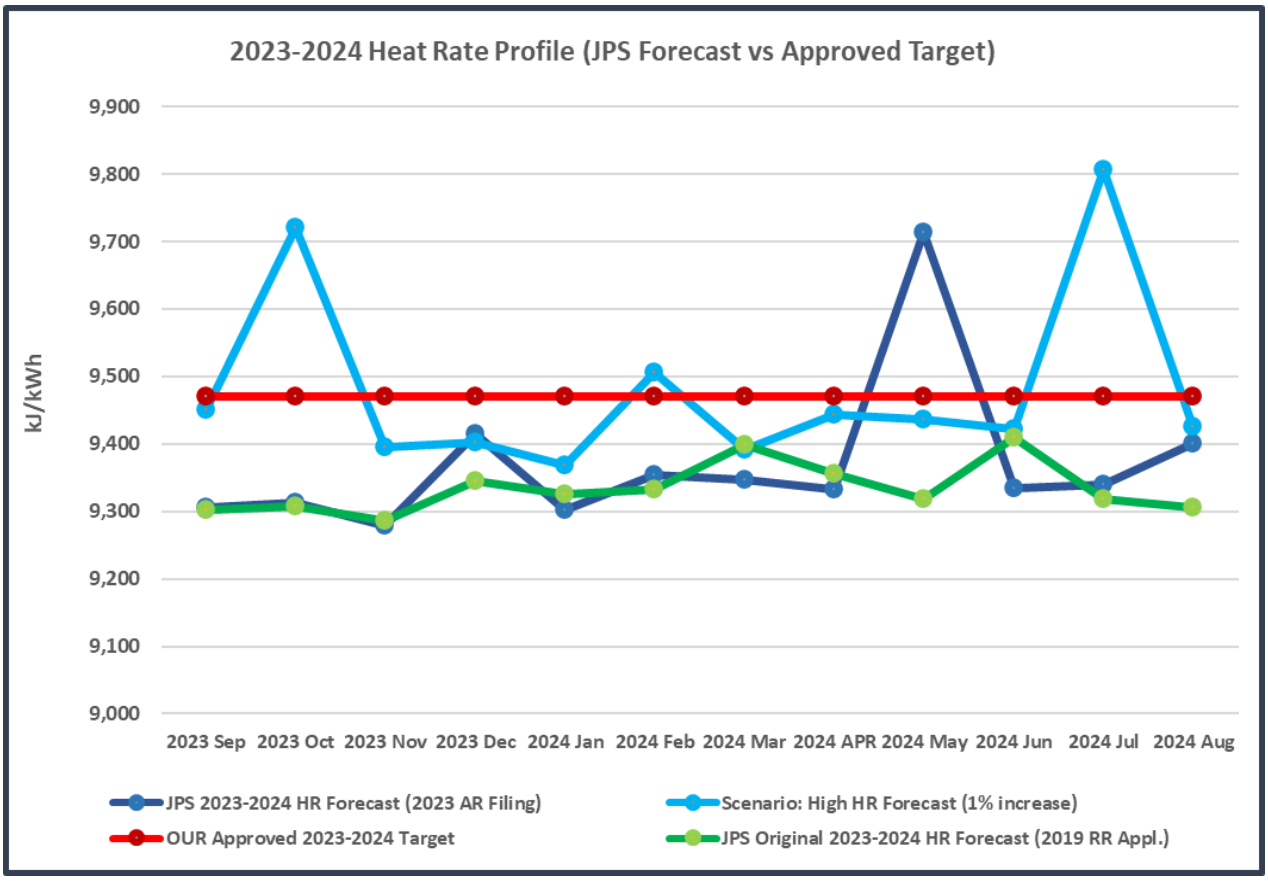
**7.10.4** A fundamental feature inherent in the H-Factor design is that the heat rate target represents an annual average threshold but is applied monthly. This means that JPS's heat rate performance for the applicable month relative to the relevant target is not inherently discrete but operates within a continuum subject to the time boundaries of the respective rate adjustment periods. This means that an underachievement of the target in one or two months may not necessarily lead to penalties to the company on aggregate, at the end of the tariff period. This construct is demonstrated in Table 7.16 below with a comparison of JPS's 2023-2024 monthly heat rate projections against the applicable target.

**Table 7.16: JPS 2023-2024 Monthly Heat Rate Projections versus Approved Target**

| JPS 2023-2024 HEAT RATE PROJECTIONS VERSUS OUR APPROVED TARGET (kJ/kWh) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **REVIEW PERIOD [2023-2024]** | **JPS Original 2023-2024 Heat Rate Forecast** | **JPS Revised 2023-2024 Heat Rate Forecast** | **Scenario: 1% Increase in Forecast Values** | **Approved 2023-2024 Heat Rate Target** | **Variance [Target – Original Forecast]** | **Variance [Target – Revised Forecast]** | **Variance [Target – 1% Dev Scenario]** |
| 2023 JUL | 9,302 | 9,360 | - | - | - | - | - |
| 2023 AUG | 9,308 | 9,629 | - | - | - | - | - |
| 2023 SEP | 9,286 | 9,306 | 9,395 | 9,470 | -184 | -164 | -75 |
| 2023 OCT | 9,345 | 9,312 | 9,401 | 9,470 | -125 | -158 | -69 |
| 2023 NOV | 9,325 | 9,279 | 9,368 | 9,470 | -145 | -191 | -102 |
| 2023 DEC | 9,333 | 9,415 | 9,505 | 9,470 | -137 | -55 | 35 |
| 2024 JAN | 9,398 | 9,302 | 9,391 | 9,470 | -72 | -168 | -79 |
| 2024 FEB | 9,356 | 9,354 | 9,444 | 9,470 | -114 | -116 | -26 |
| 2024 MAR | 9,319 | 9,346 | 9,436 | 9,470 | -151 | -124 | -34 |
| 2024 APR | 9,410 | 9,332 | 9,422 | 9,470 | -60 | -138 | -48 |
| 2024 MAY | 9,318 | 9,713 | 9,806 | 9,470 | -152 | 243 | 336 |
| 2024 JUN | 9,305 | 9,335 | 9,425 | 9,470 | -165 | -135 | -45 |
| 2024 JUL | 9,398 | 9,339 | 9,429 | 9,470 | -72 | -131 | -41 |
| 2024 AUG | 9,356 | 9,401 | 9,491 | 9,470 | -114 | -69 | 21 |
| **2023 SEP - 2024 AUG** | **9,346** | **9,362** | **9,452** | **9,470** | **-124** | **-108** | **-18** |

**7.10.5** For emphasis, the projected heat rate performance profile is further illustrated in Figure 7.7 below.

**Figure 7.7: 2023-2024 Monthly Heat Rate Profile (JPS Forecast versus Approved Target)**




**7.10.6** As indicated in Table 7.16 and Figure 7.7, under all the scenarios assessed, JPS should comfortably achieve the target for every month of the 2023-2024 review period (especially with the performance predicted with the original which is more likely to be realized based on historical results). Further, the H-Factor construct described above, dictates that JPS must adhere to economic/optimal generation dispatch operations during the tariff period in order to consistently meet the established target, and to recover the incurred fuel costs without penalties. Given all these considerations, the Office maintains that the approved 2023-2024 heat rate target of 9,470 kJ/kWh is deemed reasonable and achievable, and consistent with the Licence 2016 provisions and the "Legal and Regulatory Framework" and shall be applied by JPS in the defined H-Factor over the 2023-2024 rate adjustment period.

**JPS Further Request for Adjustment of Pre-established 2023-2024 Heat Rate Target**

**7.10.7** In its 2023 Annual Review Filing, JPS requested that the current heat rate target of 9,495 kJ/kWh be maintained for the 2023-2024 regulatory period instead of a change to the 9,470 kJ/kWh target determined by the OUR in the 2019-2024 Rate Review Determination Notice. As part of the OUR's heat rate evaluation at this 2023 Annual Review, this proposal was

fully assessed/analyzed as described herein. Based on the evaluation results, it was concluded that the 2023-2024 heat rate target should be maintained at the level of 9,470 kJ/kWh approved in the 2019-2024 Rate Review Determination Notice.

**7.10.8** After completing this heat rate review and 2023-2024 target determination, on 2023 July the OUR received a letter from JPS of even date, captioned: **"Consideration of Impact of Increased System Demand on 2023/24 Heat Rate"**. The contents of the letter are set out as follows:

*"… We now write to bring to your attention important systemic demand trends that compels a further revision to the heat rate to take account of the operational configuration of the JPS fleet necessary to preserve supply and reliability targets.*

*At the time of the JPS' filing of its proposal to maintain the current heat rate target in the Annual Adjustment, the best estimate for the key system demand was 4,883 GWh over the 12-month period from July 2023 to June 2024. At this level of demand and with other assumptions, modelling done by JPS produced a heat rate performance of 9,379 kJ/kWh of its thermal fleet. Based on this efficiency performance level and reasonable risks articulated in its submission, JPS requested the existing target of 9,495 kJ/kWh be maintained for the 2023/24 period.*

*However, we wish to bring to the OUR's attention significant and lumpy growth that has characterized the return to the pre-COVID demand trajectory over the first half of the year and particularly over the past few months. On June 14, 2023, JPS responded to the OUR's request for additional information on the heat rate forecast, to include the months of July, August and September 2024. For this 15-month period, July 2023 to September 2024, the JPS thermal heat rate was projected at 9,380 kJ/kWh. On the same day - June 14 – the system recorded its highest ever evening peak demand of 675.4MW (the previous record high was 666.7MW in 2017).*

*Furthermore, for the month of June, system demand was 404.2 GWh, the highest for June and the second highest monthly demand on record, only eclipsed by the prior month of May, the highest for a month, at 409.8 GWh. Please also note that during the first 12 days in July, net generation was 6% above forecast and even higher peak demand records have been set with 684.4MW recorded on July 11, and 692MW on July 12. Net generation from January to June has trended 2.3 higher JPS' best estimates and, excluding January and February, system demand has been consistently well ahead of forecast by 3.8% from March to June.*

*Considering the consistency of this trend, and the implications it has for system dispatch and operational requirements for reliability, JPS has done the prudent thing and revised upwards the system demand forecast by 2.5% on average to reflect the higher net generation and peak demand levels being observed over both daytime and evening peak*

*periods. As a result of this adjustment to a more realistic system demand, the net impact on the JPS heat rate for the July 2023 to September period has been a sizeable 72 kJ/kWh deterioration from 9,380 kJ/kWh to 9,452 kJ/kWh. The OUR would be aware that this would be the inescapable result of higher simple cycle gas turbine utilization, in particular the Hunts Bay units, to reliably serve the higher demand of customers. This was not a situation that was predictable but had to be responded to in the course of serving customers, but which, as you are aware, has a negative performance impact on the cost recovery for JPS.*

*On that basis, JPS is requesting that the OUR in setting the heat rate target for the 2023/24 regulatory year, gives further consideration to the unforeseen and significantly higher prevailing system demand and, as a result, accept a revised proposed target for JPS of 9,555 kJ/kWh…"*

Additionally, the refenced letter was accompanied by a supporting heat rate schedule, titled: "July 2023 – September 2024 Heat Rate Demand" (MS Excel file).

<u>OUR's Review - Consideration of Impact of Increased System Demand on 2023-2024 Heat Rate</u>

**7.10.9** Following the receipt of the referenced letter, the carried further review of the 2023-2024 heat rate outlook, taking into consideration the system demand changes in 2023 May-July cited by JPS, and its revised heat rate (influenced by temporary shifts in peak demand). The results and findings from this further heat rate review and the OUR's position are set out below:

1) The OUR's examination of the historical heat rate data for 2023 May and June (the in months for which JPS reported sizeable increase in system demand) indicates that there were no adverse effects on the heat rate performance for these months. As reported, JPS achieved the target of 9,495 kJ/kWh with a reasonable margin in each case (i.e., 2023 May – 9,324 kJ/kWh and 2023 June – 9,290 kJ/kWh).. As a general condition, a reasonably configured generation system should normally operate more economically and at higher efficiencies (lower heat rates) at increased system load levels. The indication from the system operating data is that this system load - generation efficiency relationship, was likely a dominant factor in favourable heat rate performance outcome realized for 2023 May – June. Based on the short-term system load trend, this result is also likely to be replicated in 2023 July, during which, the system load and net generation reportedly increased to unprecedented levels. From these observations/results an extrapolation for the entire 2023-2024 regulatory period was done, which inferred that the proposed increase in the 2023-2024 heat rate target to 9,555 kJ/kWh is not justified.

2) The OUR's further heat rate review indicate that under an operating scenario with assumptions of increased system peak demand during the summer period, the generation dispatch should converge to an optimal schedule, resulting in higher utilization of intermediate load generating plants (mostly IPPs), while limiting suboptimal operation of uneconomical peaking units, which should at least result in an overall lower average heat rate for 2023-2024 than proposed in JPS's 2023 July 20 revised forecast for its combined thermal plants over the applicable regulatory period. This means that the proposal for increasing the established 2023-2024 heat rate target from 9,470 kJ/kWh to 9,555 kJ/kWh is not warranted.
3) The dynamics of the power system operating conditions and the effects of external factors that were active within a 2–3-month historical timeframe does not provide sufficient empirical evidence and signals to guarantee that such factor will prevail for the entire 12-month operating period. Under the circumstances, there is limited information on the load trajectory and several unknowns regarding environmental conditions, which would prohibit the OUR in determining with high confidence that the load situation depicted by JPS, will be maintained throughout the entire 2023-2024 tariff period. Simply put, historical data/performance is not necessarily a reliable basis/model for future performance.
4) Given these considerations as well as all the relevant factors outlined herein, the OUR finds no justifiable basis to adjust the 2023-2024 heat rate target to 9,555 kJ/kWh. Accordingly, the OUR's position is that the approved 2023-2024 heat rate target of 9,470 kJ/kWh will be maintained as it is deemed to be reasonable and achievable, and consistent with the provisions of the Licence, 2016 and the "Legal and Regulatory" Framework.

## 7.11 2022-2023 H-Factor Methodology and FCAM

**7.11.1** As outlined in the 2019-2024 Rate Review Determination Notice, the approved heat rate target in conjunction with JPS's thermal plants heat rate (actual) shall constitute the monthly H-Factor during the 2019-2024 price control period. In accordance with the provisions of the Licence 2016, the H-Factor as defined shall be applicable to the approved FCAM over the 2023-2024 rate adjustment period.

**Fuel Cost Adjustment Mechanism (FCAM) for 2023-2024 Review Period**

**7.11.2** As stipulated by the requirements of Schedule 3, Exhibit 2 of the Licence 2016, the monthly fuel cost for JPS thermal generating plants to be recovered from the ratepayers shall be subject to efficiency adjustment by only the H-Factor (based on the heat rate methodology approved by the Office) in the FCAM, commencing 2016 July 1. Accordingly, the Office has since determined that the applicable FCAM to be utilized by JPS for the monthly Fuel Rate adjustment shall be the option defined as "**Alternative 1**" in Schedule 3, Exhibit 2 of the Licence 2016.

**7.11.3** It should be noted that since the implementation of the Licence 2016, no Independent System Operator (ISO) for the Jamaican electricity system has been established, which would preclude the use of the "**Alternative 2"** FCAM methodology. Given the circumstances, **Alternative 1** FCAM is designated the default methodology and has been applied up to the present time. And, from all indications, it will most likely be the same FCAM option that will be applied beyond the 2019-2024 rate review period.

**7.11.4** Having cognizance to this situation, the Office in keeping with the requirements of the Licence has determined at this 2023 Annual Review that JPS shall continue to apply the FCAM approved in the 2019-2024 Rate Review Determination Notice during the 2023-2024 review period. The approved FCAM is mathematically represented in the formulae set out in Figure 7.2 above.

## 7.12 OUR Heat Rate Review – Issues, Positions and Comments

**7.12.1** While there have been recognizable improvements in the overall efficiency of the generation system over time, a few issues have emerged during the 2019-2024 Rate Review process, some of which have lingered and continue to cause for concern at this 2023 Annual Review. It should be noted that these issues have serious ramifications for the operation of the system going forward and could have cost implications for ratepayers. The specific issues are delineated in the sections below.

**Generation Dispatch Issues**

**7.12.2** On the matter of generation dispatch, the OUR's assessment of JPS's system operation data continues to detect issues with the "merit order" and deviations outside acceptable limits in the generation scheduling and dispatch process. Considering these observations, it is imperative that the "generation dispatch audit" recommended in the 2019-2024 Rate Review Determination Notice, be executed and completed prior to the start of the 2023-2024 review period.

**VOM Costs in Merit Order/Generation Dispatch Calculations**

**7.12.3** Based on the heat rate data provided by JPS, it appears that the unitary VOM costs for JPS owned generating units have been included in the total variable cost of those units that determines the ranking in the Merit Order, which guides the generation dispatch operations. However, the basis (including cost and calculations) of the VOM cost is not being provided (the 2022 data being the most recent). This issue needs to be addressed by JPS.

**Fuel Rate Calculation Issues**

**7.12.4** In the 2022 Annual Review Determination Notice, the OUR pointed out that the Fuel Rate Report (PDF) and Calculation Model (MS Excel) being submitted by JPS to the OUR monthly, in their current form appear to have a number of deficiencies. However, since the effective date of the referenced Determination Notice, there has been no indication of any

alteration in the structure and quality of the submissions. Nonetheless, the OUR is again highlighting the Fuel Rate calculation issues that need to be addressed by JPS.

Fuel Rate Calculation - Process and Methodological Issues

**7.12.5** Based on observations over time, the quality of the submissions has deteriorated, in terms of structure, clarity, transparency and quality control. With these observations, the OUR must note that in the utility rate setting process (fuel & non-fuel), some of the main attributes contemplated are simplicity, understandability, public acceptability, feasibility of application and interpretation. However, a comprehensive evaluation of the existing JPS Fuel Rate Reports and Calculation Model indicate that these fundamental rate setting principles are scarcely embedded in the fuel rate adjustment process. Some of the issues identified include the following:

a. Several fuel rate inputs/determinants in the model are not clearly defined and cannot be easily traced and connected, while some variables are hidden in the spreadsheets. The relationship between input and output values in some instances are not clearly established and in other cases, input/output connections are not made through simple mathematical functions/formulas.

b. General lack of clarity across the spectrum of items in the reports. In some months, cost adjustments are included without being substantiated.

c. Document/records control issues are frequent. That is, documents are included in the Fuel Rate Calculation Reports (internal and external to JPS) without the necessary authentication (name of responsible personnel, signature, initials, etc.).

d. The omission of certain critical components in both the electronic and hard copy reports is prevalent. For example, the heat rate data are sometimes excluded from the hard copy of the Fuel Rate Reports as well as the electronic version. Also, some of the NG invoices are sometimes not included in the detailed Reports.

e. The monthly Net Billing Rate and the supporting inputs and calculations are currently not included in the Fuel Rate Calculation Excel Model. JPS must recognize that the monthly Net Billing Rate is a regulated rate, and therefore it must be included in the Fuel Rate Calculation Excel Model which is submitted to the OUR early in the month before the full report by mid-month, so that it can be validated in the same as the fuel rate.

f. Overall, the multiplicity of deficiencies identified with existing Fuel Rate Calculation model, renders it unsuitable for use in the fuel rate validation process. This needs to be replaced with a simplified and well-structured model, based on sound methodology to ensure transparency and accuracy in the monthly fuel rates adjustment and evaluation process.

**7.12.6** Given these findings, it cannot be overstated that JPS subject to the requirements of its Licence 2016, has the obligation to provide an adequate, safe and efficient service based on modern standards, to all parts of the Island of Jamaica at reasonable rates so as to meet the

demands of the Island and to contribute to national development. In that context, irrespective of the company's narrative, it must be recognized that the system fuel cost is a major driver of retail electricity rates and has serious implications for the Jamaican economy. Yet, the submissions continue to show that the monthly fuel rate adjustment process is not being treated in a manner that assures confidence and guarantees that the relevant fuel costs to be recovered from the ratepayers are reasonable and prudently incurred.

Fuel Rate Calculation - Data Clarity and Quality Issues

**7.12.7** The issues are as follows:

1) For the IPP plants in particular, the basis of the current estimates for IPP fuel cost for a given month is not clear. No specific details are provided but an adjustment was made in the subsequent month. There is no clear understanding of how these IPP fuel cost estimates are derived. The lack of clear assumptions constrains the fuel cost reconciliation process. It is deemed not prudent to allow the pass-through of cost to customers without proper substantiation. This issue needs to be rectified by JPS.

2) Despite raising the issue in the 2022 Annual Review Determination Notice (2023 September), the "Generation Sheet" of JPS's Heat Rate Reports submitted to the OUR for operations up to the end of 2022 December, indicated that 43,000 kWh of energy was supplied to the HB B6 unit for "Station Service" demand. As previously indicated, the HB B6 unit was retired from service at the end of 2020, and costs were allowed in the non-fuel rates to facilitate the decommissioning of this plant. Therefore, there should be no energy requirements in relation to the HB B6 unit, also there should be no reference to the HB B6 unit in the Heat Rate and Fuel Rate Calculation Reports. On that basis, the fact that energy is being supplied for "Station Service" use for the HB B6 unit, JPS is required to provide a full explanation to the OUR as the basis for this supply of energy. Also, given that the HB B6 unit is no longer in operation JPS needs to explain why the reported Station Service energy is being reflected in the monthly net generation, and specifically indicate how this energy is accounted for in the system energy balance and system losses calculations.

3) The generation data in the Heat Rate Reports, for the period 2021 September – 2023 June, shows that some of JPS GT units are receiving more energy than is being supplied to the system, resulting in negative net generation (- kWh) for these units for extended periods. JPS needs to provide a detailed explanation for this almost constant negative net generation (- kWh) reported for these units during the stated period. Also, the specific source of the electricity supply to these units is unknown and needs to be clearly identified by JPS to ensure accurate energy accounting in the energy balance process and system losses calculations.

4) The "Amended and Restated Gas Sales Agreement between NFE South Holdings Limited (Seller) and South Jamaica Power Company Limited (Buyer), dated 2016 December 21 (NFE/SJPC GSA), requires the Seller to provide the following items to facilitate billing/payment for NG supplied to the SJPC 190MW plant:
    a. Schedule 1 of the GSA: "Payment Obligations" documents/calculations.
    b. Schedule 2 of the GSA: Invoice and Worksheet.

5) Since the commencement of commercial operations of the SJPC plant, these documents have not been submitted by the Seller, and at the 2022 February 7 meeting, JPS indicated that SJPC has not requested these documents. So, this raises questions as to basis on which JPS is passing through NG cost associated with the SJPC plant to ratepayers. Presently, only summary data is provided, which lacks details on the full scope of the transactions. The requested documents would close that gap. At the 2022 February meeting, JPS claimed that it is not the company's responsibility to ensure that the referenced GSA documents are submitted and did not respond to the OUR's additional information request of 2022 February 2. With NG being the largest contributor to net generation and system fuel cost, the OUR should be in a position to determine whether NG costs incurred are "prudent and reasonable", otherwise, the fuel rate validation process would be fundamentally flawed. In the scheme of things, it is imperative that these GSA documents be included in monthly Fuel Rate Calculation Reports.

6) The situation described in item (5) & (6) above also applies to the "Amended and Restated Gas Sales Agreement between NFE South Power Trading Limited (Seller) and NFE South Power Holdings Limited (Buyer), dated 2017 August 23 (NSPTL/NSPHL GSA), which governs the supply of NG to the NFE 94MW CHP plant.

7) The frequency of unsupplied system data in conjunction with the protracted responses to the OUR's data requests is constraining the regulatory processes, particularly the periodic assessment and monitoring of the generation system performance and JPS's monthly fuel rate calculations/billing.

**7.12.8** JPS is required to exercise reasonable diligence and urgently address the issues outlined above.

**Submission of Technical Reports**

**7.12.9** The monthly "Technical Reports" form an essential part of the fuel rate validation process, particularly for the assessment of the Merit Order system and the generation dispatch operations during the applicable month. As it stands, these Technical Reports are invariably submitted late, and at times, are found to be deficient/inadequate. This imposes tremendous constraints on the OUR's ability to effectively assess and validate the performance of the generation system and the evaluation of the monthly fuel rate calculations. Moreover, based on the tardiness of JPS in furnishing these deliverables, the OUR must be constantly requesting these documents and then repeatedly reminding the company to submit same. With respect to the reporting requirements, the OUR has established a regulatory reporting framework, which has been strengthened through the Rate Review process. Specifically, in DETERMINATION 20(7) of the 2019 - 2024 Rate Review Determination Notice, and previous OUR Determination Notices, it is stipulated that JPS shall comply with all the Fuel & H-Factor related requirements, including the submission of the Technical Reports to the OUR in electronic format, within ten (10) days after the end of the applicable month. However, despite the establishment of these regulatory requirements, JPS's compliance level

on the submission of the monthly Technical Reports remains very low. The extent of the problem is demonstrated in Table 7.17 below.

**Table 7.17: JPS Compliance with Monthly Technical Reports Submission**

| JPS MONTHLY TECHNICAL REPORTS COMPLICANCE STATUS (2021 JAN – 2023 MAY) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2021 REPORTS | | | 2022 REPORTS | | | 2023 REPORTS | | |
| **Technical Report** | **Date Required** | **Date Submitted** | **Technical Report** | **Date Required** | **Date Submitted** | **Technical Report** | **Date Required** | **Date Submitted** |
| 2021 Jan | 2021 Feb 10 | 2021 Mar 24 | 2022 Jan | 2022 Feb 10 | 2022 Jun 16 | 2023 Jan | 2022 Feb 10 | 2023 May 05 |
| 2021 Feb | 2021 Mar 10 | 2021 Jun 11 | 2022 Feb | 2022 Mar 10 | 2022 Jun16 | 2023 Feb | 2022 Mar 10 | 2023 May 05 |
| 2021 Mar | 2021 Apr 12 | 2021 Jun 11 | 2022 Mar | 2022 Apr 11 | 2022 Jun 16 | 2023 Mar | 2022 Apr 10 | 2023 May 05 |
| 2021 Apr | 2021 May 10 | 2021 Jun 11 | 2022 Apr | 2022 May 10 | No Report | 2023 Apr | 2022 May 10 | 2023 Jun 26 |
| 2021 May | 2021 Jun 10 | 2021 Jul 06 | 2022 May | 2022 Jun 10 | No Report | 2023 May | 2022 Jun 12 | |
| 2021 Jun | 2021 Jul 12 | 2021 Aug 03 | 2022 Jun | 2022 Jul 11 | 2022 Sept 20 | 2023 Jun | 2022 Jul 10 | |
| 2021 Jul | 2021 Aug 10 | 2021 Nov 12 | 2022 Jul | 2022 Aug 10 | 2022 Sept 20 | 2023 Jul | 2022 Aug 10 | |
| 2021 Aug | 2021 Sep 10 | 2021 Nov 12 | 2022 Aug | 2022 Sep 12 | No Report | 2023 Aug | 2022 Sep 11 | |
| 2021 Sep | 2021 Oct 11 | 2021 Nov 12 | 2022 Sep | 2022 Oct 10 | No Report | 2023 Sep | 2022 Oct 10 | |
| 2021 Oct | 2021 Nov 10 | 2022 Jan 13 | 2022 Oct | 2022 Nov 10 | No Report | 2023 Oct | 2022 Nov 10 | |
| 2021 Nov | 2021 Dec 10 | 2022 Jan 13 | 2022 Nov | 2022 Dec 12 | 2023 Jan 4 | 2023 Nov | 2022 Dec 11 | |
| 2021 Dec | 2022 Jan 10 | 2022 Jan 25 | 2022 Dec | 2023 Jan 10 | 2023 Mar 24 | 2023 Dec | 2023 Jan 10 | |

**7.12.10** In addition to the Technical Reports, there are also frequent delays with the submission of Fuel Rate Calculation Reports, particularly the hard copy (PDF) version. The tardiness in submitting the required documents and reports is creating serious constraints for the monthly fuel rate validation and monitoring process. These reporting and compliance issues need to be addressed by JPS.

**Heat Rate Target Setting Considerations**

**7.12.11** The considerations are as follows:

1) Based on the requirements of the Licence, regulatory precedence, and the reasons cited herein, the Office maintains its decision that the heat rate target and H-Factor shall continue to be based on JPS's thermal generating plants, for the remainder of the 2019-2024 Rate Review period.

2) The Office also maintains that the determined heat rate target is "reasonable and achievable" and should encourage optimal generation dispatch operations during the 2023-2024 regulatory period.

3) Additionally, the OUR in setting the heat rate target, considered the following key conditions:

a) The configuration of the generation system (existing and projected) and its operating capabilities/limits.

b) IPPs' forced outage rates (FORs) and the potential impact of major forced outages.

c) The requirements of the Legal and Regulatory Framework, established heat rate target principles, and good regulatory practice.

**Review of Heat Rate Target**

**7.12.12** On the matter of target adjustment, some of the issues highlighted by JPS in the 2023 Annual Review Application, can be viewed as not being unreasonable. However, it should be recognized that most of the identified factors were previously considered in the OUR's heat rate evaluation and determination of the 2023-2024 heat rate target during the 2019-2024 Rate Review Process. All of these and the additional factors that emerged were taken into consideration in the OUR's heat rate evaluation and target determination at this 2023 Annual Review. In essence, the OUR in accordance with the requirements of the Licence has considered all relevant factors in determining the 2023-2024 heat rate target for JPS, to ensure that it satisfies the "reasonable and achievable" criteria.

## 7.13 Office Determination: Heat Rate Target, H-Factor And FCAM

**7.13.1** In making its determination on JPS's 2023-2024 heat rate target proposals, H-Factor and FCAM for the 2023-2024 rate adjustment period, the OUR took into consideration, among other things, the following:

1) The results of the OUR's 2023-2024 heat rate evaluation.
2) The relevant provisions of the Licence 2016, and the Legal & Regulatory Framework; and
3) The heat rate and "fuel cost recovery" determinations set out in the 2019-2024 Rate Review Determination Notice.

**7.13.2** On that basis, the Office determines that the 2023-2024 heat rate target for JPS, to be applied during the 2023-2024 regulatory period is **9,470 kJ/kWh.**

**Office Determination Summary**

**7.13.3** The Office determinations of JPS's heat rate and FCAM at this 2023 Annual Review are summarized in Determination 6 below:

**Determination 7**

1) JPS's heat rate target proposal of 9,495 kJ/kWh (revised to 9,555 kJ/kWh) for the 2023-2024 rate adjustment period is not approved, on the basis that it is not justified and would not encourage optimal economic generation dispatch during the subject period.

2) The heat rate target approved for JPS's thermal plants during the 2023-2024 rate adjustment period is 9,470 kJ/kWh (the pre-established target in the 2019-2024 Rate Review Determination Notice).

3) The "Thermal Heat Rate" methodology applicable to JPS's thermal generating plants shall continue to be in effect for the H-Factor and FCAM during the 2023-2024 price control period.

4) The H-Factor adjustment to JPS monthly fuel cost during the 2023-2024 review period shall commence with the month in which this Determination Notice becomes effective.

5) JPS shall provide an explanation addressing the basis for the energy that is being supplied for "Station Service" demand at the HB B6 unit, each month. The explanation should also state why the reported Station Service energy is being reflected in the monthly net generation given that the HB B6 unit has been retired from service, and specifically indicate how this Station Service energy is accounted for in the system energy balance and system losses calculations.

6) JPS shall include the monthly "Net Billing" rate and the supporting inputs/calculations in the Fuel Rate Calculation Excel Model which is submitted to the OUR early in the month before the full report submission by mid-month. This should take effect starting with the 2023 September Fuel Rate Calculation Report.

7) JPS shall submit the complete models used to calculate the IPPs payments as per Schedule 6 of the respective PPAs in Microsoft Excel format (showing all relevant inputs and calculations/formulas) as part of the detailed monthly Fuel Rate Calculation Report submission, starting 2023 September.

8) JPS shall comply with all the requirements relating to the H-Factor and fuel cost/rate, including the associated regulatory reporting requirements, as specified in this Determination Notice**.**

# 8 2021 System Losses Performance and Y-Factor Adjustment

## 8.1 Background

**8.1.1** Based on the provisions of the Licence 2016 (Schedule 3) applicable to the Annual Revenue Target (ART) incorporated in the defined price control regime, at each Annual Review during a 5-year revenue cap period, the Office is required to measure JPS's annual system losses performance against the relevant targets set in the Five-Year Rate Review Determination, in order to calculate the applicable "Y-Factor". As outlined in the Licence 2016, the Y-Factor is required for computing the "true-up losses" (TULos) component of the Revenue Surcharge (RS), necessary for determining the "ART" for the applicable year.

**8.1.2** In essence, the existing Performance-Based Rate Making (PBRM) mechanism, as structured, links JPS Non-Fuel Revenue to operational efficiency through the Y-Factor incentive scheme. The mechanics are such that if the system losses performance is not in line with established efficiency thresholds, then there will be financial penalties leading to disallowance of revenues, which is an intrinsic feature of the Y-Factor construct.

## 8.2 Scope of 2022 System Losses Review

**8.2.1** The OUR's system losses review at this 2023-2024 Annual Review, encompasses, among other things, the following activities:

- Assessment of JPS's 2023 Annual Review system losses proposals and the 2022 system losses performance measurements.
- Evaluation of JPS's 2022 system loss reduction initiatives, including the associated capital expenditure and impacts.
- Calculation of the 2022 Y-Factor required for the derivation of the "TULos2022" component of the 2022 RS.

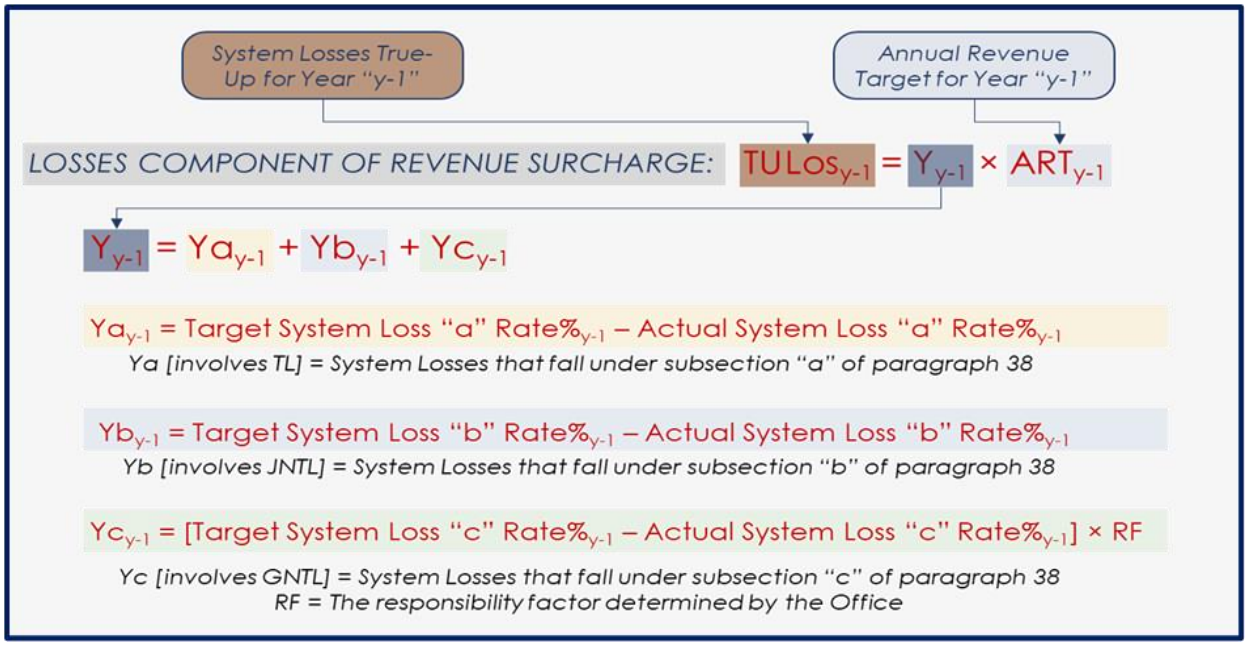
## 8.3 Licence Requirements Applicable to System Losses

**8.3.1** For reference, the regulatory requirements applicable to system losses are defined under Schedule 3, Paragraphs 37, 38, and 46; and Exhibit 1 of the Licence 2016, as well as the Legal and Regulatory framework set out in this Determination Notice.

## 8.4 Y-Factor and True-Up Losses Adjustment Mechanism

**8.4.1** As prescribed by the Licence 2016 (Schedule 3, Exhibit 1), the "Y-Factor" and the related "TULos" component of the Revenue Surcharge (RS) required for the determination of the applicable "ART" adjustment shall be calculated based on the defined mechanism, which is presented in Figure 8.1 below.

**Figure 8.1: Y-Factor and True-up Losses Adjustment Mechanism**




**8.4.2** Where:

- Ya involves Technical Losses ("TLs");
- Yb involves Non-Technical Losses (NTLs) that are totally within JPS' control ("designated JNTL");
- Yc entails NTLs that are not totally within JPS' control ("designated GNTL"); and
- RF is the responsibility factor, a percentage from 0% to 100%, which is determined by the Office.

**8.4.3** Implicit in the Y-Factor design is a symmetrical incentive scheme, which operates in a manner that allows for financial benefits or penalties resulting from any corresponding over-achievement or under-achievement of the determined system losses targets to be applied in the defined PBRM.

## 8.5 OUR Determined 2022 system Losses Targets'

**8.5.1** Pursuant to Schedule 3, paragraph 38, of the Licence 2016, the targets set by the Office for system losses shall normally be done at the Rate Review and be for a "rolling" ten (10) year period broken out year by year for the three (3) defined loss categories: TL, JNTL and GNTL.

**8.5.2** During the 2019-2024 Rate Review process, the Office determined the relevant 2019-2023 system losses targets required for the calculation of the "Y-Factor" at each Annual Review during the 2019-2024 revenue cap period, which are set out under Chapter 14 of the 2019-2024 Rate Review Determination Notice. The relevant 2022 targets to be applied at this 2023 Annual Review are presented in Table 8.1 below.

**Table 8.1: Office Approved 2022 System Losses Targets**

| 2022 SYSTEM LOSSES TARGETS - 2019-2024 RATE REVIEW DETERNINATION NOTICE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Performance Year | Rate Adjustment Period | JPS Proposed 2022 Losses Targets (With COVID-19 Impact) | | | | Office Approved 2022 Losses Targets (With COVID-19 Impact) | | | |
| | | TL | JNTL | GNTL | RF | TL | JNTL | GNTL | RF |
| 2022 | 2023-2024 | 7.93% | 6.50% | 12.00% | 10.0% | 7.67% | 4.24% | 10.75% | 20.0% |

## 8.6 System Losses Categorization

**8.6.1** As stipulated in ANNEX 3 of the Final Criteria, JPS is required to compile and report the monthly system losses in the defined Energy Loss Spectrum (ELS) framework to facilitate regulatory assessment of loss performance and target setting at Rate Reviews and Annual Reviews, as well as to support ongoing monitoring of overall system efficiency. This ELS framework provides a reasonable breakdown of JPS's total system losses into various categories of TLs and NTLs, estimated each month/year on a 12-month rolling average basis.

**JPS ELS Issues**

**8.6.2** In the 2022 Annual Review Filing, JPS as part of its campaign to deflect responsibility for system losses within its control, maintained the narrative it has propagate since 2019, that the ELS framework is flawed and that the NTLs estimated by the company itself are disconnected from reality, and contended that its own system losses measurements are not reliable, and that the use of the ELS by the OUR for system losses performance assessment and target setting is "unusual".

**8.6.3** In response, the OUR, in keeping with established regulatory principles/practice and being cognizant of the evolution and substantial improvement of the system losses measurement process, and having regard to regulatory precedence, refute such claims. The OUR's reasoning and contrasting views on the matter were delineated in the 2022 Annual Review Determination Notice.

**8.6.4** Turning to the 2023 Annual Review, while JPS had previously taken issue with the OUR over the ELS, in a turn of events, it appears that JPS has now put its "thumb on the scale" in respect to the 2022 ELS. The issue is that the OUR's evaluation of JPS's system losses performance for 2022 at this 2023 Annual Review, has detected specific cases of significant and incomprehensible anomalies in the system losses measurements reported in the 2022 ELS. The observed irregularities are described in detail in subsequent sections.

## 8.7 JPS 2022 System Losses Performance

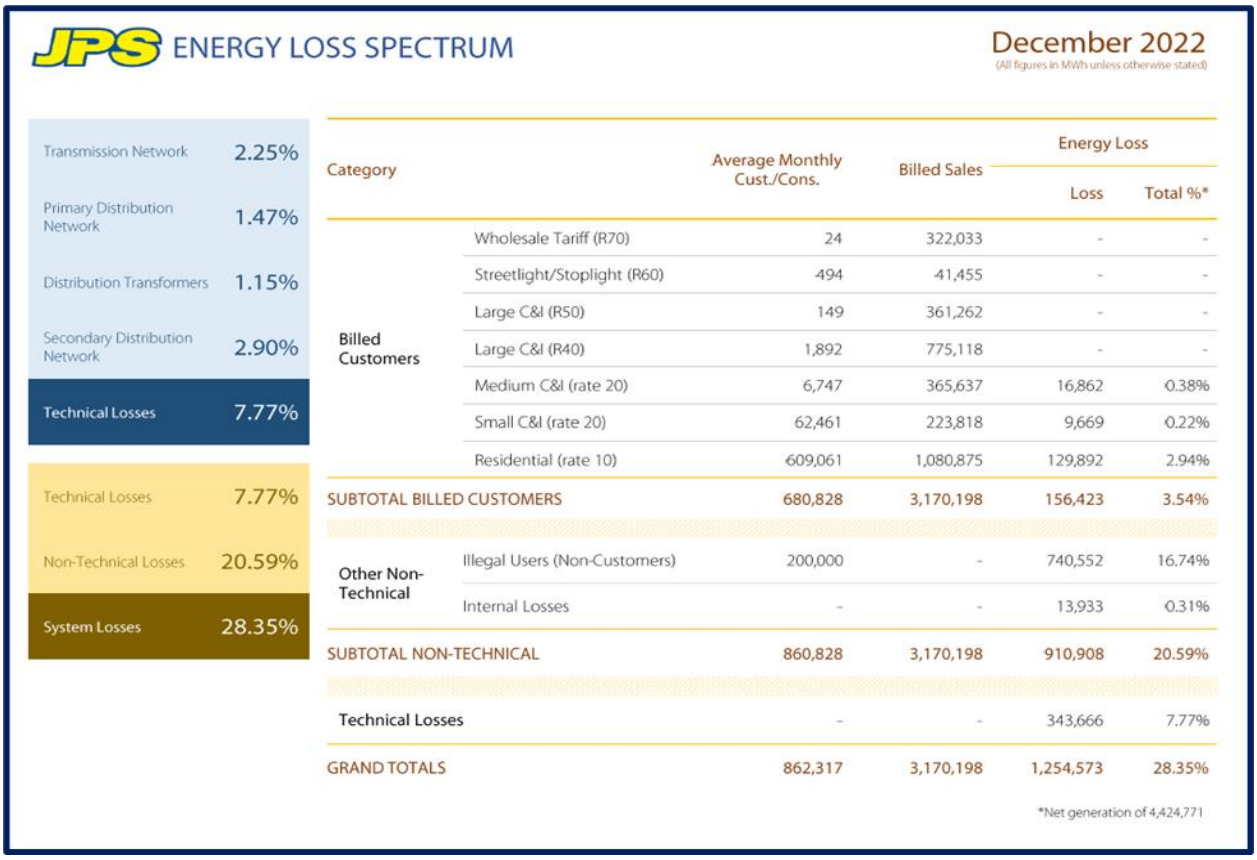
### 2022 System Losses Measurement and Reporting

**8.7.1** For regulatory evaluation of the 2022 system losses performance, in accordance with the established regulatory requirements, JPS is required to measure/estimate the overall system losses for 2022 January 1- December 31, which should be fully disaggregated into the various loss categories and structured in the ELS model for submission to the OUR. Based on the existing regulatory reporting framework, JPS was required to submit the 2022 December ELS to the OUR in 2023 January. However, JPS did not furnish this information as required. Also, the company did not submit the monthly ELS for 2022 January – November as per the requirements, despite repeated requests/notifications to the company.

**8.7.2** It should be noted that after being outstanding for over four (4) months, JPS eventually submitted the 2022 December ELS as part of its 2023 Annual Review Application. Notably, the 2022 January – November ELS were only submitted by JPS as part of its 2023 June 14 response to the OUR's 2023 June 2, additional information request in relation to the 2023 Annual Review Application.

**8.7.3** The 2022 December ELS, which according to JPS, captures the total energy losses recorded in the electricity system over the period 2022 January 1 – December 31, is represented in Figure 8.2 below.

**Figure 8.2: JPS 2022 System Losses (2022 December ELS)**



JPS ENERGY LOSS SPECTRUM

December 2022

(All figures in MWh unless otherwise stated)

| | |
|---|---|
| Transmission Network | 2.25% |
| Primary Distribution Network | 1.47% |
| Distribution Transformers | 1.15% |
| Secondary Distribution Network | 2.90% |
| Technical Losses | 7.77% |
| Technical Losses | 7.77% |
| Non-Technical Losses | 20.59% |
| System Losses | 28.35% |

| Category | | Average Monthly Cust./Cons. | Billed Sales | Energy Loss | |
|---|---|---|---|---|---|
| | | | | Loss | Total %* |
| Billed Customers | Wholesale Tariff (R70) | 24 | 322,033 | - | - |
| | Streetlight/Stoplight (R60) | 494 | 41,455 | - | - |
| | Large C&I (R50) | 149 | 361,262 | - | - |
| | Large C&I (R40) | 1,892 | 775,118 | - | - |
| | Medium C&I (rate 20) | 6,747 | 365,637 | 16,862 | 0.38% |
| | Small C&I (rate 20) | 62,461 | 223,818 | 9,669 | 0.22% |
| | Residential (rate 10) | 609,061 | 1,080,875 | 129,892 | 2.94% |
| SUBTOTAL BILLED CUSTOMERS | | 680,828 | 3,170,198 | 156,423 | 3.54% |
| Other Non-Technical | Illegal Users (Non-Customers) | 200,000 | - | 740,552 | 16.74% |
| | Internal Losses | - | - | 13,933 | 0.31% |
| SUBTOTAL NON-TECHNICAL | | 860,828 | 3,170,198 | 910,908 | 20.59% |
| Technical Losses | | - | - | 343,666 | 7.77% |
| GRAND TOTALS | | 862,317 | 3,170,198 | 1,254,573 | 28.35% |

*Net generation of 4,424,771

**8.7.4** In summary, the losses data presented in 2022 December ELS is the composite of system losses recorded each month in the period 2022 January-December. As shown, the total System Losses for 2022 was estimated by JPS to be 28.35% of annual net generation, representing a marginal increase of 0.06% percentage point or 36.81 GWh relative to the 2021 level (28.29%). Of the total 2022 losses, the equivalent of 7.77% of net generation was caused by TLs, while 20.59% was attributable to NTLs.

**8.7.5** With respect to the Y-Factor, the TLs and NTLs components reported in this 2022 December ELS were applied to derive the 2022 Y-Factor and the related TULos2022 required for determining the 2022 RS and 2023 ART.

**JPS's System Losses Performance versus Projections (2019-2022)**

**8.7.6** During the 2019-2024 Rate Review process, JPS in its response (dated 2020 September 8) to the OUR's indicative annual system losses targets for 2019-2023 set out in the "Draft 2019-2024 Rate Review Determination Notice" (submitted to JPS in 2020 July), proposed a set of "revised targets" for the review period. In rationalizing the revised targets proposal, JPS argued that an adjustment to original system losses projections and targets (2019-2024 Rate Review Application) was necessary to account for the impact of COVID-19, which was

unforeseen prior to the submission of the Application. The revised 2019-2023 system losses forecast/targets were subsequently evaluated by the OUR, considering the COVID-19 effects on system operating parameters, particularly, system annual net generation, electricity sales and average system losses. Based on this evaluation, it was accepted that the prevailing COVID-19 conditions at the time, would push system losses upwards temporarily during the 2020-2021 timeframe, but would recede to 2019 levels and decrease further after the end of the pandemic.

**8.7.7** However, since the start of the 2019-2024 review period, the actual annual system losses have followed a consistent upward trajectory, escalating from 26.05% of net generation at the end of 2019 to 28.35% by the end of 2022. This movement has resulted in deviations from the forecasted levels outside of acceptable statistical margins. For example, the actual 2022 losses were 1.92% of net generation higher than forecast (26.43%), representing a deviation of over 7.0%, which is significant.

**8.7.8** The system losses indicators, comparisons, and performance trends over the 2019-2022 operating period are represented in Table 8.2 below.

**Table 8.2: JPS 2019-2022 System Losses Indicators and Trends**

| JPS 2020-2022 SYSTEM LOSSES (REVISED FORECAST vs ACTUAL) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| COMPONENTS | 2018 | 2019 | 2020 | | 2021 | | 2022 | |
| | Actual | Actual | Projection | Actual | Projection | Actual | Projection | Actual |
| TLs | 7.94% | 7.92% | 7.85% | 7.91% | 7.90% | 7.91% | 7.93% | 7.77% |
| NTLs: | | | | | | | | |
| Rate 70 | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Rate 60 | 0.01% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Rate 50 | 0.07% | 0.07% | 0.08% | 0.06% | 0.08% | 0.07% | 0.07% | 0.00% |
| Rate 40 | 0.36% | 0.36% | 0.42% | 0.37% | 0.39% | 0.37% | 0.36% | 0.00% |
| Rate 20 (Med) | 0.39% | 0.40% | 0.47% | 0.37% | 0.43% | 0.36% | 0.41% | 0.38% |
| Rate 20 (Small) | 0.23% | 0.23% | 0.27% | 0.21% | 0.24% | 0.21% | 0.23% | 0.22% |
| Rate 10 | 6.12% | 6.16% | 7.29% | 6.57% | 6.64% | 6.51% | 6.28% | 2.94% |
| Billed Customers | 7.19% | 7.21% | 8.53% | 7.59% | 7.78% | 7.51% | 7.35% | 3.54% |
| | | | | | | | | |
| Illegal Users | 10.32% | 10.22% | 12.10% | 11.87% | 11.03% | 12.08% | 10.42% | 16.74% |
| Internal Losses | 0.82% | 0.71% | 0.84% | 0.65% | 0.76% | 0.79% | 0.72% | 0.31% |
| TOTAL NTLs | 18.33% | 18.13% | 21.48% | 20.12% | 19.57% | 20.38% | 18.50% | 20.59% |
| | | | | | | | | |
| TOTAL LOSSES | 26.27% | 26.05% | 29.33% | 28.03% | 27.47% | 28.29% | 26.43% | 28.35% |
| Actual - Projection | - | - | - | -1.30% | - | 0.82% | - | 1.92% |
| | | | | | | | | |
| NET GEN (GWh) | 4,355.54 | 4,429.87 | - | 4,227.43 | - | 4,303.96 | - | 4,424.77 |

**8.7.9** Regarding the actual 2022 system losses (JPS 2022 December ELS), the data shows massive changes in the NTLs related to "Billed Customers" and "Illegal Users" between 2021 and 2022 December, which were not substantiated by JPS. Notwithstanding, these identified anomalies were subjected to deeper examination/interrogation by the OUR, which is covered in subsequent sections of this Determination Notice.

## 2020-2022 Energy Balance

**8.7.10** For 2022, JPS reported a total system net generation of 4,424.77 GWh, with electricity sales ("billed energy") and system losses accounting for 71.65% (3,170.20 GWh) and 28.35% (1,254.57 GWh), respectively, as reflected in the 2020-2022 system energy balance provided in Table 8.3 below.

**Table 8.3: System Energy Balance (2020 – 2022)**

| 2020-2022 SYSTEM ENERGY BALANCE | | | | | | |
|---|---|---|---|---|---|---|
| COMPONENT | 2020 ENERGY BALANCE | | 2021 ENERGY BALANCE | | 2022 ENERGY BALANCE | |
| | **Energy Distribution (GWh)** | **% of Net Generation** | **Energy Distribution (GWh)** | **% of Net Generation** | **Energy Distribution (GWh)** | **% of Net Generation** |
| Technical Losses (TLs) | 334.31 | 7.91% | 340.49 | 7.91% | 322.03 | 7.77% |
| Non-Technical Losses (NTLs) | 850.48 | 20.12% | 877.28 | 20.38% | 910.91 | 20.29% |
| | | | | | | |
| TOTAL SYSTEM LOSSES | 1,184.79 | **28.03%** | 1,217.77 | **28.29%** | 1,254.57 | **28.35%** |
| Annual % change in Losses | - | - | 2.78% | - | 3.11% | - |
| | | | | | | |
| BILLED ENERGY SALES | 3,042.64 | **71.97%** | 3,086.19 | **71.71%** | 3,170.20 | **71.65%** |
| Annual % change in Sales | - | - | 1.43% | - | 2.72% | - |
| | | | | | | |
| TOTAL (NET GENERATION) | 4,227.43 | **100.00%** | 4,303.96 | **100.00%** | 4,424.77 | **100.00%** |
| Annual % change in Net Gen | - | - | **1.81%** | - | **2.81%** | - |

## Notable Observations

**8.7.11** The OUR makes the following observations:

a. The statistics presented in the 2020-2022 energy balance, indicated that the system annual net generation has trended upwards over the 2020-2022 timeframe, increasing by a margin of approximately 5.0% from the reported 2020 level of 4,227.43 GWh to 4,424.77 GWh for 2022 (2022 December ELS), signaling a recovery to pre-COVID19 levels. As demonstrated by the data, the realized increase in system annual net generation, was largely attributable to an uptick in annual electricity sales, consistent with the relaxation of COVID-19 measures since early 2022 and the subsequent waning effects of the pandemic, as well as continued increases in system losses over the stated period.

b. With respect to annual electricity sales or "billed energy" (aggregate consumption of legitimate customers), the data shows that it also followed an upward trajectory over the 2020-2022 period. Where, annual sales volume increased from the reported 2020 level of 3,042.64 GWh to 3,086.19 GWh at the end of 2021 and then grew to 3,170.20 GWh up to the end of 2022, reflecting an overall increase of 4.15% over the period, with an average annual growth rate of 2.08%.

c. On the other end, system losses have not subsided but continue to climb (both in absolute and percentage terms), with the losses gradually increasing from the reported 2020 level of 1,184.79 GWh (28.03% of annual net generation) to 1,217.77 GWh (28.29%) at the end of 2021 and then to 1,254.57 GWh (28.35%) at the end of 2022.

The data also indicates that the increase in NTLs in 2022 is equivalent to over 40% of the electricity sales growth realized for the said year. This has cost implications and raises questions about the efficacy of JPS's 2019-2024 loss reduction strategy.

## 2022 Monthly System Losses Breakdown

**8.7.12** For detailed analysis of JPS's 2022 system losses performance and for tracking the relative movement in the losses over the period, the monthly system losses recorded by the company and reported in the 2022 January-December ELS become critical. A breakdown of the monthly system losses as represented in the 2022 January-December ELS submitted JPS, is provided in Table 8.4 below.

**Table 8.4: JPS 2022 Monthly System Losses Performance (2022 January - December ELS)**

| JPS 2022 ENERGY LOSS SPECTRUM: MONTHLY BREAKDOWN | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TYPES** | **LOSS CATE-GORY** | **2021 DEC** | **2022 JAN** | **2022 FEB** | **2022 MAR** | **2022 APR** | **2022 MAY** | **2022 JUN** | **2022 JUL** | **2022 AUG** | **2022 SEP** | **2022 OCT** | **2022 NOV** | **2022 DEC** |
| **TLs** | Transmission | 2.21% | 2.20% | 2.20% | 2.21% | 2.20% | 2.21% | 2.21% | 2.20% | 2.19% | 2.17% | 2.18% | 2.23% | 2.25% |
| | Primary Distr. Lines | 1.50% | 1.47% | 1.47% | 1.47% | 1.47% | 1.47% | 1.47% | 1.47% | 1.47% | 1.47% | 1.47% | 1.47% | 1.47% |
| | Distribution Transformers | 1.30% | 1.15% | 1.15% | 1.15% | 1.15% | 1.15% | 1.15% | 1.15% | 1.15% | 1.15% | 1.15% | 1.15% | 1.15% |
| | Secondary Distr. Ntwrk. | 2.90% | 2.90% | 2.90% | 2.90% | 2.90% | 2.90% | 2.90% | 2.90% | 2.90% | 2.90% | 2.90% | 2.90% | 2.90% |
| | **Total TLs** | **7.91%** | **7.72%** | **7.72%** | **7.73%** | **7.72%** | **7.73%** | **7.73%** | **7.72%** | **7.71%** | **7.69%** | **7.70%** | **7.75%** | **7.77%** |
| **NTLs** | Rate 70 | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| | Rate 60 | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| | Rate 50 | 0.07% | 0.06% | 0.06% | 0.05% | 0.05% | 0.04% | 0.03% | 0.03% | 0.02% | 0.02% | 0.01% | 0.01% | 0.00% |
| | Rate 40 | 0.37% | 0.34% | 0.30% | 0.27% | 0.24% | 0.21% | 0.18% | 0.15% | 0.12% | 0.09% | 0.06% | 0.03% | 0.00% |
| | RT20 (Med) | 0.36% | 0.36% | 0.36% | 0.36% | 0.37% | 0.37% | 0.37% | 0.37% | 0.37% | 0.38% | 0.38% | 0.38% | 0.38% |
| | RT20 (Small) | 0.21% | 0.21% | 0.21% | 0.21% | 0.21% | 0.21% | 0.21% | 0.21% | 0.21% | 0.22% | 0.22% | 0.22% | 0.22% |
| | RT10 | 6.51% | 6.21% | 5.91% | 5.62% | 5.31% | 5.00% | 4.70% | 4.50% | 4.08% | 3.79% | 3.51% | 3.22% | 2.94% |
| | **Sub-Total** | **7.51%** | **7.18%** | **6.85%** | **6.51%** | **6.18%** | **5.83%** | **5.49%** | **5.16%** | **4.81%** | **4.49%** | **4.17%** | **3.56%** | **3.54%** |
| | JPS Internal | 0.79% | 0.74% | 1.02% | 1.00% | 0.97% | 0.85% | 0.82% | 0.70% | 0.52% | 0.27% | 0.04% | 0.29% | 0.31% |
| | **Illegal Users** | **12.08%** | **12.69%** | **12.81%** | **13.23%** | **13.51%** | **14.22%** | **14.57%** | **15.17%** | **15.43%** | **15.90%** | **16.29%** | **16.51%** | **16.74%** |
| | **Total NTLs** | **20.38%** | **20.61%** | **20.67%** | **20.75%** | **20.66%** | **20.90%** | **20.88%** | **21.02%** | **20.76%** | **20.66%** | **20.50%** | **20.65%** | **20.59%** |
| TOTAL LOSS (%) | | **28.29%** | **28.30%** | **28.39%** | **28.48%** | **28.38%** | **28.63%** | **28.61%** | **28.74%** | **28.47%** | **28.35%** | **28.20%** | **28.40%** | **28.35%** |
| TOTAL LOSS (GWh) | | 1,217.8 | 1,221.8 | 1,227.1 | 1,234.0 | 1,232.1 | 1,247.0 | 1,250.3 | 1,259.2 | 1,254.8 | 1,250.5 | 1,249.0 | 1,256.7 | 1,254.6 |
| **NET GEN (GWh)** | | **4,304.0** | **4,312.9** | **4,321.5** | **4,332.6** | **4,340.7** | **4,335.7** | **4,369.7** | **4,381.0** | **4,407.6** | **4,410.7** | **4,419.1** | **4,424.9** | **4,424.8** |

**Salient Points**

**8.7.13** The data presented in Table 8.4 indicates the following:

1) Annual system losses continue to increase (20.35% for 2022 – 0.06% above 2021 level), despite the increased deployment of advanced metering infrastructure (AMI) in the network and other targeted loss reduction initiatives by the company.

2) Both TLs and NTLs are concentrated in the distribution network, and account for over 90% of the total 2022 system losses (20.35% of net generation). The data also shows that NTLs continue to be driven by "Illegal Users", the Rate 10 service category and inefficiencies in JPS's internal processes.

3) Total TLs at the end of 2022 December were estimated at 7.77% of annual net generation, indicating a reduction of 0.14% below the 2020 December level (7.91%), which is significant for TLs. According to the data, this result was influenced by a sudden decrease in the 2021 December TLs of 7.91% to 7.72% at the end 2022 January (0.19% reduction). However, there is no indication of any material change in the T&D network configuration and/or operating dynamics at the time that would generate this level of TLs reduction within a one-month period. Additionally, the system performance reports submitted by JPS to the OUR do not identify any energy loss reduction achievement of that scale to substantiate such impact. Therefore, the basis for such a significant shift in the TLs between 2021 December and 2022 January in such a short timeframe is questionable and requires further review.

4) The purported reduction in TLs of 0.19% of net generation in one month is a very unusual outcome. Moreover, the system losses performance data being submitted by JPS indicates that this result has not been realized, whether singularly or cumulatively, over the entire preceding 3-year period (2019 January – 2021 Dec) since the start of the 2019-2024 rate review period. At a granular level, the 2021 December – 2022 December monthly ELS indicate that:

    a. The "primary distribution lines" component of TLs decreased from the 1.50% reported for 2021 December to 1.47% in 2022 January and remained constant at that level up to 2022 December, which seems odd given the variations in current flow in the distribution feeders.

    b. The "distribution transformer" component of TLs decreased from the 1.30% reported for 2021 December to 1.15% in 2022 January and remained constant at that level up to 2022 December, which is questionable.

    It should also be noted that no measurements, calculations, data, results of any specific TLs reduction activity or explanation was provided by the company to substantiate these material changes in TLs between 2021 December and 2022 January.

5) The reduction in TLs from 7.91% in 2021 to 7.77% at the end of 2022 (0.14% of net generation), did not result in any corresponding reduction in the total 2022 system losses. Instead, the indicated TLs reduction appears to be synthetic and viewed as an approach to shift the equivalent number of TLs to the aspect of NTLs deemed to be not

totally within the control of JPS. Additionally, system performance reports submitted by JPS to the OUR do not identify any energy loss reduction achievement of that scale to substantiate the reported 2022 TLs performance and impact.

6) Total NTLs at the end of 2022 December was estimated at 20.59% of annual net generation, 0.21% above the 2021 December level (20.38%), despite the installation of nearly 55,000 smart meters in 2022 reported by JPS. Based on the observations related to TLs above, it appears that the reported 0.14% change in TLs has been absorbed in the 2022 NTLs of 20.59%.

7) NTLs due to Rate 40&50 (Large C&I) customers decreased steadily from their 2021 December levels (0.7% and 0.37%, respectively) to 0.0% at the end of 2022 December in each case. No details or data were provided by the company to substantiate these NTLs reductions.

8) NTLs due to Rate 20 (Medium C&I) customers continue to be relatively high based on industry standards, despite the range of advanced metering capabilities and information systems, including "check meters", available for monitoring these accounts.

9) NTLs due to Rate 20 (Small C&I) customers remained constant at 0.21% of net generation from 2021 December to 2022 December, indicating no loss reduction gains for this NTLs category over the stated period. Furthermore, based on the 2018 – 2022 ELS, this category of NTLs has consistently resided in the range of 0.21% to 0.23%. This finding, therefore, raises questions about the scope and effectiveness of the company's 2019-2024 NTLs reduction strategy.

10) NTLs attributable to Rate 10 customers accounted for 6.51% of net generation at the end of 2021 December. Subsequently, in 2022, these losses decreased rapidly (in decrements of 0.33% each month) to 2.94% by the end of 2022 December, which is a material change (3.57% decrease) over the 12-month period. However, the company provided no basis or supporting information to substantiate these extraordinary NTLs. Additionally, the 2020-2022 system losses project updates that have been submitted to the OUR by JPS, do not identify any NTLs reduction impact consistent with the level of Rate 10 NTLs reported in JPS's 2022 December ELS. Also, there is no record of such a magnitude of reduction in NTLs or total system losses being realized in any of the years following the effective date of the initial JPS Licence in 2001. This situation is problematic and will require further review.

11) NTLs caused by "Illegal Users" (non-customers) accounted for 12.08% of annual net generation (59% of total NTLs) at the end of 2021 December. In 2022, these losses increased steadily to **16.74%** (81% of total NTLs) at the end of 2022 December. This is a material change (4.66% increase) over the 12-month period. However, no basis or reason for this extraordinary increase in these losses was provided by the company.

12) Based on the annual ELS (2022 and previous versions), NTLs due to Illegal Users have been the dominant driver of total NTLs as well as the overall system losses. According to JPS, up to 2022 November, these losses have been sustained by an estimated 180,000 "Illegal Users" across the country. Also, the system losses data being provided by JPS indicates that since the date of the 2014-2019 Rate Review, even though the number of

Illegal Users has been at a constant level (180,000), the quantity of energy that they have reportedly abstracted/consumed annually has increased considerably. For example, between 2019 and 2022 November, the energy consumed increased by approximately 452.61 GWh to 730.45 GWh, respectively. In the 2021 and 2022 Annual Review Filings, JPS claimed that the progressive increases in electricity being consumed by "Illegal Users" was influenced by the COVID-19 conditions during 2020 and 2021. However, that argument was found to be selective on the premise that there were other variables and factors at play. Moreover, the indicators in ELS for 2022 December – April (period after COVID-19 measures removed), would serve to diminish JPS's claim. Notwithstanding, JPS's 2022 December ELS indicates that the number of Illegal Users sharply jumped from 180,000 in 2022 November to 200,000 in 2022 December, but no data or basis for this change (11% increase) was provided by the company. These Illegal Users NTLs issues will require further review.

13) Total annual system losses expressed on a percentage basis (% of net generation) increased by 0.06% from the 28.29% reported for 2021 to 28.35% as at the end of 2021. However, for the actual 2022 energy losses (GWh), the level of increase relative to the 2021 value was 3.02%.

14) Total annual net generation (the baseline for converting actual losses in energy unit to percentage points), increased from 4,304.0 GWh in 2021 to 4,424.77 GWh in 2022 (2.81% increase), reflecting a return to pre-COVID-19 levels. This outcome was due to increases in both billed electricity consumption and system losses, registered by JPS during system operation in 2022. Notably, the higher net generation in 2022 would have served to moderate the effect of the 36.77 GWh increase in overall 2022 system losses, thus translating to a relatively small increase of 0.06% of annual net generation.

**2022 System Losses Measurement Anomalies**

**8.7.14** The foundational basis for assessment of JPS' system losses performance at each Annual Review during the 2019-2024 Rate Review period was established in ANNEX 3 of the Final Criteria. It therefore holds that the measurement of JPS's system losses performance for determining the Y-Factor at this 2023 Annual Review will be based on losses data reported in 2022 December ELS and the OUR's pre-established 2022 targets set out in the 2019 - 2024 Rate Review Determination Notice.

**8.7.15** ANNEX 3 of the Final Criteria also stipulates that:

> ***"No modification to the ELS shall be undertaken by JPS without prior consultation with the OUR."***

**8.7.16** However, there are indications that JPS may have altered certain elements of the 2022 ELS without notification or consultation with the OUR. Note also that a similar issue was previously detected in the 2017 ELS at the 2018 Annual Review. At the time, the modifications by JPS were deemed unacceptable and not "reasonable and prudent", resulting in the rejection of the system losses measurements reported in the said 2017 ELS.

**8.7.17** Therefore, the indication that this kind of interference has reemerged is unacceptable and seems to have no regard to precedence.

**Modifications to 2022 NTLs Components**

**8.7.18** The OUR's observations and findings emanating from its review of JPS's 2022 system losses performance data, delineated above, reveal that there are anomalies embedded in specific categories of the energy losses reported in the 2022 ELS, which has implications for the 2022 Y-Factor computation. The main issues/anomalies of concern, which were earlier highlighted in previous sections, are specifically addressed below:

NTLs due Billed Customers

- As intimated above, the 2022 NTLs due to "Billed Customers" (dominated by Rate 10 NTLs), appear to be significantly altered. That is, the superficial reduction of the losses from **7.51%** in 2021 December to **3.54%** in 2022 December (in fixed decrements of 0.33% each month), with the difference (3.97%) shifted to another loss category, where there is no overall reduction in total system losses.
- On a point of reference, the reported loss reduction realized from the implementation of the 2019-2024 Smart Meter Programme (planned to target this category of NTLs) up to the end of 2022, amount to less than 1% of annual net generation. Therefore, the indicated loss reduction of 3.97% in "Billed Customers" NTLs in 2022 is questionable and unjustifiable.
- In essence, this situation depicts a re-arrangement of the 2022 ELS, where a portion of the NTLs in the "Billed Customer" category was incorporated into the Illegal Users category. This displacement is demonstrated in Table 8.5 and Figure 8.3 below.
- From all accounts, these actions by JPS appear to be a blatant manipulation of the 2022 ELS, consequently diminishing the credibility and reliability of the 2022 NTLs measurements, and more so, has introduced unwanted distortions in the system losses measurement process.
- Note also, that the reported NTLs (3.54%) significantly deviates from the related baseline NTLs s used to develop the 2019-2023 NTLs forecast and relevant targets, which is a clear misalignment.
- Based on the dynamics, it can be construed that the act of altering the 2022 ELS might have been an attempt by the company to manipulate the 2022 ELS, to achieve a specific, predetermine outcome, in relation to the 2022 Y-Factor adjustment. In any event, on principle, these reallocations are deemed unacceptable and unjustifiable, and are clearly not in accordance with the "reasonable and prudent" regulatory standard. As such, the reported losses for this NTLs category will not be considered by the OUR for the 2022 Y-Factor adjustment.

NTLs attributable to Illegal Users

- In contrast, the 2022 NTLs attributable to Illegal Users (non-customers) appear to be altered in the opposite direction. That is, the losses were made to increase steadily from

12.08% in 2021 December to 16.74% in 2022 December, where the overall increase of 4.66% was largely due to the addition of the 3.97% of NTLs removed from the Billed Customer category. This adjustment created a counterbalancing effect, resulting in virtually no material change in total system losses for 2022.

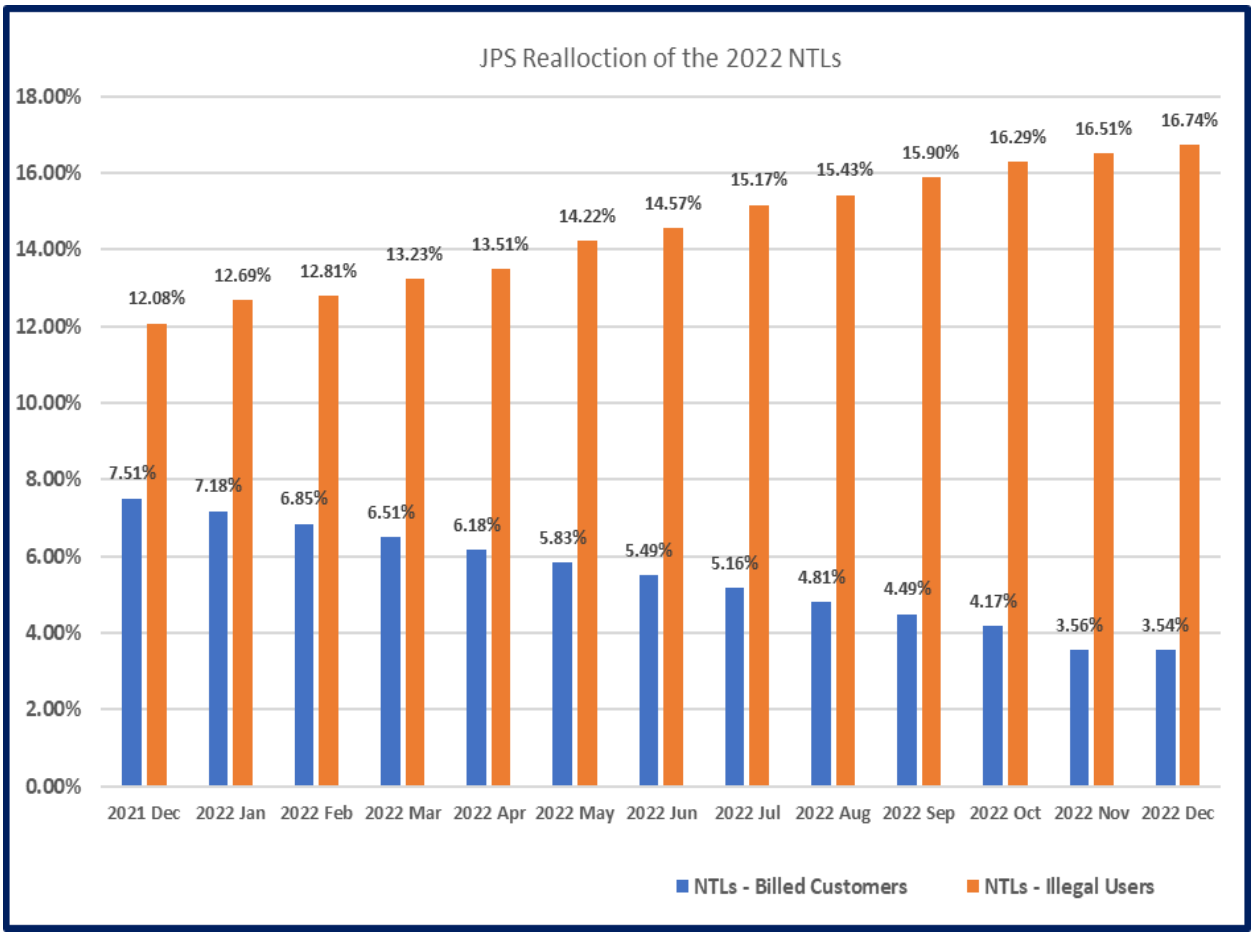
- Like the issues with the Billed Customer NTLs, the alterations to the "Illegal Users" NTLs were also found to be unacceptable and unjustifiable, and do not meet "reasonable and prudent" regulatory standard, for the reasons cited herein.

**Table 8.5: JPS Rearrangement of the 2022 NTLs**

| ALTERATIONS TO 2022 NTLs | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NTLs COMP. | 2021 DEC | 2022 JAN | 2022 FEB | 2022 MAR | 2022 APR | 2022 MAY | 2022 JUN | 2022 JUL | 2022 AUG | 2022 SEP | 2022 OCT | 2022 NOV | 2022 DEC | DIFF. | AVE. |
| RT10 NTLs | 6.51% | 6.21% | 5.91% | 5.62% | 5.31% | 5.00% | 4.70% | 4.50% | 4.08% | 3.79% | 3.51% | 3.22% | 2.94% | 3.57% | - |
| | - | -0.30% | -0.30% | -0.29% | -0.31% | -0.31% | -0.30% | -0.20% | -0.42% | -0.29% | -0.28% | -0.29% | -0.28% | - | -0.30% |
| | | | | | | | | | | | | | | | |
| Billed | **7.51%** | **7.18%** | **6.85%** | **6.51%** | **6.18%** | **5.83%** | **5.49%** | **5.16%** | **4.81%** | **4.49%** | **4.17%** | **3.56%** | **3.54%** | **3.97%** | - |
| Cust. NTLs | - | -0.33% | -0.33% | -0.34% | -0.33% | -0.35% | -0.34% | -0.33% | -0.35% | -0.32% | -0.32% | -0.31% | -0.32% | - | **-0.33%** |
| | | | | | | | | | | | | | | | |
| Illegal | **12.08%** | **12.69%** | **12.81%** | **13.23%** | **13.51%** | **14.22%** | **14.57%** | **15.17%** | **15.43%** | **15.90%** | **16.29%** | **16.51%** | **16.74%** | **4.66%** | - |
| Users NTLs | - | 0.61% | 0.12% | 0.42% | 0.28% | 0.71% | 0.35% | 0.60% | 0.26% | 0.47% | 0.39% | 0.22% | 0.23% | - | **0.39%** |
| | | | | | | | | | | | | | | | |

**8.7.19** Table 8.5 and Figure 8.3 clearly show the displacement of the NTLs from the "Billed Customers" category to the "Illegal Users" category, between 2021 December 31 to 2022 December 31.

**Figure 8.3: JPS Rearrangement of the 2022 NTLs**




**OUR's Position – System Losses Measurement Irregularities**

**8.7.20** Given the issues involving the modification of the 2022 ELS and related implications, the OUR's position is that such actions are not in accordance with the relevant regulatory requirements and prudent utility practice. Accordingly, the level of NTLs due "Billed Customers" and "Illegal Users" that were reported in the 2022 December ELS by JPS, will NOT be allowed for the computation of the 2022 Y-Factor, at this 2023 Annual Review.

## 8.8 JPS 2022 System Losses Reduction Projects Status

**JPS 2022 Loss Reduction Projects – Scope and Impact**

**8.8.1** In the 2019-2024 Rate Review Determination Notice, the Office approved a total CAPEX of US$19.57M to finance the implementation of JPS 2021 loss reduction projects included in its 5-year capital investment plan. The status of these projects, as presented in the 2022 Annual Review Filing, is summarized in Table 8.6 below.

**Table 8.6: JPS 2022 Loss Reduction Projects – Scope and Impact**

| STATUS OF JPS 2022 LOSS REDUCTION PROJECTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Loss Category** | **Projects** | **Approved CAPEX (US$'000)** | **Planned Scope** | **Actual Scope** | **Expected Impact** | **Actual Impact** | **Remarks** |
| TLs | Voltage Standardization Programme (VSP) | 4,165 | - | - | 2.595 GWh | - | Planned upgrade of the New Michelton Halt 210 and 310 feeders delayed. Project brought forward to 2023. |
| | Capacitor Bank Project (Corporate Area) | 1,340 | - | - | 0.603 GWh | - | • The project scope: installation and commissioning of 40 MVAR of MV capacitor banks in JPS substations in the Corporate Area, in 2022.<br>• No commissioning in 2022.<br>• JPS reported that that the project has steadily been commissioned since in 2023 January. |
| NTLs | Smart Meters | 12,511 | 65,500 customer meters<br><br>4,000 Transformer meters | 41,487<br><br>4,398 | - | - | • JPS claimed that lower than planned meter installations were due to global supply chain issues.<br>• No information on loss reduction impact provided. |
| | Audits and Investigations | - | 75,000 | > 67,500 | 17.00 GWh | 7.00 GWh | • Less audits were performed than planned, purportedly due to non-AMI meter reading issues with third-party contractors. |
| | Metering Infrastructure Replacements | 183 | - | - | - | - | • According to JPS, this project, including procurement activities, runs annually with installations determined by customer demand or meter failures in service.<br>• Meter installations up to the end of 2022: 45,204.<br>• Service wires installations up to the end of 2022: 478 kilometers. |
| | RAMI Projects | 3,001 | - | - | 11,217 | - | • Six (6) project areas were planned for completion in 2022, with benefits expected in 2023.<br>• JPS reported that all were completed in 2022.<br>• No planned impact stated. |
| | Social Initiatives, Community Renewal and Strike Force | - | - | - | 6.72 GWh | 5.10 GWh | The strike force initiative resulted in 283,888 illegal connections being removed, 2,127 nonmetered. consumers were regularized, 130 arrests were made, and about three GWh of recoveries were recorded. |
| **Total NTLs** | | **15,695** | | | | | |

**8.8.2** According to JPS, its planned smart meter programme scope and RAMI initiatives for 2022 were severely impacted by global supply chain constraints, which it claims resulted in long lead times and a shortage of metering devices. The OUR has examined this issue, and from its review of the OUR's Meter Testing, Administrative and Operational Protocol (MTAOP)

records for 2022, it was found that a much lower quantity of smart meters was tested and authorized in 2022 than previous years (2019-2021).

**8.8.3** Notwithstanding, given the total number of smart meters that had already been approved under the MTAOP for installation up to the end of 2022 (almost 420,000, while the number of meters proposed for JPS 2019-2024 smart meter programme was 470,000), it is not clear whether the purported meter shortage, was the direct result of supply chain issues or meter procurement scheduling hiccups, or due to project ending effects, where less units may be required at that stage to achieve the overall project scope. This issue, however, may require further review.

## OUR's Review of JPS System Losses Reduction Programme Developments

**8.8.4** The OUR's review of the status of JPS's 2022 loss reduction projects identified some very pertinent issues and concerns. These are outlined in Table 8.7 below.

**Table 8.7: JPS System Losses Reduction Projects Implementation Problems**

| JPS SYSTEM LOSSES REDUCTION PROJECTS IMPLEMENTATION ISSUES |
|---|
| **2022 TLs REDUCTION PROJECTS** |
| **1. Voltage Standardization Programme (VSP)** |
| In power system operations, a Voltage Standardization Programme VSP is considered essential for regulating current flow in conductors to minimize power losses. In the case of the Jamaican electricity system, the aim of the VSP is to reduce the magnitude of the currents flowing through the primary distribution conductors by upgrading all distribution feeder voltages to 24 kV medium voltage (MV) level.<br><br>2021 VSP Initiatives<br>In 2022 Annual Review Filing, JPS reported that it completed the upgrade of three (3) feeders (one emanating the Blackstonedge Substation and two emanating from the Highgate Substation) from 12 kV to 24kV. It was noted that the scope of work for these feeder upgrades required reinsulating 322km of primary distribution line (85% of the needed re-insulations), and construction of 1.4km of new distribution lines to facilitate transferability between Highgate and Annotto Bay substations. JPS further indicated that the remaining 57km of line re-insulation will be completed in 2022 and will cost an additional US$0.3M. Based on the project update included in the 2023 Annual Review Filing (Appendix F), the reinsulation of the remaining 57km of distribution lines was 10% completed at the end of 2022, but no schedule for full completion was indicated by JPS.<br><br>2022 VSP Initiatives<br>According to JPS's 2019-2024 Rate Review Application, its 2022 VSP initiatives included the upgrade of New Michelton Halt 210 and 310 distribution feeders in St. Catherine, and scheduled for completion in 2022, with expected TLs reduction of 2.5955 GWh. In the 2019-2024 Rate review Determination Notice, the Office approved a total CAPEX of US$4.165M to fund the implementation of these VSP initiatives.<br><br>In section 5.1.1 (page 68) of the 2023 Annual Review Filing, JPS indicated that in 2022, supply chain disruptions affected the delivery of key materials needed support all aspects of the business. According to JPS, in recognition of this problem, it took a strategic decision to delay the implementation of the VSP programme to ensure a smooth supply of materials to other critical areas of the business. The program will continue in the 2023 calendar year with a total spend of US$ 9.2M, which will encompass the original scope of the two feeders at Michelton Halt plus additional feeders including Rhodens Pen 210, 310 and 410 for a total of five (5) feeders to be upgraded. Notwithstanding, the company did not provide a specific schedule for completing the upgrade of the five named feeders, and also, the estimated reduction in TLs expected.<br><br>In summary, while the OUR has taken note of the challenges and constraints concern with logistics and supply chain arrangements, it cannot be overlooked that the overall lack of progress with some of these projects, and the absence of tangible results in some cases, are implicitly compounding the unbearable system losses problem. With issues and factors emerging on the verge of the new Rate Review period, the company may need to recalibrate its strategy to prevent the situation from worsening. |

| JPS SYSTEM LOSSES REDUCTION PROJECTS IMPLEMENTATION ISSUES |
|---|
| **2. Capacitor Bank Project (Corporate Area)** |
| The Corporate Area Capacitor Bank Project involves the installation and commissioning of 40 MVAR MV capacitor banks (30 MVAR of new equipment and rehabilitation of 10 MVAR of existing units) at designated substations in the Corporate Area (Hunts Bay, Rockfort, Three Miles, Greenwich Road, Washington Boulevard and Hope substations), in 2022, with expected TLs reduction of 603 MWh. The project was proposed by JPS in its 2022 May Extraordinary Rate Review Application and was subsequently approved by the OUR in the 2022 Annual Review and Extraordinary Rate Review Determination Notice.<br><br>In the 2023 Annual Review Filing, JPS reported that it faced significant delays in the delivery of key capacitor bank components due to supply chain challenges and as a result, the capacitor banks were not commissioned in the 2022 calendar year. Nonetheless, in the project update, JPS noted that the capacitor banks have steadily been commissioned starting 2023 January. However, it is not clear from this update that the capacitor banks have fully commissioned. Also, the company did not provide any specific schedule for the full commissioning capacitor banks and commencement of operations. These gaps need to be addressed by JPS. |
| **3. Distributed Generation (DG) Project** |
| Based on project documents previously submitted to the OUR, JPS has partnered with Caribbean Broilers (CB) and New Fortress Energy (NFE) to commission a 10MW combined heat and power (CHP), distributed generation (DG) facility in Hill Run, St Catherine, at a total capital cost of US$9.00M. The project was scheduled to be completed in early 2021, but after extended delays, the facility was eventually commissioned into service in 2021 December, and commercial operations date (COD) declared on 2021 December 17. With the interconnection of this facility to the distribution network, during operation, it would be expected to contribute to TLs reduction in the network. Based on this dynamic, the operation of the plant in 2022 reportedly resulted in TLs reduction of 545 MWh. However, the OUR's review of the plant's operating performance since commissioning revealed that there may some embedded problems that may be hindering optimal operation of the facility, and so, the reported gains in TLs reduction may be the full achievable amount. This issue will require further review. |
| **2022 NTLs REDUCTION PROJECTS** |
| **4. Smart Meter Project** |
| In the 2019-2024 Determination Notice, the Office approved US$12.511M (no IDC) to fund the installation of 95,000 smart meters (JPS 2019-2023 Investment Plan) in 2022, with loss reduction impact of 16.606 GWh. However, in the 2022 Annual Review Filing, JPS indicated that the target for 2022 was reduced to 65,500 smart meters (service meters), along with 4,000 transformer meters.<br><br>In section 5.1.2 (page 69) of the 2023 Annual Review Filing, JPS noted that global supply constraints encountered in 2022 severely affected its ability to secure enough meters to meet the demand for new installations and the smart meter project, which resulted in long lead times and lower than expected meter stock levels. JPS indicated that under the circumstances, the company decided to prioritize having meters available for new installations and maintenance activities. JPS reported that due to this decision, the 2022 smart meter project started late, took longer than expected, and had fewer meter installations than planned (41,487 installed compared to 65,500 planned), and also the plan to expand the transformer metering (energy balance), was paused, as revenue meters were prioritized over transformer metering. However, in Appendix F of the 2023 Annual Review Filing, JPS reported the following accomplishments for the smart meter programme in 2022:<br>• 65,590 smart meters (residential and commercial) installed in St. Ann and Westmoreland up to 2022 December 30.<br>• 4,398 transformer meters installed.<br>• Installation of a communication network to backhaul the AMI data completed.<br>This indicates clear inconsistencies in the reported outcomes for the smart meter project in 2022, which needs to be clarified by JPS. Also, the expected level of energy loss reduction was not quantified, which needs to be addressed by the company. |
| **5. Audit and Investigations** |
| In the 2023 Annual review Filing (page 69), JPS reported that in 2022 it performed less audits than were planned, for the following reasons:<br>• Meter reading for non-AMI meters in 2022 was disrupted due to issues with its third-party contractor, which resulted in an increase in estimated bills for its customers in specific areas.<br>• Smart meters that were earmarked for the Westmoreland project area were used instead to change out non-AMI meters for its most affected customers.<br>• Some of its technician teams that perform investigations were diverted to assist in manual meter readings for several months to help contain the impact of the meter reading issues.<br>JPS contends that despite these disruptions and strain on it audit resources, the company still managed to complete over 90% of the 75,000 planned audits, which yielded a recovery of seven (7) GWh.<br><br>Given the described inconsistencies with JPS smart meter installations in 2022, the reported use of smart meters that were allotted to the Westmoreland project area, creates more discrepancies. Clarification/Explanation required from JPS.<br><br>While JPS has reported 75,026 audits/investigations for 2022, the data in the "JPS Losses Orders – 2022", submitted as part of the 2022 Annual Review Filling, indicates that a total of 115,313 investigations were conducted. This level of inconsistency raises questions about the reliability and credibility of data/results being reported, and therefore requires explanation from JPS. |
| **6. Residential Automated Metering Infrastructure (RAMI) Projects** |

| JPS SYSTEM LOSSES REDUCTION PROJECTS IMPLEMENTATION ISSUES |
|---|
| In the 2019-2024 Determination Notice, the Office approved US$3.001M (no IDC) to fund the installation of 3,725 RAMI meter installations (JPS 2019-2023 Investment Plan) in 2022, with loss reduction impact of 3.190 GWh.<br><br>In the 2022 Annual Review Filing, JPS indicated that:<br>• Three (3) RAMI project areas originally planned for completion in 2021 are rescheduled for completion in 2022.<br>• Three (3) new RAMI project areas planned for 2022 are to be completed by the end of the year.<br>• The loss reduction from the six projects would be about 758 MWh/month.<br><br>In the 2023 Annual Review Filing, JPS reported that all the projects (Tower Hill, Steer Town, Grants Pen Phase 1, August Town Phase 2, Granville, and Lilliput,) were completed in 2022 (October – December), with expected benefit of 11.22 GWh to be fully realized in 2023, but the completion of each project was delayed due to longer than expected lead times on pole line materials and, to a lesser extent, RAMI meters.<br><br>In terms of project scope, in Appendix F of the 2023 Filing, JPS reported that it completed the installation and commissioning of 4,592 RAMI meters (5,221 planned) in the six project areas as at 2023 March 31, and connections were still ongoing in Lilliput and Tower Hill as at the date of the Filing. JPS also indicated that the solution through the installation of 657 RAMI enclosures (618 planned) has an overall customer capacity for 11,169 customers (10,506 planned), and that the installations to date, have resulted in 0.93 GWh monthly.<br><br>While the indicated challenges are noted, the extended delays in project implementation is serving to diminish the effectiveness and benefits of the projects and is preventing the loss reduction achieved from being reflected in the spectrum of losses in a timeframe to appropriately represent the resulting impact.<br><br>Further, the OUR is of the view that the RAMI project results reported to date are not encouraging. And, given the planned project scope and amount of capital expended, the results suggest that the programme up to this point is not cost effective, and may need to be reassessed and recalibrated.<br><br>Additionally, JPS will be required to submit to the OUR, the full commissioning reports for the RAMI projects that have been completed since the start of the 2019-2024 Rate Review period. |
| **7. Community Renewal Initiatives** |
| As described by JPS, the "Community Renewal" is a social intervention programme that is focused on addressing socioeconomic issues that drive NTLs at the community level, and the company's main goal is to convert illegal users to legitimate customers, and wherever possible, tries to reduce the consumption of illegal users.<br><br>In the 2022 Annual Review Filing (page 71), the company indicated that its goal for 2022 was to convert 6,200 illegal users to legitimate customers, with estimated energy loss reduction of 6.72 GWh. Subsequently, in the 2023 Annual Review Filing, JPS reported that through its social reform programmes (Initiatives: Ambassador, Spin-to-Win, and House Wiring), it completed 3,882 regularizations in 2022, with actual loss reduction of 5.10 GWh. According to JPS, the high cost of house wiring & certification and socioeconomic challenges/complexities in the targeted communities continue to be a significant barrier to legitimate electricity supply for lower income households in these areas.<br><br>Given these constraints and conditions, going forward there will need for greater collaboration/intervention by JPS, the GOJ and other relevant stakeholders, to address some of the underlying impediments, with a view to amplify these initiatives and to implement other appropriate measures to substantially increase the level of regularization of access to electricity supply. |
| **8. Strike Force Initiative** |
| In the 2022 Filing, JPS reported that its strike force initiative in 2022 resulted in: the removal of 283,888 illegal connections, 2,127 illegitimate consumers regularized, 130 arrests, and the recovery of about 3.0 GWh. JPS indicated that despite the challenges, the company continues with its ambition to reverse the rampant NTLs in lower income areas, and it is particularly focused in seeking access to funding for house wiring for individuals in order to increase the number of regularizations. JPS also noted that its "Spin to Win" initiative (formerly Grand Bonanza), appears to be garnering greater public response than other initiatives and, it will be looking at ways to capitalize on this development in 2023.<br><br>The OUR acknowledges the reported results of JPS's strike force activities executed in 2022. It is also recognized that a sustained and coordinated strike force operation can be very effective in detecting and eliminating certain elements of NTLs. However, the OUR based on its assessment of this initiative over the years, is of the view that the reported annual gains are relatively small, considering the level of effort and resources committed to this initiative each year. |

**OUR's Comments - JPS 2020-2022 Loss Reduction Initiatives**

**8.8.5** The following are the comments of the OUR:

a) The OUR's review of the 2020-2022 projects revealed numerous implementation problems, and for the projects that are already completed, the reported energy loss reduction impact is deemed negligible. Further, given the level of capital that has been expended on these loss reduction initiatives since 2020, the results yielded to date are not promising, and portends an inevitable futile outcome for the 2019-2024 loss reduction programme by the end of the review period. As the evidence suggests, the realized gains are hardly noticeable, while at the same time, overall system losses continue to increase.

b) Quantitatively, the cumulative loss reduction realized from the system losses projects completed since the start of the 2019-2024 Rate Review period, does not amount to 1% of net generation, which is not encouraging. The bigger issue though is that JPS continues to report some loss reduction benefits at each Annual Review, but the impact is not seen in the spectrum of losses. Furthermore, the gains being reported are just a fraction of the annual increases, suggesting that there is no pullback, and that the losses may be tending towards an uncontrollable spiral.

c) Given these findings and considering that the 2022 projects that were not started have been brought forward to 2023, and that some that were started in 2022, are rescheduled to be completed in 2023, the OUR believes that at this juncture, it is important for JPS to reassess and revise its project implementation strategy, taking into account, the scope, objectives, targets, and justification that informed the approval of the system losses projects proposed for implementation over the 2019-2024 review period.

**JPS 2023 Loss Reduction Projects**

**8.8.6** In the 2022 Annual Review Filling, JPS indicated that in 2023, it intends to focus on the implementation of the loss reduction projects described in Table 8.8 below.

**Table 8.8: JPS Loss Reduction Projects Planned for 2022**

| JPS 2023 LOSS REDUCTION PROJECTS | | | | |
|---|---|---|---|---|
| **Loss Category** | **Projects** | **Approved CAPEX (US$'000)** | **Estimated Loss Reduction Impact** | **Remarks** |
| TLs | VSP | 4,547.0 | - | • JPS indicated in the 2023 Annual Review Filing that the VSP activities in 2023 will encompass the original scope of the two feeders at Michelton Halt plus additional feeders including Rhodens Pen 210, 310 and 410.<br>• No loss reduction impact for these initiatives was stated by JPS. |
| | Capacitor Bank Project (Corporate Area) | - | 0.603 GWh | • JPS indicated in the 2023 Annual Review Filing that the capacitor bank project originally scheduled for commissioning in 2022 have steadily been commissioned since 2023 January.<br>• Project is expected to reduce annual transmission TLs by 603 MWh. |
| NTLs | RAMI | 2,019.0 | 6.804 GWh | • 2,500 RAMI meters planned for installation in 2023 (JPS 2019-2023 Investment Plan).<br>• Three projects scheduled for completion in 2023, in communities with "Loss Rate" of over 70% (August Town Phase 3, Grants Pen Phase 2, and Leith Hall).<br>• The estimated loss reduction of about 567 MWh/month. |
| | Smart Meter | 14,016.0 | - | • 55,000 smart meters was originally planned for installation in 2023 (JPS 2019-2023 Investment Plan).<br>• 80,000 smart meters to be installed in 2023. This includes 24,000 that was initially scheduled for installation in 2022. |
| | Audit and Investigations | - | 29.000 GWh | • JPS indicated in the 2023 Annual Review Filing that its plans to perform 90,000 meter/account audits in 2023.<br>• JPS estimates that the loss reduction from the audits and the 80,000 smart meter installations combined will be 29.0 GWh. |
| | Community Renewal and Strike Force | - | | • In the 2023 Annual Review Filing, JPS noted that it will continue with its ambition to reverse the rampant NTLs in lower income areas, and to that end, it has focused on seeking access to funding for house wiring for individuals and improving the economic prospects of residents in these areas. JPS also indicated the "Spin to Win initiative", formerly Grand Bonanza, garnered better public response when compared to the other initiatives and, the company is looking at ways to capitalize on this in 2023.<br>• The no specific scope involving strike force activities and regularization of network access in 2023, and related energy loss reduction impact were stated by JPS. |

## OUR's Comments – JPS 2023 Loss Reduction Projects

**8.8.7** The following are the OUR comments:

a) For the smart meters that were not installed (24,000) as part of the 2022 deployments and carried forward to 2023, the specific schedule and estimated loss reduction impact were not stated. This does not allow for proper evaluation of outcomes in 2023 and the reconciliation of the benefits of the project activities in the applicable year.

b) The absence of key information, such as, the scope and level of loss reduction for some of the 2023 projects/initiatives as indicated in Table 8.8 above will constrain the assessment of the effectiveness of the projects. These repeated deficiencies need to be sorted out by JPS.

## 8.9 JPS Proposed New System Losses Targets For 2023

**8.9.1** In the 2023 Annual Review Application, JPS noted that the biggest challenge in 2022 was the availability of materials to complete initiatives on time and at scope. JPS further indicated that despite such challenges, the rate of increase in system losses was not as significant as in prior years, which according to the company was driven by the recovering economy.

**8.9.2** Based on that summary, it appears that the company was rather oblivious of the poor system losses performance for 2022 and was comfortable with total annual system losses at the level of 28.35% of annual net generation. And, apparently not recognizing that the objective of the system losses management strategy is not about the moderation of the magnitude of the increases in system losses but is fundamentally concerned with reducing losses (TLs and NTLs) to acceptable levels.

**8.9.3** With the worsening system losses performance for 2022, the company was seemingly upbeat about the prospects for 2023, and on that note, it asserted that its internal focus in 2023 will be the execution of the planned 2023 system losses reduction projects.

**8.9.4** Further, the company submitted that it is also committed to seeking public and private sector partnerships, in an effort to lower the barrier to legitimate supply for low-income households and improve their economic prospects. In that regard, the company posited that it expects its initiatives to yield a loss reduction of 50 GWh in 2023, and if the current trend of growth in GDP persists, then a 0.5 percentage point reduction in total system losses is a reasonable projection.

**8.9.5** On that basis, JPS proffered that the overall system losses target for 2023 should be revised upwards to 28.15% with TLs at 7.90% and NTLs at 20.25%, as represented in Table 8.9 below.

**Table 8.9 JPS proposed new System Losses Targets for 2023**

| JPS REVISED 2023 SYSTEM LOSSES TARGETS - PROPOSED IN THE 2023 ANNUAL REVIEW FILING | |
|---|---|
| **System Loss Component** | **Target** |
| Technical losses (TLs) | 7.90% |
| NTLs within the control of JPS (JNTL) | - |
| NTLs not totally within the control of JPS (GNTL) | - |
| Total NTLs | 20.5% |
| TOTAL | 28.15% |
| RF | - |

**OUR's Position – JPS Proposed New System Losses Targets for 2023**

**8.9.6** The OUR's position on JPS's proposed new system losses targets is as follows:

1) JPS's proposal for the adjustment of the previously approved 2023 losses targets, was found to be incomplete, as it does not include the two (2) aspects of NTLs specified in Schedule 3, paragraph 38 of the Licence 2016, which would enable a complete evaluation of the proposal. As such, this proposal was not considered by the OUR in this 2023 Annual Review. In addition to the identified omissions, no plausible basis was provided to justify the proposal.

2) Notwithstanding, it is important to underscore that JPS's 2023 system losses proposals (forecast and targets), were already assessed during the 2019-2024 Rate Review Process, and the relevant 2023 targets determined by the OUR, taking into consideration the requirements of the Licence 2016. The approved capital expenditure for the 2023 loss reduction projects, ongoing loss reduction measures (account audit, meter investigations etc.), projected impact of 2019-2024 Smart Meter project (AMI meters), and the options for recovering lost revenues associated with some modes of the NTLs.

3) Based on this methodological and robust approach, the OUR considers the 2023 system losses targets approved in the 2019-2024 Rate Review Determination Notice to be "reasonable and achievable" and represents a fair allocation of the system losses burden between the "ratepayers" and JPS, in the context of the shared responsibility for system losses. This means that there is no need for any adjustment to the approved 2023 system losses targets.

4) Considering these factors, the OUR's position is that the 2023 system losses targets approved in the 2019-2024 Rate Review Determination Notice (TL = 7.61%, JNTL = 3.99%, and GNTL = 10.39%), will stand.

5) With respect to RF, the OUR's position is outlined in subsequent sections.

**JPS Proposed Determinants for the 2022 Y-Factor**

**8.9.7** As indicated in the 2023 Annual Review Application, JPS used the 2022 System Losses components (actual performance) and the approved 2022 targets (DETERMINATION #21 of the 2019-2024 Rate Review Determination Notice), to derive the 2022 Y-Factor and the related "TULos2022". These parameters (Ya, Yb, Yc and RF) were applied by JPS to compute the 2022 Y-Factor is provided in Table 8.10 below.

**Table 8.10: JPS' 2022 System Losses Parameters used to derive 2022 Y-Factor**

| JPS 2022 SYSTEM LOSSES PARMETERS AND Y-FACTOR COMPUTATION | | | | | | |
|---|---|---|---|---|---|---|
| **DESCRIPTION** | **TL** | **JNTL** | **GNTL** | **TOTAL** | **RF** | **REMARKS** |
| JPS 2022 SYSTEM LOSSES (ACTUAL) | 7.77% | 3.85% | 16.74% | 28.35% | - | Based on JPS 2022 December ELS |
| OUR 2022 TARGETS | 7.67% | 4.24% | 10.75% | - | 20.0% | 2019-2024 Determination Notice |

**8.9.8** Regarding these 2022 Y-Factor determinants, JPS submitted that based on the allocations outlined in Table 14.26 of the 2019-2024 Rate Review Determination Notice and the absence of a stay by the Tribunal under Condition 32 paragraph 1 (iii) of the Licence 2016, the targets remain as the approved targets from the OUR unless JPS is successful in its pending appeal of the OUR's decision. However, Table 14.26 of the 2019 - 2024 Rate Review Determination Notice specifically addresses NTL targets, but the reference "Tribunal Appeal" speaks to all the System Losses targets specified by the Licence 2016. So, it is not clear as to whether JPS has conceded in its challenge against the TL targets.

**JPS 2022 Y-Factor and related "TULos2022" Computations**

**8.9.9** As indicated in the 2023 Annual Review Application, JPS used the 2022 System Losses components shown in Table 8.10 above (actual TL, JNTL and GNTL values versus the corresponding targets), to compute the 2022 Y-Factor and related "TULos2022". These computations are demonstrated in Figure 8.4 below.

**Figure 8.4: JPS 2022 Y-Factor and related "TULos2022" Computations**

| System Losses Adjustment TULos2022 | | | |
|---|---|---|---|
| **Line** | **Description** | **Formula** | **Value** |
| L1 | Actual $TL_{2022}$ | | 7.77% |
| L2 | Target $TL_{2022}$ | | 7.67% |
| L3 | $Ya_{2022}$ | (L2-L1) | -0.10% |
| L4 | Actual $JNTL_{2022}$ | | 3.85% |
| L5 | Target $JNTL_{2022}$ | | 4.24% |
| L6 | $Yb_{2022}$ | (L5-L4) | 0.39% |
| L7 | Actual $GNTL_{2022}$ | | 16.74% |
| L8 | Target $GNTL_{2022}$ | | 10.75% |
| L9 | RF | | 20.00% |
| L10 | $Yc_{2022}$ | (L8-L7)*L9 | -1.20% |
| L11 | $Y_{2022}$ | L3 + L6 + L10 | -0.91% |
| L12 | $ART_{2022}$ | | 48,160,407,073 |
| **L13** | **$TULos_{2022}$** | **L11*L12** | **(437,296,496)** |

**8.9.10** As indicated, the 2022 Y-Factor calculated by JPS is **-0.91%,** this is applied to the 2022 ART (excluding IPP Non-fuel cost) (J$48.16B) to derive the "TULos2022" value of -**J$437.30M** (the amount of financial penalty assumed by JPS). However, it should be noted that the issues identified with the reported 2022 "Billed Customers" and "Illegal Users"

NTLs, effectively disqualifies this 2022 Y-Factor and "TULos2022" proposal, as the alterations to the 2022 NTLs measurements are unjustified and are found to be not "reasonable and prudent". Therefore, it was not allowed in the 2023 PBRM adjustments. OUR's Evaluation of JPS 2022 Y-Factor Proposal.

**OUR's Preliminary Review**

**8.9.11** The OUR's initial review of JPS' 2022 system losses measurements and 2022 Y-Factor proposal presented in the 2022 Annual Review Filing, identified information gaps which created the need for additional System Losses data, necessary to facilitate a thorough assessment of the 2022 system losses performance. The additional information was requested from JPS via letter dated 2023 June 2, and includes the following items:

1) The Energy Loss Spectrum (ELS) for the months 2022 January – 2022 November, as required by Regulatory Reporting Framework have not been submitted by JPS. These monthly ELS are required to support the OUR's evaluation of JPS's 2022 System Losses performance at this 2023 Annual Review.

2) Documentary evidence of the meter readings and energy measurements used to determine the Technical Losses within the boundaries of the Transmission System as defined in the Electricity Sector Codes, as reported in the 2022 ELS.

3) A full breakdown of the total number of Advanced Meters (AMI), including Transformer/Total Meters, and "Check Meters" installed in the electricity network under the "Smart Meter Programme" up to 2023 May, broken out by Customer Class and by Parish/Service Area.

4) DETERMINATION #8(4) of the 2022 Annual Review Determination Notice states that JPS shall submit the requested information to facilitate the review of the RAMI programme. The requested is set out below:

> "*1) A report on the operational performance of each and all of the RAMI systems that are currently in operation in the distribution network. This report should indicate which RAMI system has functioning communications systems and those that are defective.*
> *2) The total number of customer accounts that have RAMI meters up to 2022 August. This should include the following:*
>
> *a) A breakdown of the number RAMI accounts in the communities where the RAMI systems have been deployed.*
> *b) The date of RAMI meter installation*
> *c) The cost of each RAMI meter*
> *d) Confirmation if the relevant RAMI devices are depreciated in accordance with Schedule 4 of the Licence 2016 and the 2018 Depreciation Study.*
> *e) The number of customers that were given RAMI "display units", and the number of display units that are functional.*

*3) The specific RAMI customers who have received more than two (2) consecutive estimated bills since 2019.*
*4) The reasons why RAMI customers are receiving perpetual "estimated bills" in violation of EGS7"*
To date, this information remains outstanding. The requested information is also necessary to support the evaluation of the system losses and must be submitted to the OUR.

5) Under DETERMINATION #21 of the 2019 - 2024 Rate Review Determination Notice, the Office requested several deliverables (audits and studies) to provide more in-depth information on the overall system loss situation. Some of these items were delayed but were eventually submitted in response to the OUR's 2022 May 26 additional information request. However, the independent study of NTLs due to "Illegal Users", is still outstanding. The situation is such that in the 2021 Annual Review Determination Notice, the Office granted a no objection to JPS for consolidating this study with the National Electricity Loss Reduction Plan (NELRP) sponsored by the IDB, provided that the conditions specified in the 2019-2024 Rate Review Determination Notice are satisfied. The OUR notes that the independent study of NTLs due to "Illegal Users, is expected to be addressed in the NELRP final report, but this has not been received by the OUR. JPS is required to provide an update on the assessment of NTLs due to Illegal Users, and copies of any deliverables from the NELRP received by the company.

6) A detailed update on the System Losses Reduction initiatives and approved projects currently in progress, including commencement date, projected completion date, capital expenditure and corresponding loss reduction impact, up to 2023 May.

**Responsibility Factor (RF)**

**8.9.12** All relevant information pertaining to GNTL and RF since the effective date of the 2019-2024 Rate Review Determination Notice is required. This information shall, include, among other things, the following:

a. Targeted GNTL reduction measures/initiatives implemented by JPS and the GOJ over the period 2021 January – 2023 May.

b. The resulting impact of such initiatives on GNTL; and

c. The initiatives being contemplated by JPS and the GOJ to address GNTL for the remainder of the 2019-2024 Rate Review period.

**8.9.13** Most of the requested data was submitted by JPS up to 2023 June 21. The data received was reviewed, and while there were some omitted items, for the most part, the data was found to be acceptable. Subsequently, the OUR carried out a full technical evaluation of JPS's 2023 Annual Review system losses proposals, including the 2022 system losses performance measurements and 2022 Y-Factor, and all the relevant supporting schedules and data. This

evaluation/analysis was necessary to facilitate the calculation of the 2022 Y-Factor required for the derivation of the "TULos2022" component of the 2022 RS.

**Issue of JPS's Modifications to the 2022 ELS**

**8.9.14** As previously mentioned, during the evaluation of JPS's 2022 system losses performance, the OUR detected that there were significant modifications made to the 2022 ELS (January – December) by the company, without any substantiation or justification. With these findings, the OUR by letter dated 2023 July 12 to JPS, requiring substantiation for the identified modifications to the specific components of the NTLs measurements reported in the 2022 ELS, as set out below:

*"…Our review of the filing has revealed material changes in certain elements of the 2022 non-technical losses (NTLs) measurements reported in the 2022 January – 2022 December Energy Loss Spectrum (ELS). JPS has not submitted any supporting basis, including calculations, data or results of any relevant NTLs reduction projects, which corroborate the indicated decrease in NTLs in specific categories, nor reports of any related studies, to substantiate these movements.*

*The areas of concern specifically relate to the following:*

***NTLs due to "Billed Customers"***

*As represented in JPS's 2021 December - 2022 December ELS, NTLs due to "Billed Customers" (dominated by Rate 10 NTLs) decreased from **7.51%** in 2021 December to **3.54%** at the end of 2022 December (in fixed decrements of 0.33% each month), reflecting a difference of 3.97% of annual net generation, with no overall reduction in the total 2022 NTLs. Notwithstanding, there is no justification or supporting information to substantiate the reported reduction in these NTLs over such a relatively short timeframe.*

***NTLs due "Illegal Users"***

*On the other hand, the said 2021 December - 2022 December ELS indicates that NTLs due to "Illegal Users" increased steadily from **12.08%** in 2021 December to **16.74%** at the end of 2022 December (4.66 percentage point increase), even as the total 2022 NTL maintained at a constant level of 20.59%. However, no basis was provided to justify this significant increase in the NTL over the 12-month period.*

*Since the 2019-2024 system losses forecast and targets were established based on JPS's Energy Losses Spectrum that contained a particular distribution therein, JPS is required to provide the following:*

1. *Full explanation and justification for the significant changes reflected in the "Billed Customers" and "Illegal Users" components of the reported NTLs for 2022.*

2. *A clear description of the basis and methodology that was used to allocate NTLs (JNTL and GNTL) applied in the 2022 Y-Factor calculation.*

*The requested information should be submitted to the OUR by 2023 July 14."*

On 2023 July 21, JPS provided its response to the OUR. JPS's response is set out below:

**8.9.15** The OUR's review of JPS's response revealed the following:

1) JPS's did not specifically address the issues raised by the OUR in its letter of 2023 July 12. The company also did not satisfy the information requirements specified in the said letter.

2) The approach/methodology employed by JPS to modify the 2022 ELS was not prudent and was not informed by any robust technical/engineering assessment. Further, , the identified modifications to the 2022 NTLs due to "Billed Customers" and "Illegal Users", were not justified and not supported by any tangible reduction in the respective categories of NTLs over the 2022 January – December operating period.

3) The reallocation of the NTLs components in the 2022 ELS was not in keeping with the requirements of the Final Criteria (Section A3.3 of ANNEX 3), which states that: "No modification to the ELS shall be undertaken by JPS without prior consultation with the OUR". Consequently, the reported 2022 NTLs due to "Billed Customers" and "Illegal Users" are not considered to be legitimate and are not allowable.

4) The JPS 2022 NTLs alterations also significantly deviate from the established basis/methodology of JPS's 2019-2023 Energy Loss Spectrums that includes specific annual NTLs distributions, which were applied in developing the 2019-2023 system losses forecast and the setting of the relevant system losses targets.

**OUR's Position**

**8.9.16** Given these findings and considerations as well as all the relevant factors outlined herein, the OUR's position is that the modifications made by JPS to the 2022 ELS are unacceptable and unjustified. In that regard, these alterations to the 2022 "Billed Customers" and "Illegal Users" NTLs are deemed to be not "reasonable and prudent" and deviate from the established "regulatory criteria" and the relevant requirements of Licence and are not in line with prudent utility practice. On that basis, the reported 2022 NTLs due to "Billed Customers" and "Illegal Users", and the associated JNTL and GNTL are Not Allowed.

**Actual 2022 System Losses relative to Forecast.**

**8.9.17** At the 2019-2024 Rate Review, JPS proposed revised total system losses target for 2022 of 26.43% (100% of the forecasted 2022 losses), arguing that the adjustments were necessary to make allowance for potential adverse effects of the developing COVID-19 situation on its operations and system losses. Using JPS's assumptions and other available system losses information, the OUR also generated its own forecast of the total system losses for 2022, which was approximately the same value proposed by JPS. However, the actual system losses recorded by JPS for 2022 (2022 December ELS) turned out to be significantly higher than forecast, at 28.35% of net generation, representing a deviation of 1.92% on the upside.

**8.9.18** Despite this outcome, the OUR nonetheless carried out the necessary verification checks on the relevant supporting data, which indicated that the reported total 2022 system losses of 28.35% was representative. However, as previously highlighted, the losses allocated by JPS to the major components contributing to 2022 JNTL and GNTL, were found to be unacceptable and unjustified, and as such, were not allowed. A comparison of the referenced 2022 system losses forecasts versus the actual 2022 performance are presented in Table 8.11 below.

**Table 8.11: 2022 System Losses Forecasts versus Actual Performance**

| 2022 SYSTEM LOSSES FORECAST vs ACTUAL PERFORMANCE | | | | | | |
|---|---|---|---|---|---|---|
| Loss Component | JPS Original Forecast – COVID-19 Impact [2019 Rate Review] | JPS Revised Forecast – COVID-19 Impact [2019 Rate Review] | OUR 2021 Forecast – COVID-19 Impact [2019 Rate Review] | **Actual Losses (2022 ELS)** | Variance (JPS COVID19 Forecast vs Actual) | Variance (OUR COVID19 Forecast vs Actual) |
| **TL** | 7.85% | 7.93% | 7.93% | 7.77% | -0.16% | -0.16% |
| **NTL** | 16.23% | 18.50% | 18.50% | 20.58% | 2.08% | 2.08% |
| - JNTL | 6.36% | 6.50% | 6.15% | - | | |
| - GNTL | 10.37% | 12.00% | 12.35% | - | | |
| | | | | | | |
| **TOTAL LOSSES** | **24.08%** | **26.43%** | **26.43%** | **28.35%** | **1.92%** | **1.92%** |

**8.9.19** The data shows that the actual 2022 system losses (28.35%) have exceeded the 2022 projection (26.43%) by a sizeable margin (1.92%), indicating that annual system losses continue to escalate above the baseline level (2018 system losses = 26.27%), despite the ending of the COVID-19 pandemic in Jamaica in early 2022, the effects of which JPS

consistently cites as being the cause of the increases in NTLs during 2020-2021. This therefore calls into question the effectiveness of the company's loss reduction programme being implemented during the 2019-2024 review period.

**2022 NTLs Allocation to JNTL and GNTL**

**8.9.20** In keeping with the relevant provisions of Schedule 3 of the Licence 2016, the calculation of the annual Y-Factor adjustment on a reasonable basis, to be applied in the PBRM at each Annual Review, largely depends on the allocation of the reported annual NTLs into its JNTL and GNTL constituents.

**8.9.21** With that understanding, the OUR as part of its technical review of JPS's 2022 system losses performance, conducted a comprehensive assessment of the sources/modes of the 2022 NTLs, as well as the proportions of the total 2022 NTLs proposed for JNTL and GNTL. However, as previously indicated, the OUR's review found that the 2022 NTLs due "Billed Customers" and "Illegal Users" (the major contributors to JNTL and GNTL), reported in the 2022 December ELS were unjustifiably altered by JPS, which was found to be unacceptable and not "reasonable and prudent". Accordingly, the 2022 NTLs reported for the named categories (3.54% and 16.74% respectively) were not accepted. This means that the related 2022 JNTL and GNTL allocations of 3.85% and 16.74%, respectively, proposed by JPS for computing the 2022 Y-Factor adjustment, were Not Allowed.

**OUR's NTLs Allocation - 2022 NTLs to JNTL and GNTL**

**8.9.22** With the disallowance of JPS's proposed 2022 JNTL and GNTL values, the OUR having regard to the requirements of the Licence 2016, performed technical/statistical analyses, utilizing the NTLs allocation approach/model described in the Final Criteria and the 2019-2024 Rate Review Determination Notice, together with JPS's 2019-2022 NTLs Source Data, the base year NTLs, the 2019-2022 NTLs, and previous NTLs causation/distribution factors provided by the company, to estimate the relative proportions for the 2022 JNTL and GNTL. This methodology estimated JNTL at 6.18% and GNTL at 14.41%, as represented in Table 8.12 below.

**Table 8.12: OUR's 2022 NTLs Distribution – (JNTL and GNTL)**

| 2022 NTLs DISTRIBUTION - JNTL & GNTL | | | | | | |
|---|---|---|---|---|---|---|
| **Description** | **Total NTLs** | **JPS NTLs Allocation** | | **OUR NTLs Allocation** | | **Remarks** |
| | | JNTL | GNTL | JNTL | GNTL | |
| 2022 NTLs (Actual) | 20.59% | 3.85% | 16.74% | **6.18%** | **14.41%** | Basis for JPS NTLs allocation not stated. |
| 2022 NTLs Proportions | 100.00% | 18.70% | 81.30% | **30.02%** | **69.98%** | |

## 8.10 Review of the Responsibility Factor (RF)

### Responsibility Factor Definition and Target

**8.10.1** To compute the annual Y-Factor, Schedule 3, Exhibit 1 of the Licence 2016, stipulates that the Yc component shall equate to the difference between the annual GNTL (target) and GNTL (actual) multiplied by a factor RF. That is, Yc = [GNTL (target) – GNTL (actual)] x RF. Where RF is the responsibility factor determined by the Office, which is a percentage between 0% and 100%.

**8.10.2** As stated in the Licence 2016, this responsibility factor shall be determined by the Office, in consultation with JPS, having regard to (i) nature and root cause of losses; (ii) roles of JPS and the Government to reduce losses; (iii) actions that were supposed to be undertaken and resources to be allocated in the Business Plan; (iv) actual actions undertaken by the resources spent by JPS; (v) actual cooperation by the Government; and (vi) change in the external environment that affected losses.

### OUR's 2022 Review of JPS Responsibility Factor

**8.10.3** At the 2022 Annual Review, the OUR in keeping with DETERMINATION #21(3b) of the 2019 - 2024 Rate Review Determination Notice, carried out a review of the responsibility factor, to:

a. examine the strategies/initiatives being implemented by the utility and GOJ to address NTLs;
b. ascertain the level of progress being made in reducing GNTL.
c. estimate the portion of GNTL that is within JPS control.
d. determine whether there is need for adjustment to the exiting RF level.

**8.10.4** The scope of this RF review in 2022 considered, among other things, the following:

- The historical NTLs data, including their orientation, causes, and distribution.
- The planned initiatives/measures to address GNTL during the 2019-2024 Rate Review period.
- The progress and impact of the GOJ/JPS initiatives targeting the reduction of GNTL.
- The GOJ's strategy to address NTLs, going forward.

### OUR's 2022 RF Review Findings

**8.10.5** This review of the responsibility factor in the 2022 Annual Review, found that:

a) A collaborative approach was being established by JPS and the GOJ to address GNTL, however, there was no indication or anticipation of any tangible reduction in GNTL over the short term that would warrant a downward shift in the responsibility for GNTL in relation to JPS.

b) The strategies/interventions contemplated to combat NTLs (mainly GNTL) involve considerable challenges and intricacies. This situation was being compounded by the lack of specificity and the narrowness of the scope of some of the proposed initiatives, as well as limited progress due to process inertia. Consequently, their implementation up to this point has had virtually no effect on GNTL, which has increased markedly since the effective date of the 2019-2024 Rate Review Determination Notice.

**8.10.6** Based on these findings, the OUR deduced that based on the progress of the GNTL reduction initiatives being pursued, it was not likely that there would not be any material change in the existing RF threshold until about the early years of the 2024-2029 Rate Review.

**OUR's Determination on RF (2022 Annual Review)**

**8.10.7** Taking into consideration, among other things, the results/findings of its 2022 RF review, and the relevant provisions of the Licence, the OUR in the 2022 Annual Review Determination Notice determined that:

a) RF shall remain at **20%** for application at the 2022-2023 Annual Review.
b) RF shall be 20% for application at the 2023-2024 Annual Review, and the 2024 Rate Review.

**Further Examination of JPS Responsibility Factor**

**8.10.8** Despite the OUR completing a full review of the responsibility factor construct at the 2022 Annual Review, and has set out its findings and determinations in its Determination Notice, given that some GNTL related initiatives are being pursued, including some amount of social interventions in certain communities across the country, the OUR thought that it was necessary to undertake a further examination of the GNTL situation and the responsibility factor (RF) to applied in the 2022 Y-Factor computations at this 2023 Annual Review.

**8.10.9** Accordingly, the OUR requested updated information relating to GNTL and RF in its 2023 June 2 letter, requesting additional information in relation to the 2023 Annual Review Application. The response from JPS (2023 June 14) is set out below:

*"JPS and the GOJ have not agreed on any measurable, time-bound initiatives for loss reduction in 2023 despite sustained lobbying on JPS' part. Some of the many initiatives we have proposed to the government include:*

- *A dedicated utility court or more resources allocated to disposing of matters concerning electricity theft.*
- *Training of the police to identify irregularities, conduct investigations, collect evidence, and provide testimony independently of JPS.*
- *Expansion of the house-wiring program as lack of GER certification and the financial means to do so is a significant barrier in the areas with high levels of illegal users.*
- *Harsher penalties for electricity theft both in legislation as well as in the application of legislation.*

*We are optimistic that the National Energy Loss Reduction Plan that is expected to be completed later this year will be a catalyst for increased collaboration amongst the GOJ, JPS, and all other parties that are essential to sustained loss reduction."*

**8.10.10** Based on this update from JPS, it can be deduced that since the conclusion of the 2022 Annual Review, there has been no advancement of the GOJ/JPS strategy, plans, programmes, initiatives identified to address NTLs, particularly GNTL.

**OUR's Position – RF for 2023**

**8.10.11** Given the evident lack of progress on the GOJ/JPS NTLs reduction strategy up to this juncture and considering the distortionary effects of the unjustified modification of the 2022 NTLs by JPS, the OUR's position is that the 2022 RF for JPS shall remain at the level of **20%** approved in the 2022 Annual Review Determination Notice.

## 8.11 OUR 2022 Y-Factor Computation

**8.11.1** To determine the 2022 Y-Factor, the actual TL, JNTL, and GNTL values were measured against the corresponding 2022 TL, JNTL and GNTL targets, approved in the 2019-2024 Rate Review Determination Notice, in accordance with the Y-Factor mechanism defined under Schedule 3, Exhibit 1 of the Licence 2016. The required computations and the resulting 2022 Y-Factor is presented in Table 8.13 below.

**Table 8.13: OUR Derivation of the 2022 Y-Factor**

| 2022 Y-FACTOR FOR JPS 2023 PBRM | | | | | | | |
|---|---|---|---|---|---|---|---|
| **2022 Losses Parameters** | **Approved 2022 Targets** | **JPS 2022 Actual** | **OUR 2022 Losses Allocation** | | **2022 Y-Factor Components** | **JPS 2022 Y-Factor** | **OUR 2022 Y-Factor** |
| TL2022 | **7.67%** | 7.77% | 7.77% | | Ya2022 = [TL2022(target) – TL2022(actual)] | -0.10% | **-0.10%** |
| JNTL2022 | **4.24%** | 3.85% | 6.18% | | Yb2022 = [JNTL2022(target) – JNTL2022(actual)] | 0.39% | **-1.94%** |
| GNTL2022 | **10.75%** | 16.74% | 14.41% | | Yc2022 = [GNTL2022(target) – GNTL2022(actual)] x **RF** | -1.20% | **-0.73%** |
| TOTAL | - | 28.35% | 28.35% | | | | |
| RF2022 | **20.00%** | | | | | | |
| | | | | | **Y-Factor2022 = (Ya2022+ Yb2022 + Yc2022)** | **-0.91%** | **-2.77%** |

**8.11.2** As shown, the Y-Factor resulting from the 2022 System Losses performance measurement is **-2.77%**. Based on the defined "ART" adjustment mechanism, this 2022 Y-Factor value was used to derive the "TULos2022" component of the 2022 RS.

**8.11.3** Importantly, the computed 2022 Y-Factor indicates that of the total 2022 system losses (28.35% of annual net generation), only 2.77% is referred to JPS, while the cost of the remaining 25.58% (share of 90.2%) will be borne by the ratepayers. Yet still, the company agitates about unreasonable targets.

## 8.12 OUR System Losses Review - Issues and Comments

**8.12.1** The findings and issues emerging from the OUR's review of JPS's system losses proposals and supporting data during this 2023-2024 Annual Review, are delineated in the sections below.

### System Losses Measurement Concerns

**8.12.2** In the 2022 Annual Review Application, to deflect responsibility for system losses within its control, and to disguise the worsening system losses performance, JPS criticized the ELS framework and its own energy loss measurements for 2021 and previous years. JPS stated that those measurements were not reliable and should not be used for target setting and Y-Factor determination. In response, the OUR having regard to established regulatory precedence, principles, and practice, and in recognition of the evolution and improvement of the system losses measurement process over time, rejected such arguments. The OUR's reasoning in refuting JPS's claims is outlined in the 2022 Annual Review Determination Notice.

**8.12.3** JPS also demanded that the OUR provides detailed evidence, rationale and justifications for its positions on the system losses subject, including the annual targets. In response, the OUR referred JPS to the regulatory principles and legal provisions that guide the regulatory treatment of system losses, which are expressly set out in the Licence 2016, the Final Criteria, the 2019-2024 Rate Review Determination Notice, and previous OUR determinations on system losses.

**8.12.4** As a salient point, it must be underscored that the OUR in executing its regulatory functions of monitoring and assessing the energy losses in the electricity system, has been very explicit that the system losses measurement process, must embody the core principles of transparency, integrity, credibility, and legitimacy.

**8.12.5** Having cognizance to these principles, it is of profound importance to give serious attention to the 2022 system losses measurements, reported in the 2022 January – December ELS by JPS, due to the observation of certain irregularities. As previously indicated, the OUR's evaluation of JPS's system losses performance for 2022 at this 2023 Annual Review has

detected specific cases of significant and unfathomable anomalies in the system losses measurements as described herein, which were not substantiated or justified by the company.

**8.12.6** In the OUR's view, these are troubling developments, which go contrary to the guiding principles of the system losses measurement/management process. Furthermore, the conspicuousness of the alterations made by JPS, suggests that this may have been a calculated effort on the part of the company to manipulate the 2022 ELS to achieve a particular result. On the flip side, such actions or the perception of such actions will undoubtedly diminish the transparency, integrity, credibility, and reliability of the system losses measurements, and introduce unwanted distortions in the process. In that context, JPS must recognize that such modifications, whether inadvertent or intentional, are unacceptable and are not in accordance with the provisions of the Licence 2016, established regulatory principles, and prudent utility practice, and therefore should be discontinued.

**8.12.7** Further, the OUR having regard to the extent and implications of the identified NTLs reallocations, considered it necessary to express the following:

a) It is important to note that the fundamental purpose of electricity service regulation in Jamaica is to align private behaviour with the "public interest". As relates to system losses, it is about ensuring that the cost of system losses is not disproportionally allocated to ratepayers, while at the same, incentivizing the utility to reduce these losses, and lower the financial burden.

b) Under the existing legal and regulatory framework, the OUR has the power to set system losses targets and approve JPS's loss reduction programme, while JPS has the obligation to manage and mitigate system losses. Therefore, JPS, subject to the requirements of the legal and regulatory framework, is expected to operate in a reasonable, prudent, and transparent manner in relation to the activities of the Licensed Business, including the measurement and reporting of system losses. Therefore, JPS should not be engaged in any questionable activities or irregular actions involving the regulated business, such as the unjustified modification of the 2022 ELS.

c) The thinking that JPS can stand by and not perform on NTLs and at the end of the day make synthetic adjustments to the system losses measurements in its favour, where JNTL target is exceeded without performance is unacceptable. Note also that JPS's obligations in relation to regulated electricity service involve decisional responsibility and cannot be separated from the decisional consequences. And so, the decision/action of manipulating the 2022 ELS, cannot be allowed to stand, which means the reversal of the unwarranted alterations and the appropriate system losses penalties for 2022 performance duly applied. In support of this position, it must be emphasized that the OUR does not prescribe JPS's choice or decisions in relation to system losses measurement/management, but where there are questionable deviations, the OUR has no obligation to impose imprudent costs of NTLs on customers.

d) JPS would also be aware that the regulatory process at the core, is fundamentally concerned with the utility's performance and outputs, and with ensuring that the utility

discharges its obligations and duties in accordance with the requirements of the legal and regulatory framework, and in a manner that is consistent with prudent and ethical standards. Given this imperative and the established regulatory principles/practice, there should be no occasion for the regulatory process to be contending with the type of underhanded behaviour reflected in the 2022 ELS.

e) A common feature that has been discerned from the OUR's assessment of JPS's performance and positions on system losses, over time, is the lack of performance/results and the avoidance of responsibility. With this observation, it must be emphasized that under the current structure of the electricity sector, JPS has monopoly control over electricity service in the country. Therefore, in the absence of regulatory standards and safeguards, and consequences for inappropriate actions and failure to meet performance targets, the utility would lack the incentive to perform efficiently and cost-effectively as opposed to a utility subject to the full force of market competition. It should be noted that in competitive electricity market environments, utilities are subject to the free interplay of market competition and have no alternative to efficiency and performance. But, in the case of JPS (a regulated monopoly), it does not face such pressure to perform, which is a likely reason for the decision to interfere with 2022 NTLs measurements. In the scheme of things, the regulatory process must therefore cause the utility to prudently discharge its obligations (including those relating to requirements system losses) with the aim of improving performance. And in doing so, must seek to satisfy certain key requirements, which are, to:

    i. Secure and improve efficiency in the utilization of its resources.
    ii. Operate with all reasonable economies and adhere to standards of prudence.
    iii. Incur the lowest feasible costs and capitalize on all available cost-saving opportunities.

**8.12.8** These requirements must serve as a guide for JPS in its operation of the Licensed Business and in executing its legal and regulatory obligations/responsibilities, including those related to system losses, and whatever additional obligations the Office imposes lawfully.

**8.12.9** Given the issues, factors and considerations, the Office has rejected the unjustified NTLs (attributable to "Billed Customers" and "Illegal Users") reported by JPS in the 2022 ELS.

**JPS Compliance with OUR's Determinations**

a) DETERMINATION #21(6) of the 2019-2024 Rate Review Determination Notice, stipulated that the company shall conduct an independent study of NTLs due to Illegal Users, to establish a credible baseline, to facilitate calibration of the reported NTLs and regulatory decisions going forward. This study shall be completed within one (1) year of the effective date of the 2019-2024 Rate Review Determination Notice, and a copy of the report of the study shall be submitted to the OUR. However, based on a request from JPS in the 2021 Annual Review Filing, the OUR granted a no objection to JPS for consolidating this study with the National Electricity Loss Reduction Plan (NELRP), provided that the conditions specified in the 2019-2024 Determination Notice are satisfied. Accordingly, the independent study of NTLs due to "Illegal Users, was expected to be a deliverable of the NELRP study.

b) In the 2022 Annual Review Determination Notice, the OUR again emphasized the need for this independent study of NTLs due to Illegal Users and indicated that the study report was not yet received from JPS.

c) Up to the submission date of the 2023 Annual Review Application, no update or report on this study was submitted to the OUR by JPS. With this void, the OUR as part of its 2023 June 2 additional information request, stated that JPS is required to provide an update on the assessment of NTLs due to Illegal Users, and copies of any deliverables from the NELRP received by the company. JPS in its response, indicated that it received the draft NELRP report on 2023 April 24, but in reviewing the document it recognized that the "illegal users" study amongst other studies were not included, though clearly required as per the terms of reference. It was noted by JPS that if "illegal users" study is not remedied in the final report commissioned by MSET, then JPS will undertake the study independently.

d) While the reported deficiencies/omissions are noted, the OUR's position is that the study is long overdue and must be completed by JPS by 2023 December.

**Modes and Sources of NTLs**

**8.12.10** The OUR's review of JPS's 2019-2022 NTLs investigation data, including details of account audits, meter inspections/investigations, and the detected sources/modes of NTLs, submitted as part of the 2022 Annual Review Filing, revealed that JPS completed over 73,000 account audits/investigations in each year from 2019 to 2022 (JPS service order 2022 indicate 115,313). The OUR's review of the submitted data revealed that over 11% of the total number of accounts investigated by JPS in each of the respective years were found with service-related irregularities. According to JPS, these detected irregularities constitute the main contributors to NTLs. The sources/modes of these irregularities include:

a) Defective Metering Equipment (meters, CTs, PTs, etc.);
b) Burnt/Damaged Meter.
c) Meter Tampering/Bypass.
d) Inverted Meter.
e) Incorrect Metering Configuration.
f) Cross Phasing.
g) Single Phasing.
h) Open Circuit.
i) Line Tap at Pothead; and
j) Other sources.

**8.12.11** Notably, these sources/modes of NTLs identified by JPS are found to be largely consistent with the OUR's NTLs causation factors elaborated in the 2019-2024 Rate Review Determination Notice, which are the primary drivers of "Billed Customers" NTLs.

**8.12.12** From a statistical perspective, the total number of accounts investigated in each of the stated years effectively represents an acceptable statistical "sample size" necessary to draw reasonable inference from the respective total populations (the respective annual total customer counts for 2019-2022). It is important to note that the respective sample sizes relative to total population, at a minimum, suggest a statistical confidence level of 95% for

the results, with a confidence interval ("margin of error") of 5%. Accordingly, based on the OUR's analysis, it can be reasonably inferred that the level of irregularities detected in each annual sample (number of accounts investigated annually) would be similar across the total customer base for the respective year. This extrapolation from the sample to the entire population is deemed critical for the validation of NTLs in the system, NTLs allocation to JNTL and GNTL, and to inform the process for formulating targeted NTLs curtailment and mitigation strategies.

**8.12.13** From the OUR's observations/findings, the following deductions were made:

1) The NTLs datasets provided by JPS consistently show that energy losses due to "Billed Customers" (RT10, RT20, RT40, and RT50), largely result from normal supply/service connection faults, meter infrastructure configuration problems & defects, and detectable meter irregularities, most of which can be corrected and mitigated by JPS. These sources of NTLs are totally within the control of JPS.

**8.12.14** As a result of the 2019-2024 Smart Meter Programme, a large percentage of the Rate 10 and small Rate 20 accounts are now metered with AMI devices that also have advanced monitoring capabilities supported by "Data Analytics". These capabilities provide the company with increased visibility and enhanced monitoring functions to detect certain irregularities that contribute to NTLs. With this high penetration of AMI devices/systems in the network, which is under the direct management and control of JPS, there should be significant reductions in NTLs caused by the sources/causes listed above, but the performance indicators show the opposite.

2) Based on the nature of most of the identified sources/modes of NTLs, a significant portion of the recorded energy losses attributable to "Billed Customers" are regarded as "recoverable" losses, which can be reclaimed by the JPS. Accordingly, the company should account for these losses as "recoverable energy" since they have been identified and quantified and can be reclaimed as translated to "billed revenue", to be recovered from the specific customers involved, instead of carrying them forward as existing losses in the ELS. To be clear, these detected energy leakages should not be classified as NTLs in the ELS, on the basis that they can be quantified and billed to the relevant customers, for recovery of the associated revenues by JPS.

3) For NTLs caused by these sources, JPS can recover the associated loss revenues by means of billing adjustments in accordance with the relevant "Back Billing Policy" or other permissible means available to the company for redress.

4) The NTLs datasets also indicate that the total number of customer accounts audited/investigated by JPS annually have consistently exceeded the targets specified in the Licence 2016 (Schedule 2, Overall Standards - EOS7a & EOS7b). The increasing number of annual account audits and investigation activities should allow JPS to gather

more valuable information, to enhance its energy loss detection programme, data analytics and loss mitigation strategy.

OUR's Position

**8.12.15** Given these factors and considerations, the OUR is of the view that NTLs resulting from the identified sources and modalities are directly with the control of JPS, and there are practical/means available to the company to curtail these energy losses on a sustained basis.

**JPS 2019-2024 Smart Meter Programme**

**8.12.16** The smart meter project information submitted by JPS as part of the 2023 Annual Review Application, includes a breakdown of the number meter installations completed since the start of the 2019-2024 Rate Review period, which is presented in Table 8.14 below.

**Table 8.14: JPS's Smart Meter Installations (2019-2022)**

| JPS SMART METER INSTALLATIONS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Category | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2019-2022 | Remarks |
| RT10 | 16,728 | 19,315 | 67,370 | 98,679 | 68,956 | 52,488 | 47,932 | 268,055 | |
| RT20 | 498 | 1,713 | 6,652 | 11,360 | 10,109 | 8,069 | 6,895 | 36,433 | |
| RT40 | | 4 | 769 | 818 | 76 | 97 | 83 | 1,074 | |
| RT50 | | | 59 | 81 | 16 | 9 | 16 | 122 | |
| RT70 | | | 2 | 16 | 1 | 2 | | 19 | |
| Total Cust Meters | 17,226 | 21,032 | 74,852 | 110,954 | 79,158 | 60,665 | 54,926 | 305,703 | > 60% of Cust Base |
| | | | | | | | | | |
| Transformer Meters | | | | 839 | 1,395 | 10,759 | 4,113 | 17,106 | |
| | | | | | | | | | |
| TOTALS | 17,226 | 21,032 | 74,852 | 111,793 | 80,553 | 71,424 | 59,039 | 322,809 | |
| APPROVED CAPEX | | | | US$20.96 | US$8.68 | US$14.59 | US$12.52 | | |
| TOTAL NTLs | 18.11% | 17.85% | 18.33% | 18.13% | 20.12% | 20.38% | 20.59% | - | - |

**8.12.17** The data indicates that over 305,000 smart meters were installed over the period 2019-2022, but despite this achievement, NTLs continues to increase (from 8.13% in 2019 to 20.59% at the end of 2022), which raises questions about the effectiveness of the programme in reducing system losses.

**8.12.18** To facilitate the OUR's overall assessment of the smart meter programme after its completion in 2023, JPS will be required to submit a detailed report on the implementation of the programme over the 2019-2023 period, covering, among other things, the scope, costs, benefits, and the overall loss reduction impact, within two (2) months after completion in 2023.

**RAMI Requirements**

**8.12.19** In the 2019-2024 Rate Review Application, JPS indicated that it has started a multiyear initiative to upgrade aging RAMI platforms. This according to JPS, was driven by RAMI customers experiencing higher than normal incidence of estimated bills due to the aging RAMI infrastructure and the lack of support from the meter original equipment manufacturers (OEMs).

**8.12.20** With cases of multiple and perpetual estimated bills to RAMI customers (over 24 consecutive estimated bills in some cases) increasing exponentially, the OUR recognizing the ramifications of this problem, brought to light the various RAMI issues at the 2022 Annual Review.

**8.12.21** After careful examination, the OUR in the 2022 Annual Review Determination Notice, indicated that it will be looking into JPS's entire RAMI programme, and as such a specific set of information (Determination #8 and section 9.32 of the 2022 Annual Review Determination Notice) was required from JPS to support the investigation, which was to be submitted within (1) month of the said Determination Notice. However, despite multiple follow-up requests, notifications, and reminders between 2022 October and early 2023, JPS did not provide the requested information as per the referenced sections of the 2022 Annual Review Determination Notice. This non-compliance has significantly constrained the OUR's investigation into the RAMI issues, which is unacceptable and untenable.

**8.12.22** It should be noted that it was only after the OUR's 2023 June 2, additional information request in relation to the 2023 Annual Review Application that JPS provided a portion of the requested information, some of which was found to be inadequate.

**8.12.23** Notwithstanding, the OUR's investigation into the RAMI issues continues, and the OUR intends to have further consultations with JPS to address data requirements and other matters. In addition, JPS will be required to submit to the OUR, the full commissioning report for the RAMI projects that have been completed since the start of the 2019-2024 Rate Review period, to support the investigation.

**JPS Responsibility for some NTLs Components**

**8.12.24** Pursuant to ANNEX 3 of the Final Criteria, and the system losses determinations in the 2019 - 2024 Rate Review Determination Notice, JPS was assigned full responsibility (100%) for the following NTLs components:

- Rate 70 – Wholesale customers
- Rate 60 - Streetlight/Stoplight/Interchange
- Rate 40 & 50 - Large C&I customer class
- Rate 20 - Medium C&I customer class
- JPS Internal Losses

**8.12.25** This was determined based on the premise that these losses were totally under the control of JPS, and the company possesses the means and capabilities to detect and reduce these losses to zero. However, based on the 2019 - 2022 ELS, some of these categories of NTLs continue to exit at unacceptable levels, as shown in Table 8.15 below.

**Table 8.15: NTLs Fully Assigned to JPS**

| NTL COMPONENTS FULLY ASSIGNED TO JPS (2019 - 2022) | | | | | | |
|---|---|---|---|---|---|---|
| **Components** | **JPS Control (Final Criteria)** | **2019 Dec ELS** | **2020 Dec ELS** | **2021 Dec ELS** | **2022 Dec ELS** | **Remarks** |
| Wholesale (Rate 70) | 100% | 0.00% | 0.00% | 0.00% | 0.00% | |
| Rate 60 | 100% | 0.00% | 0.00% | 0.00% | 0.00% | Smart LED technology |
| Large C&I (Rate 50) | 100% | 0.07% | 0.06% | 0.07% | 0.00% | All accounts have AMI and Check Meters. |
| Large C&I (Rate 40) | 100% | 0.36% | 0.37% | 0.37% | 0.00% | All accounts have AMI and Check Meters. |
| Medium C&I (Rate 20) | 100% | 0.40% | 0.37% | 0.36% | 0.38% | |
| JPS Internal Losses | 100% | 0.71% | 0.65% | 0.79% | 0.31% | JPS billing errors and process inefficiencies. |

**8.12.26** Despite arguments proffered by JPS defending these NTLs components, the OUR maintains that given the advanced metering capabilities, enhanced information/communication platforms and advanced data analytics capabilities available to JPS to identify and address these losses, the current levels are unacceptable, and will not be passed on to the ratepayers. Therefore, in compliance with the OUR's determinations and the Final Criteria, JPS should seek to reduce these losses to zero (0), as a matter of priority.

## 8.13 OUR 2023 Annual Review System Losses Determinations

### 2022 Y-Factor Determination

**8.13.1** In making its determination on JPS's 2022 Y-Factor adjustment, the Office took into consideration, among other things, the following:

- The results of the OUR's 2022 system losses evaluation.
- The relevant provisions of the Licence 2016; and
- The System Losses determinations set out in the 2019-2024 Rate Review Determination Notice.

**8.13.2** Accordingly, the Office determines that the 2022 Y-Factor applicable to the "TULos2022", 2022 RS, and the 2023 ART adjustment is **-2.77%**.

### System Losses Determination Summary

**8.13.3** The Office's determinations on JPS's system losses at this 2023 Annual Review are summarized in Determination 7 below:

**Determination 8**

1) The RF applicable to the 2022 Y-Factor is 20%. For Y-Factor adjustment at the 2024 Rate Review, the applicable RF shall be 20%.

2) The 2022 Y-Factor applicable to the "TULos2022", the 2022 Revenue Surcharge (RS) and the 2023 Annual Revenue Target (ART) is: **-2.77%.**

3) JPS's proposal for new 2023 system losses targets were rejected on the basis that it was not in accordance with the requirements of the Licence 2016.

4) JPS is required to submit to the OUR, the full commissioning report for the RAMI projects that have been completed since the start of the 2019-2024 Rate Review period, within one (1) month of the effective date of this Determination Notice.

5) JPS is required to complete the independent study on NTLs due to Illegal Users and submit the final report to the OUR by 2023 December.

6) After completion of the smart meter programme in 2023, JPS is required to submit a detailed report on the implementation of the programme over the 2019-2023 period, covering, among other things, the scope, costs, benefits, and the overall loss reduction impact, within two (2) months after completion in 2023.

7) JPS shall comply with all the regulatory requirements relating to system losses, as specified in this Determination Notice.

# 9 Quality of Service (Q-Factor Adjustment)

## 9.1 Background

**9.1.1** As stipulated in Schedule 3, paragraph 46(a) of the Licence 2016, the Office shall apply a Q-Factor to JPS non-fuel rates at each PBRM review. To satisfy this requirement, the Office is required to measure JPS's quality of service performance for each year in the Five-year revenue cap period versus the annual targets set in the Five-year Rate Review determination. The Q-Factor, as defined in the Licence 2016, is the allowed price adjustment to reflect changes in the quality of service provided to customers. This price adjustment is captured in the "RCy(1+dPCI)" component of the ART, through the formula: $dPCI = dI \pm Q \pm Z$

**9.1.2** In observance of these conditions, at this 2023 Annual Review, the 2022 Q-Factor as defined in the Licence 2016, was determined based on the OUR's measurement of JPS's 2022 quality of service performance, which is the subject of this section of the Determination Notice.

**Quality of Service Dimensions**

**9.1.3** In electric utility operations, "quality of service" requirements generally encompasses three (3) main dimensions:

- Commercial Quality – involves specific performance measures (Guaranteed/Overall Standards).
- Power Quality – mainly addresses the voltage quality of the electricity supply; and
- Reliability of Supply – relates to overall system reliability and the continuity of electricity supply to customers.

**9.1.4** However, based on the quality-of-service provisions of the Licence 2016, the "Reliability of Supply" dimension forms the core of the Q-Factor mechanism, which is the main focus of this regulatory review.

## 9.2 Q-Factor Review Scope

**9.2.1** The OUR's evaluation of JPS's Q-Factor at this 2023 Annual Review, encompasses among other things, the following activities:

- Assessment of JPS's system reliability performance for 2022, focusing on outage frequency and duration, and their impact on customers.
- Analysis of outage causes to determine the main drivers of the electricity supply interruptions in 2022, with focus on JPS's reliability improvement strategies.
- Evaluation JPS's 2023 Annual Review Q-Factor proposals.
- Derivation of the 2022 quality indices.
- Determination of the Q-Factor to be applied in the 2023 PBRM.

## 9.3 Measurement of System Reliability

**9.3.1** In regulated electric utility operations, where rates are linked to quality-of-service performance, reliability of supply is critical for meeting regulatory targets/objectives and for ensuring acceptable service quality to customers. However, to achieve the reliability objectives, the utility must be able to properly define, measure, manage and monitor the various aspects of system reliability. Following that logic, the measurement system for reliability will require the use of specific performance metrics, so as to establish a practicable framework for quantifying quality of service performance. Additionally, reliability measurements/metrics are also considered essential for regulatory assessment/monitoring of the utility reliability performance.

**9.3.2** As generally practiced across the electricity supply industry, the measurement/assessment of electricity system reliability quality of service performance, is commonly done using the following metrics/indicators:

1) **System Average Interruption Frequency Index (SAIFI)** - indicates the frequency at which the average customer experiences a sustained interruption (duration > minutes) over a specified period of time (usually a year);
2) **System Average Interruption Duration Index (SAIDI)** - indicates the total duration of interruption for the average customer during a predefined period.
3) **Customer Average Interruption Duration Index (CAIDI**) - represents the average time taken to restore service to the average customer per sustained interruption; and
4) **Momentary Average Interruption Frequency Index (MAIFI)** – indicates the average frequency of momentary interruptions (momentary interruption events).

$$SAIFI = \frac{\Sigma\, Total\ Number\ of\ Customers\ Interrupted}{Total\ Number\ of\ Customers\ Served}$$

[Interruptions/Customer (Duration > 5 minutes)]

$$SAIDI = \frac{\Sigma\, Customer\ Minutes\ of\ Interruption}{Total\ Number\ of\ Customers\ Served}$$

[Minutes/Customer (Duration > 5 minutes)]

$$CAIDI = \frac{\Sigma\, Customer\ Minutes\ of\ Interruption}{Total\ Number\ of\ Customers\ Interrupted}$$

[Minutes/Interruption (Duration > 5 minutes)]

**9.3.3** In relation to the Q-Factor, the Licence 2016 clearly sets out the definition and conditions for computing SAIFI, SAIDI, and CAIDI (the prescribed quality indices), to facilitate the measurement of JPS's quality of service performance.

## 9.4 Licence Requirements for Q-Factor

**9.4.1** For reference, the regulatory requirements applicable to the Q-Factor are defined under the Schedule 3, (Paragraphs 37, 39, 46(a) and Exhibit 1) of the Licence 2016, and are also covered in the Legal and Regulatory framework set out in this Determination Notice.

## 9.5 Regulatory Principles for Implementation of Q-Factor

**9.5.1** To ensure proper application of the Q-Factor scheme, the OUR and JPS have agreed that the fundamental principles to guide the process should include, among other things, the following:

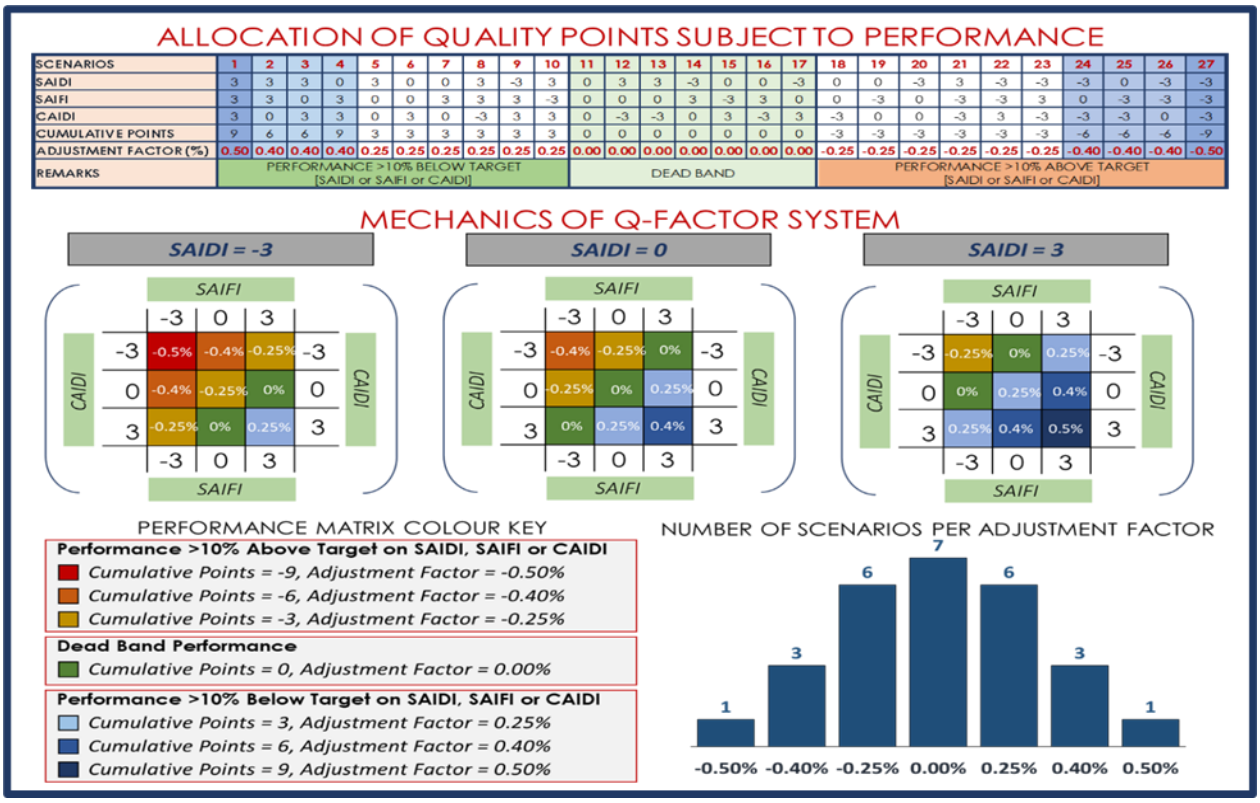
1) It should provide proper financial incentives for JPS to deliver an acceptable quality of service to customers.
2) The process must be transparent and supported by accurate data/information.
3) It should consider certain factors that are outside of JPS's control.

**9.5.2** Based on the quality-of-service requirements of the Licence 2016, the Q-Factor should be determined based on the average reliability performance across the entire electricity system. This means that all customers served by the system should necessarily receive the same level of reliability, irrespective of their individual preferences. However, indications from historical system reliability data reported by JPS show that this expected uniformity in service reliability is not being achieved. As revealed by the data, this is largely due to significant and sustained disparities in service reliability across the different regions of the network.

**Design of Q-Factor Scheme**

**9.5.3** As described in Schedule 3, Exhibit 1 of the Licence 2016, the Q-Factor mechanism is based on a design that incorporates the three (3) prescribed "quality indices" (SAIFI, SAIDI and CAIDI) into a quality points/scoring system. The structure of this Q-Factor scheme is illustrated in Figure 9.1 below.

**Figure 9.1: Q-Factor Points System and Adjustment Matrix**




**9.5.4** Based on the mechanics of the Q-Factor scheme, JPS's annual quality of service performance measurement in terms of SAIFI, SAIDI and CAIDI can either be within ±10% of target (dead band) or outside this range. This means that if the indices fall below 10% of the target, within the dead band, or above 10% of the target, the quality point allocations will be +3, 0, or -3 for each index, respectively. The quality points system as structured gives twenty-seven (27) different possible outcomes/results, with quality points scores ranging from a minimum of -9 to a maximum of 9, and corresponding Q-Factor value ranging between -0.5% and +0.5%.

## 9.6 OUR Determined Q-Factor Baseline and 2022 Targets

**9.6.1** As stipulated in paragraph 39, Schedule 3 of the Licence 2016, the Q-Factor targets set by the Office shall normally be done at the Rate Review for each of the five (5) years and broken out year by year.

**9.6.2** At this 2023 Annual Review, the 2022 Q-Factor targets set by the Office for JPS during the 2019-2024 Rate Review Process, were used to measure JPS's quality of service performance in 2022, to determine the Q-Factor level to be applied in the 2023 PBRM.

**Pre-established 2022 Q-Factor Targets**

**9.6.3** With reference to the 2019 - 2024 Rate Review Determination Notice, the Office determined Q-Factor baseline and 2022 targets (SAIFI, SAIDI and CAIDI) for the computation of the 2022 Q-Factor, to be applied in the 2023 PBRM at this 2023 Annual Review, are represented in Table 9.1 below.

**Table 9.1: Office Approved 2019-2024 Q-Factor Baseline and 2022 Targets**

| APPROVED 2019-2024 Q-FACTOR BASELINE AND 2022 TARGETS (SAIFI, SAIDI & CAIDI) | | | | |
|---|---|---|---|---|
| COMPONENTS | APPLICABLE REVIEW PERIOD | SAIFI (interruptions/customer) | SAIDI (minutes/customer) | CAIDI (minutes/interruption) |
| BASELINE | 2019-2024 | $SAIFI_{BASE}$ = 12.9 | $SAIDI_{BASE}$ = 1,582 | $CAIDI_{BASE}$ = 122.7 |
| 2020 TARGETS | 2021–2022 | $SAIFI_{BASE} \times (1 - 0.04) = 12.4$ | $SAIDI_{BASE} \times (1 - 0.05) = 1{,}502.9$ | $CAIDI_{BASE} \times (1 - 0.01) = 121.5$ |
| 2021 TARGETS | 2022–2023 | $SAIFI_{BASE} \times (1 - 0.09) = 11.7$ | $SAIDI_{BASE} \times (1 - 0.11) = 1{,}408.0$ | $CAIDI_{BASE} \times (1 - 0.02) = 120.2$ |
| 2022 TARGETS | 2023–2024 | $SAIFI_{BASE} \times (1 - 0.13) = 11.5$ | $SAIDI_{BASE} \times (1 - 0.15) = 1{,}344.7$ | $CAIDI_{BASE} \times (1 - 0.02) = 120.3$ |

## 9.7 JPS 2022 System Outage Data

**9.7.1** In the 2023 Annual Review Application, JPS submitted that the 2022 "Annual Outage Dataset" (compiled from its Outage Management System - "OMS"), formed the basis of its 2022 system reliability performance measurements used to compute the "2022 Q-Factor", applied in the proposed 2022 RC and ART adjustment.

**9.7.2** According to JPS, the dataset used to compute the 2022 reliability performance was extracted from the old Ventyx ABB OMS for the period 2022 January – February 2022, and the new Open Systems International (OSI) OMS data for the period 2022 March - December. As reported by JPS, the new OSI OMS was commissioned in March 2022 without critical variances that would prevent it to go-live, but some non-critical post implementation challenges were identified, which impacted the outage data quality and completeness. According to JPS, these challenges persisted and required resolution throughout the year. These issues involving the new OMS are addressed in detail in subsequent sections.

## 9.8 JPS System Reliability Performance For 2022

**9.8.1** In the 2023 Annual Review Application, JPS submitted that the 2022 "Annual Outage Dataset" (compiled from its Outage Management System - "OMS") formed the basis of its 2022 system reliability performance measurements used to compute the "2021 Q-Factor" and applied in the proposed RC2022 and ART adjustment.

**9.8.2** According to JPS, the 2022 forced outage data (2021 Outage Dataset) was used to derive the prescribed "quality indices" (the actual SAIFI, SAIDI and CAIDI) for 2021, which were then measured against the Office approved 2021 targets, to determine the 2021 Q-Factor. The derived 2021 system reliability indicators as presented in the 2022 Annual Review

Filing, is summarized in Table 9.2 below. The corresponding 2019 and 2020 indicators are also included for comparison.

**Table 9.2: JPS System Reliability Performance Indicators for 2022**

| JPS SYSTEM RELIBILITY INDICATORS (2019-2022) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| YEAR | Total System Outages | Planned Outages | Forced Outages | Reportable Forced Outages | SAIFI (Interruptions/ Customer) | SAIDI (Minutes/ Customer) | CAIDI (Minutes/ Interruption) | MAIFI (Interruptions/ Customer) |
| 2019 | 51,242 | 1,999 | 49,243 | 44,389 | 11.7 | 1,375.2 | 117.1 | 7.6 |
| 2020 | 63,217 | 2,453 | 60,764 | 57,726 | 8.6 | 1,486.8 | 173.2 | 13.8 |
| 2021 | 70,563 | 4,064 | 66,499 | 57,333 | 7.7 | 1,862.7 | 243.2 | 12.0 |
| 2022 | 107,663 | 2,715 | 104,948 | 89,884 | 7.5 | 1,983.8 | 266.1 | 36.5 |
| 2022 | | | | | 2.6% < 2021 level | 6.5% > 2021 level | 9.4% > 2021 level | 204.2% < 2021 level |

## 2022 System Outage Data

**9.8.3** For 2022, JPS reported that a total of 107,663 system outage events were recorded by its OMS (Ventyx and the new OSI OMS). Of this total, 2,715 were reported as "planned outages", (scheduled to execute planned maintenance/works on the system infrastructure), while 104,948 were forced outage events, which resulted in unplanned supply interruptions to customers. The 2022 outage data also indicates that the recorded total forced outages (104,948) include 91,065 "sustained" and 13,883 "momentary" outage events. Additionally, 89,884 forced outages were designated by JPS as "Reportable". This means that 14.35 of total forced outages (15,064 outages) were classified as "non-Reportable", which far exceeds the established 5% threshold.

## JPS 2022 SAIFI, SAIDI and CAIDI Levels

**9.8.4** The quality-of-service performance for 2022, as measured by the prescribed reliability metrics/indices, based on the system outages that occurred during 2022, is summarized as follows:

- The 2022 SAIFI indicator decreased to 7.5 interruptions/customer, representing a 2.6% improvement over the 2021 level (7.7 interruptions/customer). According to JPS, this performance is attributed to the benefits realized from its reliability programmes. However, the indications from outage data suggest that the reported improvement in the 2022 SAIFI was mainly due to the higher OMS "daily customer counts" for 2022 (relative to the 2021 daily customer counts) used to calculate the 2022 SAIFI, and not because of the impact of the completed reliability projects, as the reported benefits are quite negligible.
- SAIDI for 2022 increased to 1,983.8 minutes/customer, reflecting a 6.5% deterioration in average interruption duration relative to the 2021 level (1,862.7).

- CAIDI, which is the derivative from the quotient (SAIDI ÷ SAIFI), continued to decline in 2022 to 266.1 minutes/interruption, worsening by 9.4% relative to the 2021 level (243.2 minutes/interruption). Based on the outage data, it can be inferred that this outcome was largely influenced by the significant increase in the average duration of electricity supply interruptions experienced by customers in 2022 relative to 2021.

**9.8.5** Regarding the SAIDI performance, JPS claimed that the increase in SAIDI in 2022 was caused by outage management processing issues within the new OSI OMS (erroneous and long outage durations), logistic delays and greater lead times in respect of procuring materials for reliability projects, and the effect of one (1) major tropical storm (Tropical Storm Ian), which according to JPS contributed 2% to the 2022 SAIDI performance. The OUR's comments on JPS's assertions are as follows:

a) With respect to the new OSI OMS processing issues, it is important to emphasize that JPS was fully responsible for ensuring the proper implementation and operation of the new OMS, and that the embedded OMS facilities and functions are adequate, acceptable, reliable and reasonable, prior to the commencement of commercial operations. Therefore, the reports from JPS that errors in the new OMS (erroneous and long outage durations) over the period 2022 March – December, resulted in very high SAIDI outcomes in 2022, is not acceptable, and does not merit the exclusion of the 2022 SAIDI performance for the 2022 quality of service measurement and Q-Factor. This issue will be addressed further in subsequent sections.

b) In relation to the issue of logistic and procurement delays that JPS has identified as a factor that impeded its implementation of the 2022 reliability projects, it is acknowledged that in 2022 there has been some global supply chain challenges, resulting from the effects of the geo-political problems as well as the lingering effects of the COVID-19 pandemic. Notwithstanding, based on the sequence of implementation and the indicated completion schedules of the reliability projects up to the 2022 Annual Review, all things being equal, the actual impact of most of the 2022 reliability projects would be realized in 2023, and therefore would not influence the 2022 SAIDI outcome. On that premise, if there were logistical/supply chain related delays impacting the implementation of the 2022 reliability projects, their completion dates would likely be extended. This means that the expected benefits would certainly not be realized in 2022, thus the reported logistic and procurement issues encountered in 2022 would not be a factor in any increase in SAIDI in 2022.

c) Regarding the claim of tropical storm conditions negatively impacting SAIDI, JPS would be fully aware that tropical storm conditions on the island is a perennial issue, with increased storm activity expected during the June - November period of each year. With the company being fully cognizant of this annual threat in advance each year, it is difficult to rationalize the apparent lack of anticipation and preparedness by the company and the inability of the T&D network to withstand the effects of a few

relatively weak tropical storms that passed in recent years, with the Tropical Storm Ian being the most recent in 2022. The repeated claim by JPS each year of significant impact on system reliability and service quality due to tropical storm conditions with no obvious improvement in resilience, is questionable, considering the significant level of capital investment in recent years for the reinforcement/hardening of the electricity network infrastructure, which was deployed with the aim of ensuring that the power grid is robust, reliable and resilient. Also, the assumed impact of the named tropical storm on the 2022 SAIDI appears to be overstated. This and other related aspects of the 2022 quality of service performance will be the subject of further regulatory review.

d) It is also important to highlight that since the start of the 2019-2024 Rate Review period, there has been a marked increase in the number of forced outages occurring on the system, resulting in frequent and sustained interruptions in electricity supply to customers across the network. According to respective Annual Outage Datasets, outages caused by "Equipment Failure" and "Vegetation" were found to be the main drivers contributing to the escalation in system forced outages. While these outage causes are generally recognized across the industry, particularly for predominantly over-head electricity networks, the relatively high number of forced outages recorded for 2020 - 2022 raises questions about the efficacy of JPS's reliability improvement programme as well as the level of planning and preparedness to withstand, respond and recover rapidly from potential disruptions during the annual hurricane season. This situation will be the subject of further review and analysis.

**Momentary Interruptions and MAIFI**

**9.8.6** As established across the electricity industry, supply interruptions lasting five (5) minutes or less are categorized as "momentary". In electric utility system operations, momentary interruptions normally occur when there is a brief (duration $\leq$ 5 minutes) loss of power delivery to one or more customers, caused by the opening and closing operation of an interrupting device, in response to momentary faults detected on distribution circuits. To track these interruptions, the MAIFI metric as defined herein is applied.

**9.8.7** In reference to JPS's quality of service performance measurement, it must be pointed out that while MAIFI is recognized as a key reliability metric/indicator, it is not a component of the Q-Factor scheme prescribed by the Licence 2016. Notwithstanding, as stipulated in the established regulatory reporting framework, and reinforced in the 2019-2024 Rate Review Determination Notice, and subsequent 2021 and 2022 Annual Review Determination Notices, JPS is required to report momentary interruptions to facilitate ongoing system reliability assessments and regulatory monitoring of momentary interruption events. In the OUR's view, this is necessary to drive performance transparency and to ensure proper momentary interruption measurements, reporting, tracking, and benchmarking.

**9.8.8** With respect to JPS's 2022 performance on momentary service interruptions as measured by the MAIFI metric, Table 9.71 above shows that on average, momentary interruptions per

customer increased markedly by 204.2% to 36.5 interruptions/customer in 2022 relative to the 2020 level (12.0 interruptions/customer). No details or explanation for this significant deterioration in MAFI performance was provided by JPS. This will be subject to further review.

**9.8.9** According to JPS, this increase was primarily due to a peak in MAIFI during 2022 September caused by an increase in feeder cycling events associated with Tropical Storm Ian. JPS also noted that based on the transient nature of momentary faults it is difficult to ascertain the drivers/causes of these outages, and by default, their causes are designated as "Unknown". It should be noted that in 2021 and 2022 Annual Review Determination Notices, the OUR raised the issue of the cause of momentary interruptions being reported as "Unknown", and that the company should investigate and remedy this problem.

**9.8.10** Also note that in JPS's 2022 Annual Review Filing, the company claimed that the old ABB/Ventyx OMS was not designed to ascertain the drivers/causes of momentary outages, and this deficiency would be resolved with the implementation of the new OSI OMS in 2022. However, this new OSI OMS with advanced capabilities has been in operation since 2022 March, yet still, JPS continues to claim that it is unable to ascertain the specific causes of momentary interruptions.

**9.8.11** These revelations are very concerning given the various information systems/platforms and automated/intelligent network devices implemented by JPS to monitor the T&D system and raises questions about the effectiveness of the significant capital investment in system reliability since the start of the 2019-2024 Rate Review period. This issue of increased momentary interruptions in 2022 and the causes/drivers of these interruptions will be subject of further regulatory review.

## 9.9 JPS Reliability Improvement Programme

### 2022 Reliability Projects – Capital, Scope, and Impact

**9.9.1** In the 2019-2024 Rate Review Determination Notice, the Office approved a total CAPEX of US$17.03M to finance the implementation of JPS 2022 reliability improvement projects included in its 5-year capital investment plan. The status of these projects, as presented by JPS in the 2023 Annual Review Application, is summarized in Table 9.3 below.

**Table 9.3: JPS 2022 Reliability Improvement Projects – Status**

| STATUS OF JPS 2022 RELIABILITY IMPROVEMENT PROJECTS | | | | |
|---|---|---|---|---|
| **Projects** | **Approved 2022 CAPEX (US$M)** | **Actual Spend (US$M)** | **Planned Scope** | **Project Status Reported by JPS** |
| Voltage Standardization Programme (VSP) | 4.165 | 0.37 | - Reinsulation of 57km of distribution lines.<br>- Construction of 17.3km of tie-line between Blackstonedge S/S and Michelton Halt S/S.<br>- Reinsulation and conversion Michelton Halt S/S and 2 feeders. | - 10% reinsulation completed.<br>- Scope deferred to 2023 due to material unavailability.<br>- Scope deferred to 2023 due material unavailability.<br><br>**Expected/actual reliability impact not stated.** |
| Grid Modernization Programme | 2.410 | 2.46 | - 320 TripSavers (24kV @100A)<br>- 30 Sectionalizers (DA switches), 27kV @ 630A<br>- 4 Pole Mounted Reclosers (PMRs)<br>- 90 Faulted Circuit Indicators (FCIs) | Devices installed<br>- 307 TripSavers<br>- 15 Sectionalizers (DA switches)<br>- 4 PMRs<br>- 24 FCIs<br><br>**Expected/actual reliability impact not stated.** |
| Distribution Line Structural Integrity | 4.763 | 5.20 | - Replacement of 1,964 poles<br>- Rehabilitation 3,801 poles<br>- Replacement of 12,700 pieces of equipment | - Replaced 4,109 poles<br>- Rehabilitate 4,476 poles<br>- Replaced 9,118 pieces of equipment<br><br>According to JPS, the planned work activities were delayed because several items of material were unavailable due to longer procurement lead times and suppliers not delivering as scheduled. 96% of target achieved even with procurement delays.<br><br>**Expected/actual reliability impact not stated.** |
| Distribution Line Re-Conductoring and Relocation | 2.037 | Not Stated | Not Stated | Most projects under the programme were completed with two reliability upgrade projects deferred to 2023 due to unavailability of material.<br><br>**Expected/actual reliability impact not stated.** |
| Transmission Line Structural Integrity | 1.858 | Not Stated | Not Stated | Scope Completed. |
| Substation Structural Integrity | 1.798 | Not Stated | Not Stated | Project incomplete. Programme scope deferred for Equipment such as breakers and reclosers to 2023 due to material unavailability caused by logistical challenges. |
| **TOTAL** | **US$ 17.03M** | | | |

**9.9.2** Regarding the overall status of the 2019-2024 system reliability capital investment programme up to the end of 2022, JPS contended that since the emergence of the COVID-19 pandemic it has faced logistics challenges, including tightening supply chains, unusually long lead times for critical assets, and shipping logistics delays, all of which have curtailed planned work activities, and as a result, five (5) projects were deferred for implementation in 2023.

**9.9.3** JPS further asserted that despite the various challenges, it has made significant efforts through strategic planning and other initiatives to reduce the impact on its reliability objectives and the quality of service it provided to customers during the stated period. These assertions by JPS are not necessarily supported by the results of the reliability programme

and annual quality of service performance outcomes since the start of the 2019-2024 Rate Review period.

**OUR's Comments – JPS 2022 Reliability Projects**

**9.9.4** The OUR's review of the status of the reliability projects up to the end of 2022, revealed numerous implementation issues, and for the projects that are already completed, the reported reliability improvements (SAIDI reduction), do not appear to be impactful. Further, given the level of capital that has been expended on these reliability projects since 2020, the results yielded to date are way below target, and signifies a likely unfavourable outcome for the 2019-2024 reliability programme by the end of the review period. As the evidence suggests, the realized gains are negligible, while at the same time, the system reliability continues to worsen.

**9.9.5** Given these findings, and considering that some of the 2022 projects that were not started have been carried forward to 2023, and some projects that were started in 2022 are now rescheduled to be completed in 2023, the OUR is of the view that at this juncture, it is prudent for JPS to reassess and revise its project implementation strategy, taking into account, the scope, objectives, targets, and justification that informed the approval of the reliability projects proposed for implementation over the 2019-2024 regulatory period.

**JPS 2023 Reliability Projects**

**9.9.6** In the 2023 Annual Review Application, JPS indicated that the planned 2023 reliability improvements projects and associated capital investment, are as summarized in Table 9.4 below.

**Table 9.4: JPS 2023 Reliability Improvement Projects**

| JPS 2023 RELIABILITY PROJECTS AND ASSOCIATED CAPITAL EXPENDITURE | | |
|---|---|---|
| **Projects** | **OFFICE Approved CAPEX for 2023 (US$ M)** | **Remarks** |
| Transmission Line Structural Integrity Programme | 1.839 | Planned scope/impact not defined. |
| Substation Structural Integrity Programme | 1.837 | |
| Distribution Line Structural Integrity Programme | 4.822 | |
| Voltage Standardization Programme | 4.547 | |
| Grid Modernization Programme | 2.320 | |
| Distribution Line Re-Conductoring and Relocation | 2.351 | |
| **TOTAL** | **US$17,716 M** | |

**9.9.7** JPS posited that the over-arching objectives of its 2023 reliability programme are to, among other things:

- Improve outage reporting capabilities for customers.
- Improve outage response capabilities.
- Reduce the frequency of outages through grid modernization initiatives.
- Improve T&D network flexibility and load transferability.

- Expand automated outage detection and reporting capabilities.
- Introduce innovative grid maintenance and improvement initiatives.
- Improve Project Management processes for reliability programmes.

**9.9.8** However, the specific scope of work and estimated reliability impact for each of these planned 2023 projects have not been defined by JPS.

**New Outage Management System**

**9.9.9** In the 2019-2024 Rate Review Determination Notice, the Office approved a total CAPEX of US$2.126M for the replacement of JPS's ABB/Ventyx OMS with a new OMS platform (equipped with advanced capabilities and flexibility to accommodate full integration with other key information systems), to be commissioned by the end of 2021. The old ABB/Ventyx OMS was commissioned in 2013 and had reached the end of its useful life (fully depreciated), and due for replacement in early 2022.

**9.9.10** In a project update to the OUR in 2022 April (JPS's letter dated 2022 April 5), JPS reported that a new "Electra OSI OMS" was commissioned into service, and all operational functions have been migrated to the system on 2022 March 1. According to JPS, the new OSI OMS provides full integration with its existing OSI Monarch SCADA/ADMS platform as well as other key JPS enterprise systems including the AMI, CIS, GIS, WFMS and Mobile App, and possesses capabilities to reduce cyber-security risk exposure. JPS also informed the OUR that it was in the process of conducting validation and stress testing on the new system to ensure technical compliance, system integration compliance and regulatory compliance, which is projected to be completed by the end of 2022 June. JPS further indicated that the company is working diligently with suppliers to resolve the technical hitches and hiccups encountered.

**9.9.11** In the referenced letter, JPS noted that during the stress testing period, the quality of the output of the new OMS cannot be assured for Q-Factor reporting, as JPS may not be able to accurately reproduce and represent all the reliability/outage performance data for analysis as required for regulatory compliance. On that premise, the company requested that the OUR grants a waiver of the reliability report requirement for the period 2022 March – June.

**9.9.12** As set out in the 2022 Annual Review Determination, the OUR after careful review of the issues raised, responded to JPS by letter dated 2022 June 20, indicating that the OUR had taken note of the developments regarding the new Electra OMS and conveyed that based on the design orientation of these information systems, it accepts that there is a likelihood for certain glitches to surface in the early stages of operation. Notwithstanding, the OUR made it clear that it was not pre-empting a particular result/outcome, and noted that the anxieties expressed by JPS about the prospects of the OMS stress testing results appeared to be overblown or premature, as the testing process at that time was not yet concluded; and

furthermore, the specific OMS anomalies/errors JPS claimed it had encountered since the start of commercial operations had not been reported to the OUR.

**9.9.13** It should be noted that up to end of 2022, JPS did not provide proper justification (supported by data accumulated since the commencement of the new OMS operations) to substantiate its request for exemption from the 2022 March-June system reliability reporting requirements (request was also made in the 2022 Annual Review Filing). Due to this information gap, the OUR was unable to make any informed decision regarding the requested waiver. The OUR also indicated to JPS that it was not averse to looking at the evolving OMS issues, but this could not be accommodated until the referenced "stress testing" process is fully completed and a "testing & validation" report covering the testing scope/procedures, results, findings, and all data quality issues identified, is presented to the OUR for review. Additionally, a copy of the full OMS commissioning report should be submitted to the OUR. Despite repeated reminders, follow-up, and meetings on the issues in 2022, up to the end of the year, none of these reports were submitted to the OUR. This prevented the OUR from examining the reported post-commissioning OMS issues that were being encountered by JPS and providing feedback to the company on the issues. It also constrained the OUR in establishing a position as to how the associated outage data and quality of service measurements may be treated at the 2023 Annual Review. This issue is addressed further in subsequent sections.

**9.9.14** JPS's approach in the implementation of the new OSI OMS raises questions as to the level of diligence and prudence that was applied in the project management process and the decision to proceed with transition even when there were major unresolved technical issues in late 2022 February. These concerns are also in line with comments from the OMS vender that were included in the report, entitled "Monarch Site Acceptance Test Plan – Jamaica Public Service Company OSI-JPS11-1003 Revision 2.2", dated 2022 February 25, (section 5.4) which states as follows:

> 8. Site and Redundant Server Failover Testing
>
> a. Attempted site failover 2/24/2022 but failed. Servers on site manager were disconnecting and reconnecting causing issues logging in and using the system. Due to what the issue is (networking or otherwise) and how much time is left before cutover, we are unable to test OMS on the backup site. **JPS assumes the risk of going live with an OMS system that has not been guaranteed working in the event of a site failover to EBS.**

**Data Dictionary alignment with New OMS**

**9.9.15** JPS submitted that the "Data Calibration Dictionary" was initially developed based on JPS's recommendations and was approved by the OUR to have a standard in the classification of

non-Reportable outages due to certain constraints in OMS process. With the implementation of the new OSI OMS, JPS is proposing a review of the current Rules Based Data Dictionary, since the current rules were developed using the previous Ventyx OMS.

**9.9.16** The OUR's position is that JPS understood the full implementation of the new OMS was due by the end of 2022, and so, there should have been consideration for updating the existing Data Dictionary Rules early in the process. Nonetheless, the OUR is not averse to the proposal but is of the view that such exercise should encompass a comprehensive review of the OMS transition, the limitations and problems areas that have been identified, which should form the basis for updating the Rules Based Data Dictionary. This, however, will require additional information and further consultations with JPS.

## 9.10 JPS 2023 Annual Review Q-Factor Proposals

**9.10.1** As stipulated in Criterion 11 and ANNEX 2 of the Final Criteria, JPS is required to submit its Q-Factor proposals, supported by the required schedules, models and data, for regulatory evaluation and determination by the OUR. Regarding these requirements, JPS included in its quality-of-service proposals and supporting schedules/data in the 2023 Annual Review Application. The details of these proposals are delineated below.

**JPS Proposed 2022 Q-Factor for 2023 PBRM**

**9.10.2** As outlined in the 2023 Annual Review Application, JPS's measurement of its quality-of-service performance for 2022 indicates a Q-Factor of -0.25%, but instead, the company proposed a Q-Factor of 0% as shown in Figure 9.2 below.

**Figure 9.2: JPS Proposed 2022 Q-Factor for 2023 PBRM**

| | SAIDI (min/customer) | | | SAIFI (interruptions/customer) | | | CAIDI (min/customer) | | |
|---|---|---|---|---|---|---|---|---|---|
| | OUR Q-factor Target | JPS' Actual | Variance (%) | OUR Q-factor Target | JPS' Actual | Variance (%) | OUR Q-factor Target | JPS' Actual | Variance (%) |
| With FM | 1,344.70 | 1983.8 | -48% | 11.22 | 7.5 | 34% | 120.3 | 266.1 | -121% |
| Without FM | 1,344.70 | 1935.0 | -44% | 11.22 | 7.4 | 34% | 120.3 | 263.3 | -119% |

| | SAIDI (min/customer) | | SAIFI (interruptions/customer) | | CAIDI (min/customer) | | |
|---|---|---|---|---|---|---|---|
| | Variance | Quality Points | Variance | Quality Points | Variance | Quality Points | Total Quality Points |
| | -44% | -3 | 34% | 3 | -119% | -3 | -3 |
| Proposal | - | 0 | - | 0 | - | 0 | 0 |

**9.10.3** In rationalizing this proposal, JPS argued that because the annual Q-Factor Targets were established based on the old Ventyx OMS, there have been an alignment bias in the expected outcomes due the massive data calibration issues caused by the new OSI OMS's technical and configuration challenges. On that basis, JPS proposed that the entire 2022 quality of service performance be granted as a data review and post implementation data resolution period, which would effectively set the Q-Factor at zero in the PBRM at this 2023 Annual Review.

**JPS 2023 Annual Review Proposals – Quality of Service Measurement**

**9.10.4** The quality-of-service related proposals made by JPS in the 2023 Annual Review Application are summarized as follows:

a) JPS is proposing that the Baseline which was developed using the previous OMS data should be revised with considerations to the finding of the current OSI OMS.

b) JPS has made significant improvements to its outage management capabilities through the introduction of the OSI OMS. However, the company has faced challenges with data validation and quality assurance that have impacted the reliability indices. As a result, JPS is proposing that the Q-Factor outcome for the 2023 Tariff Adjustment Filing be set to zero (0) quality points due to these challenges.

c) JPS is seeking to establish a mechanism with OUR/MSET for the timely approval of Force Majeure applications, as provisioned in the Licence 2016.

d) JPS is requesting the exclusion of outages due to Motor Vehicle Accidents, which are out of the utilities' control.

e) JPS is requesting the OUR to consider excluding non-Reportable outages from the reliability Q-Factor calculations.

f) JPS is requesting the OUR to reconsider the adoption of the 2.5 beta methodology in the IEEE 1366 Standard, thereby excluding these events from the normal reliability performance. This is consistent with regulatory utility practice.

g) JPS is requesting the OUR to establish the CAIDI target based on JPS's ability/capacity to respond to outages, rather than it being derived from the ratio of SAIDI and SAIFI.

h) Finally, JPS proposes that the definition of "Major System Failure" should align with international utility best practices.

**9.10.5** JPS asserted that by implementing these measures, it aims to improve its reliability indices and ensure it provides quality service to its valued customers.

**OUR's Comment**

**9.10.6** Based on JPS's assertion, the company appears to be saying that without the implementation of the proposed measures, it cannot improve reliability performance. However, in the OUR's view, none of the listed issues impedes JPS from improving system reliability performance. The issue is that these proposals largely relate to process issues which do not restrict actual

reliable operations and quality of service performance. But it appears that the posture is to persuade rather than perform.

## 9.11 Evaluation of JPS Q-Factor Proposals

### Preliminary Review of 2022 Outage Dataset

**9.11.1** The OUR's preliminary review of the 2022 outage dataset revealed several information gaps, which created the need for additional information, necessary to facilitate a thorough assessment of the 2022 system outages and JPS's quality of service performance for the year. The additional information was requested from JPS via letter dated 2023 June 2, and includes the following items:

1) At the 2022 Annual Review, the OUR pointed out to JPS that values of SAIFI, SAIDI and CAIDI included in the 2021 Outage Dataset were hard wired, and related calculations and formulas were absent. The OUR indicated that this issue should be remedied by JPS going forward. However, the OUR's preliminary review of the 2022 Annual Outage Dataset found that the issue has not been addressed by JPS. Considering this finding, JPS is required to clearly show all the mathematical formulas and calculations used to derive the 2022 daily and annual SAIFI, SAIDI and CAIDI values.

2) The 2022 Outage Dataset indicates that over 15% (> the 13% reported for 2021) of the total recorded sustained forced outages were classified as "non-Reportable", representing a significant deviation from the established threshold level (5%). Moreover, in DETERMINATION #22(d) of the 2019-2024 Rate Review Determination Notice, JPS was required to put measures in place to ensure that non-Reportable forced outages do not exceed 5% of total forced outages reported for each year in the review period, but apparently such measures have not been implemented, having presented no evidence to the contrary. Given this indication, the OUR would ask that JPS provides an explanation for the excessively high level of non-Reportable forces outages being recorded in the outage datasets.

3) Determination #9(2) of the 2022 Annual Review Determination Notice stipulates that:

> *"JPS shall submit to the Office a detailed "Monthly Reliability Report", which shall be structured in MS Excel format, and shall include all the data requirements/contents as represented in the "Annual Outage Dataset" template, for the applicable month. The report shall also include the following:*
> - *The specific "cause" of each recorded outage (forced and planned),*
> - *Clear indication of all the adjustments made to the "Raw Data" to compile the "Calibrated Data", with the specific reasons for each amendment clearly stated.*
> - *The status/progress of the Reliability Improvement Projects being implemented.*
>
> *This report shall be submitted within fifteen (15) days after the end of each applicable month, starting with the first full month after the effective date of this Determination Notice."*

To date, JPS has not satisfied this requirement. Consequently, this has constrained the OUR's efforts to assess the quality of the outage data generated by the new OSI Outage Management System (OMS) and to provide comments, prior to the submission of the 2022 Annual Outage Dataset in the 2023 Annual Review Application.

JPS is therefore required to provide a detailed explanation for its failure to submit the monthly reliability reports to the OUR, as prescribed in the 2022 Annual Review Determination Notice.

4) Page 42 of the 2023 Annual Review Application indicates that some issues have been encountered with the implementation and operation of the new OSI OMS. It was also indicated that other issues, such as those listed below, had no definitive solution.

   - Missing operation steps for events started in the DMS/SCADA
   - Non-creation of outage plans in the OMS.
   - AMI Metering issues

   Based on these indications, JPS is required to provide clarification and additional details on the operational status of the new OMS and the related problems being encountered.

5) Determination #9(3) of the 2022 Annual Review Determination Notice requires JPS to provide a detailed breakdown of the CIS/OMS customer count data used in the prescribed quality indices computations, by customer category and status, as part of the Q-Factor reporting requirements. However, this information is not being submitted by JPS. Note that the requested information is critical to ensure the accurate calculation of the metrics/indicators used to assess JPS's annual reliability performance. Accordingly, the company is required to furnish this data to the OUR.

6) Determination #9(6) of the 2022 Annual Review Determination Notice requires JPS to submit a copy of the final "Stress Testing & Validation" report covering the activities of the post-commissioning performance validation and stress testing of the New OSI OMS, which shall include, among other things, the testing scope/procedures, results, findings, and all data quality issues identified during the process. The requested report has not been submitted to the OUR, JPS is required to provide the same.

**9.11.2** JPS provided a response to the OUR's information request on 2023 June 14, purporting to address the data requirements and issues raised by the OUR. Subsequently, the OUR carried out a full technical evaluation of JPS's 2023 Annual Review quality of service proposals, including the 2022 reliability performance measurements, 2022 Q-Factor, and all the relevant supporting schedules and data. This evaluation/analysis was necessary for the derivation of the 2022 Q-Factor to be applied in the "$RC_{2023}(1+dPCI)$" component of the 2023 ART.

**OUR's Review of JPS 2022 Annual Outage Dataset**

**9.11.3** Subject to the Q-Factor requirements in the Final Criteria and the relevant conditions of the 2019-2024 Rate Review Determination Notice, the 2022 Annual Outage Dataset submitted

in the 2023 Annual Review Application formed the basis of the OUR's assessment of JPS' system reliability performance in 2021. As per the Final Criteria, this outage dataset was compiled and presented in Microsoft Excel format under the filename "JPS 2022 OMS Dataset Revision 4" (submitted as part of the 2023 Annual Review Application). Given that the new OSI OMS (commissioned in 2022 February) became fully operational on 2022 March 1, the 2022 outage dataset contained two (2) separate parts:

1) A subset for 2022 January – February (compiled from the old Ventyx OMS).
2) A subset for 2022 March – December (generated by the new OSI OMS).

**9.11.4** Nonetheless, JPS reported that full dataset comprises all the relevant outage data recorded in the respective OMSs for the operating period 2022 January – 2022 December 31 and includes the related JPS calculated 2022 quality indices (SAIFI, SAIDI and CAIDI). The dataset is structured as shown below:

a) Annex A – Ventyx Raw Data
b) Annex B – Ventyx Calibrated Data
c) Annex C – OSI Raw Data
d) Annex D – OSI Pre Archived 2016-2020 Trend
e) Annex E – Non-Reportable Outage
f) Annex F – OSI Missing Condition
g) Annex G – Erroneous Duration
h) Annex H – OSI Planned Outages
i) Annex I – Calibrated OSI Data
j) Annex J – Summary Table

**2022 Outage Dataset – Modification**

**9.11.5** In its response to the issues the OUR identified in the 2022 outage dataset, JPS provided the following items:

a) A schedule of the Daily Customer Count for 2022 applicable to 2022 outage dataset.
b) A revised version of the "Calibrated OSI Data", titled "JPS 2022 OMS Dataset FinalRevision1", which appears to be an update of the version included in the original dataset "JPS 2022 OMS Dataset Revision 4" (submitted in the 2023 Annual Review Filing).

**9.11.6** The "JPS 2022 OMS Dataset Revision 4" and the revisions thereof, were used as the foundational basis of the OUR's evaluation of the JPS's 2022 quality of service performance and Q-Factor determination.

**2022 System Outage Data Validation**

**9.11.7** To ensure that the 2022 outage dataset is acceptable for determining the prescribed quality indices and 2022 Q-Factor, the OUR performed data validation checks to ascertain the quality and veracity of the reported 2022 outage data and reliability measurements.

**9.11.8** This activity involved the initial screening of the 2022 outage dataset to identify errors, omissions, or misrepresentations in the outage data as well as to determine the scope and scale of any adjustments/calibrations to the "Raw Outage Data" by JPS. The data validation process, also entails, among other things, checks to identify and rectify certain anomalies/deviations in the dataset, such as outage events with negative duration, duplicate outage event records, and outage events incorrectly classified as momentary or sustained, prior to the calculation of the prescribed quality indices. These procedures are executed in a meticulous manner to ascertain the credibility of the outage dataset, as embedded discrepancies or errors can distort the reliability calculations, leading to inaccuracies in the computed quality indices, and by extension the Q-Factor adjustment.

**9.11.9** After completing the data screening exercise, the "Raw Data" (Ventyx and OSI) and the "Calibrated Data" (Ventyx and OSI), which contain the relevant records/details of the 2022 system outages and associated supply interruptions, were comprehensively evaluated, and analyzed. This was done to appropriately categorize the different types of system outages, and to validate JPS's reliability calculations, proposed 2022 SAIFI, SAIDI and CAIDI values, and 2022 Q-Factor.

**JPS Adjustments to the 2022 Outage Dataset**

**9.11.10** The OUR's review of the 2022 Outage Dataset (Ventyx and OSI) identified several issues in the records/entries, more so, with the OSI OMS data. Some of the major issues include:

a) The revised OSI OMS Calibrated Data ("JPS 2022 OMS Dataset FinalRevision1") submitted by JPS on 2023 June 14", was found to be incomplete, noisy, and inconsistent in many aspects. Specifically, some of these issues involve outage events which were not linked to a specific feeder or parish/service area as well as numerous outage data records that were not clearly defined and their relationship/connection with the relevant reliability indicators were not clearly established. Based on these revelations, the OUR surmised that these issues may have been caused by factors such as human error, limitations in the OMS and related network devices, or flaws in the outage data collection process. Regardless, these are problematic issues that implicates JPS's outage management process, and as such, these identified deficiencies need to be urgently sorted out by the company.

b) The revised OSI OMS Calibrated Data was also found to contain 1,320 more outage events than the version (defined as "Annex I – Calibrated OSI Data) that was included in the original 2022 outage dataset as part of the 2023 Annual Review Application. However, no basis or explanation for this deviation was provided by JPS.

c) The representation of some cases of non-Reportable outages in the dataset lacks clarity. For example, there were 422 forced outages with cause identified as "Disconnection" and flagged as "non-Reportable", however, no specific description of the nature of the disconnection was included.

d) There are cases where forced outages classified as non-Reportable (due excessive customer count) were linked to certain outages causes, which logically bears no connection with the condition of "excessive customer count".

e) The dataset indicates that 15,064 forced outages were classified as being Non-Reportable by JPS, yet there were only 4,533 cases where data calibration rules were applied. No explanation was provided for this discrepancy.

f) The dataset shows that 1,149 forced outages were initiated from generation facilities (JPS and IPPs) with all the outage causes reported as "Generation Shortfall". However, the specific cause of the generation shortfall in each case was not stated. This omission constrained the OUR in verifying the occurrence of the outage and the resulting supply interruptions.

g) Based on the OUR's observations, a significant number of outage events were identified in the 2022 Calibrated Data with amended data points. However, the actual modifications to the Raw Data to produce the Calibrated Data, were not clearly identified in the dataset. Also, the specific reasons for the amendments were not stated, which does not reflect transparency in the process. On this matter, it must be reiterated that the OUR has consistently highlighted this issue, which clearly is not being addressed. With the implementation of the new OSI OMS, the understanding was that these issues and other deficiencies would have been eliminated, but 2022 outage dataset indicates they are still present. This issue needs to be addressed by JPS.

**Adjustment/Calibration of Raw Outage Data by JPS**

**9.11.11** As with previous reliability performance measurements, JPS derived the 2022 quality indices from the "Calibrated Data" (2022 Outage Dataset) and not the raw OMS outage data. This according to JPS is because the application of data calibration/normalization procedures ("Rules-based Data Dictionary") excluded some of the recorded outage events that were linked to factors, such as abnormal system operating conditions, non-utility related outages, erroneous "customer-to-device" mapping, and gaps in outage data records caused by OMS/GIS interface dysfunction. The adjustments made to the Raw Data by JPS, as reflected in the Calibrated Data, generally involves:

a) Inclusion of additional information for each outage record contained in the Raw Data.
b) Amendments to the outage information for some forced outage events.

**9.11.12** As compiled, the Calibrated Data contains additional data elements and indicators for each outage record, including the name of the distribution feeder to which each outage event was assigned, the system customer count, the data calibration rule applied, the primary/secondary cause of each outage; as well as derived quantities, such as the respective SAIFI and SAIDI.

## Categorization of the 2022 Annual Outage Dataset

**9.11.13** As currently configured, the 2022 Annual Outage Dataset contains multiple data points. However, for simplicity, the encapsulated data is summarized as shown in Table 9.5 below.

**Table 9.5: Summary Description of 2022 Outage Dataset**

| 2022 ANNUAL OUTAGE DATASET (SUMMARY) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CALIBRATED DATA | TOTAL SYSTEM OUTAGES | NUMBER OF FORCED AND PLANNED OUTAGES | | OUTAGE EVENTS BY SYSTEM SEGMENT (Forced & Planned) | | | MOMEMTARY vs SUSTAINED | | REPORTABLE vs NON-REPORTABLE | |
| | | Forced | Planned | Gen. | Trans. | Dist. | Momentary | Sustained | Reportable | Non-Rept. |
| VENTYX | 8,863 | 8,390 | 473 | 148 | 116 | 8,599 | 494 | 8,369 | 7,453 | 1,410 |
| OSI OMS | 98,800 | 96,558 | 2,242 | 1,001 | 1,611 | 96,188 | 13,984 | 84,816 | 84,938 | 13,862 |
| TOTAL | 107,663 | 104,948 | 2,715 | 1,149 | 1,727 | 104,787 | 14,478 | 93,185 | 92,391 | 15,272 |
| | RANGE OF CUSTOMERS AFFECTED DURING OUTAGE EVENTS | | OUTAGE DURATIONS (Minutes) | | | | RANGE OF CUSTOMER MINUTES LOST (CML) | | | |
| | Minimum | Maximum | Minimum | Maximum | | | Minimum | | Maximum | |
| VENTYX & OSI OMS | 1 | 29,222 | 0.00 | 81,713.88 | | | 0.00 | | 28,669,559.84 | |

## Review of JPS Non-Reportable Outages

**9.11.14** As indicated in Table 9.5 above, 15,272 (14.19%) out of the total number system outages (107,663) recorded for 2022, were classified by JPS as "Non-Reportable" outages. Of these Non-Reportable outages, 15,064 were identified as forced outages, which exceeded the established 5% limit. Recognizing the increasing trend in these "Non-Reportable" outages, the OUR had indicated to JPS that the results are untenable, and it needs to take urgent action to curtail the worsening situation, but apparently seemingly, the issue is not being addressed. The number of forced outages classified as Non-Reportable by JPS for the years 2019-2022 are represented in Table 9.6 below.

**Table 9.6: JPS Non-Reportable Forced Outages for 2019-2022**

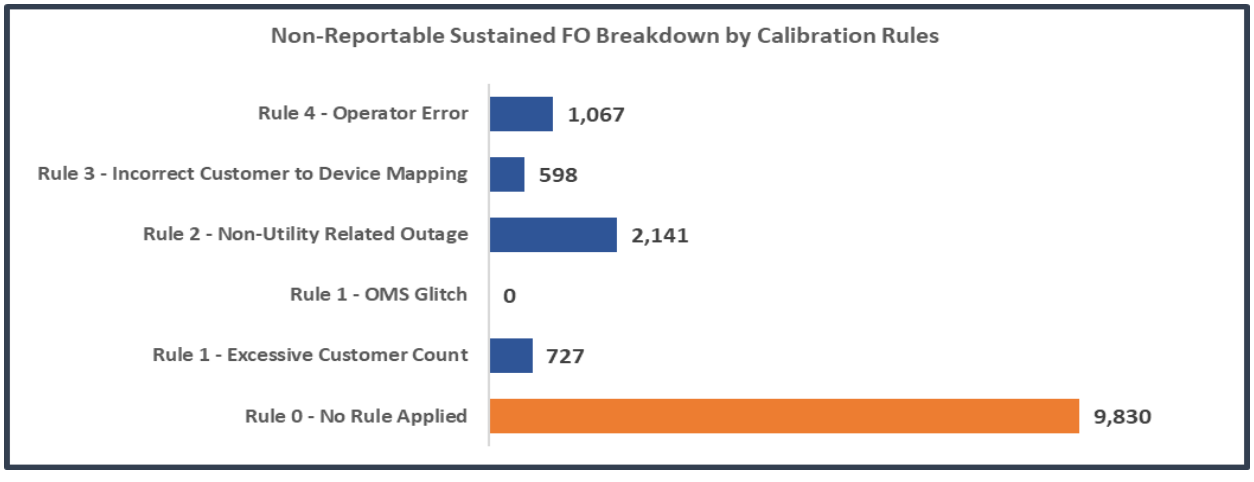
| NON-REPORTABLE FORCED OUTAGES (2019-2022) | | | | | |
|---|---|---|---|---|---|
| **Year** | **Total FO** | **Reportable FO** | **% of Total** | **Non-Rep FO** | **% of Total** |
| 2019 | 49,243 | 44,389 | 91.10% | 4,854 | 9.86% |
| 2020 | 60,764 | 57,726 | 95.00% | 3,038 | 5.00% |
| 2021 | 66,499 | 57,333 | 86.22% | 9,166 | 13.78% |
| **2022** | **104,948** | **89,884** | **85.65%** | **15,064** | **14.35%** |

**9.11.15** Based on the system outage reporting rules established by the OUR and JPS, an outage event is designated "non-Reportable" when certain types of errors are linked to that outage event. However, during the 2014-2019 Rate Review period, the OUR observed that the number non-Reportable outages had increased to almost 10% annually, causing some degree of distortion in the relevant Q-Factor calculations, applicable to that review period. To incentivize JPS to remedy this problem, the Office in the 2019-2024 Rate Review Determination Notice, established the **5%** limit for non-Reportable forced outages (sustained) each year. This means that from 2020, going forward, the forced outage events classified as "Reportable" shall at a minimum, account for 95% of total forced outages for the purpose of the Q-Factor measurements. Considering this criterion, the OUR carried-out a thorough examination of the designated 2022 "non-Reportable" forced outages, which validated that JPS 14,363 sustained forced outages were classified as "Non-Reportable" by JPS, representing 15.89% of the total 2022 sustained forced outages. As the data shows, this proportion has breached the stipulated 5% limit by a margin of 218%.

**9.11.16** In absolute terms, a total of 14,363 sustained forced outages (IPP FO excluded) in the 2022 outage dataset, were classified as "non-Reportable". This according to JPS was due its application of the established calibration rules ("Data Dictionary" rules) to certain outage causes/conditions. Due to this classification, these outages were excluded from the JPS's 2022 reliability measurements. However, this creates a conflict with the number of reported cases for which the data calibration rules were applied (4,533). This is a major discrepancy in the outage data calibration process and the approach to determine an outage is non-Reportable, but no explanation on the situation was provided by JPS.

**9.11.17** The breakdown of the 2022 non-Reportable by calibration rules is shown in Figure 9.3 below.

**Figure 9.3: Breakdown of 2022 Non-Reportable Sustained Forced Outages by Calibration Rules**



### OUR's Review of JPS 2022 Daily System Customer Count Data

**9.11.18** The system customer count is a key input used in the reliability calculations required for determining the Q-Factor. For this reason, the accuracy of this parameter, particularly the "daily system customer count", is critical for ensuring that the computed quality indices are reasonable and representative. As such, it is imperative that the necessary data validation is done, as the use of incorrect customer count is likely to produce inaccurate Q-Factor results, which could have financial implications for the utility or ratepayers.

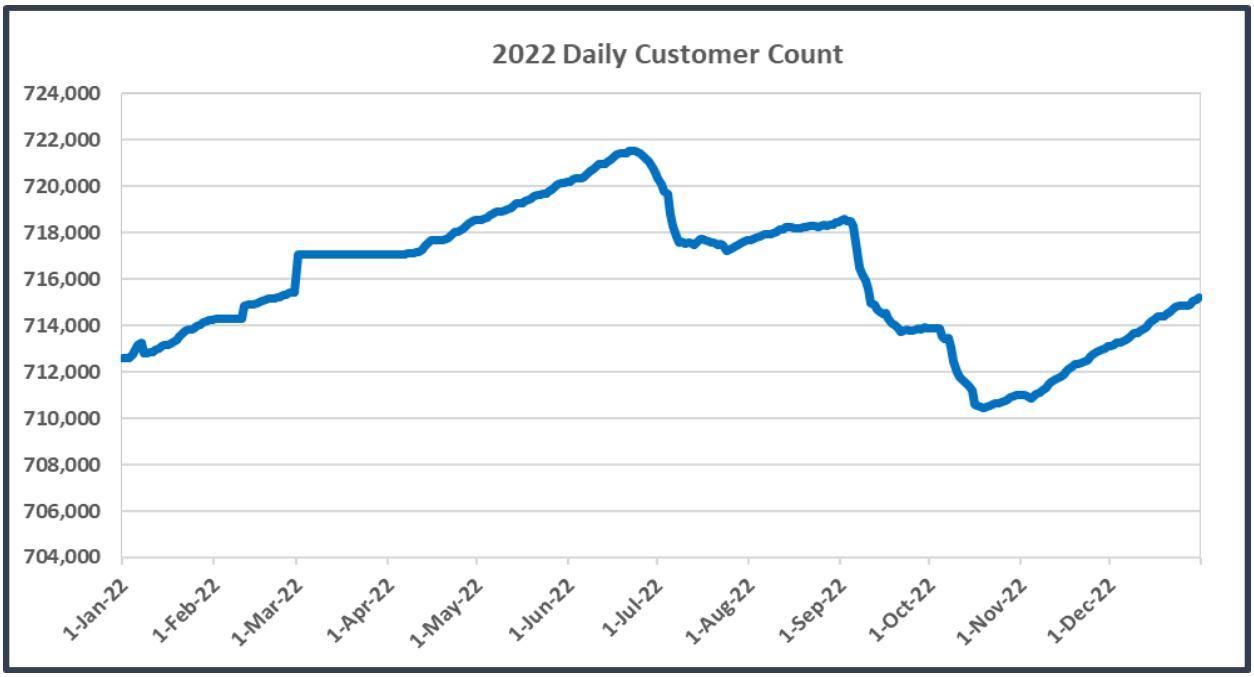
**9.11.19** With respect to the 2022 system customer count, the data records in the 2022 Annual Outage Dataset indicate that each of the outages recorded for 2022 (January 1 - December 31), was assigned the "daily customer count" for the specific day on which that outage was initiated. This is a critical requirement, which must be satisfied to guarantee the accuracy and precision of the computed reliability metrics. The customer count data included in the 2022 Outage Dataset is summarized in Table 9.7 below.

**Table 9.7: 2022 Outage Dataset Daily Customer Count Statistics**

| JPS DAILY CUSTOMER COUNT SUMMARY STATISTICS - 2022 OUTAGE DATA | | | | | | |
|---|---|---|---|---|---|---|
| MINIMUM | MAXIMUM | AVERAGE | AVG. DAILY Δ | MAX. DAILY Δ | COUNT @ 2021JAN01 | COUNT @ 2022DEC31 |
| **710,442** | **721,534** | **716,022** | **7** | **1,656** | **712,575** | **715,196** |

**9.11.20** JPS has indicated that the new Electra OMS is fully synchronized with the CIS and is now being updated in real time. According to JPS, these daily customer counts include "Active" customer accounts in the CIS, including prepaid, disconnected, and suspended accounts. But, "Inactive Accounts", comprising "Terminated Accounts" (inclusive of accounts terminated by customers' request, expiration of temporary accounts and disconnected accounts in a suspended state after one (1) year), are not included in the daily customer count numbers. A plot of JPS's OMS 2022 daily system customer count is exhibited in Figure 9.4 below.

**Figure 9.4: JPS OMS 2022 System Daily Customer Count Profile**




**Perceived Inconsistency in JPS's Reported Customer Count Data**

**9.11.21** During this 2023 Annual Review, the issue of inconsistency with customer count data source has come back into focus. The situation is that there are significant disparities with the customer count data included in the 2022 Outage Dataset and those reported in other JPS submissions to the OUR. Some of these inconsistencies are shown in Table 9.8 below.

**Table 9.8: JPS System Customer Count across Data Sources**

| 2022 SYSTEM CUSTOMER COUNT ACROSS DIFFERENT DATA SOURCES | | | | | |
|---|---|---|---|---|---|
| **Year/Month** | **JPS 2022 Outage Dataset (OMS)** | **JPS 2022 Fuel Reports** | **JPS 2022 Final Dataset** | **Variance (OMS vs 2022 Fuel Reports)** | **Variance (OMS vs 2022 Final Dataset)** |
| 2022 January | 714,230 | 690,462 | 690,462 | 23,768 | 23,768 |
| 2022 February | 715,425 | 691,790 | 691,789 | 23,635 | 23,636 |
| 2022 March | 717,081 | 692,598 | 692,598 | 24,483 | 24,483 |
| 2022 April | 718,533 | 670,535 | 670,535 | 47,998 | 47,998 |
| 2022 May | 720,208 | 673,068 | 671,986 | 47,140 | 48,222 |
| 2022 June | 720,620 | 673,195 | 673,264 | 47,425 | 47,356 |
| 2022 July | 717,668 | 675,119 | 675,117 | 42,549 | 42,551 |
| 2022 August | 718,459 | 676,365 | 676,364 | 42,094 | 42,095 |
| 2022 September | 713,893 | 678,831 | 678,829 | 35,062 | 35,064 |
| 2022 October | 710,986 | 683,205 | 683,203 | 27,781 | 27,783 |
| 2022 November | 713,084 | 681,929 | 681,927 | 31,155 | 31,157 |
| 2022 December | 715,196 | 682,837 | 682,835 | 32,359 | 32,361 |

**9.11.22** Notably, this issue was raised with JPS, as part of the OUR's request for clarification/additional information in relation to the 2022 Annual Review Filing. In its response, JPS proclaimed that the reported customer counts across the different data sources are accurate and do not constitute an inconsistency in the data, for the following reasons:

- The Customer Count reported in the Final Dataset relates to "Billed Customers."
- The reported Customer Count relates to "Active Customers".
- Both datasets were retrieved from the CIS at different intervals.

**9.11.23** JPS also asserted that the "daily system customer count" used to calculate the quality indices is retrieved at 12:00am daily from the CIS, and it comprises all customers with an "Active" account status, which may be either billed (charged/invoiced), or unbilled (not yet invoiced). JPS further noted that the Billed Customers reported in the Final Dataset is retrieved once per month, at the end of a billing period, and refer to accounts that have been charged/invoiced which may have an "Active", "Final" or "Inactive". In summary, JPS posited that the "daily system customer count" can be described as a snapshot at a given point in time of the actual month's data, while Billed Customers provide a representation of the customer count for the month, taking into account all customer activities (e.g. accounts activated and accounts terminated) that occurred within the respective billing period (e.g. January 1-31).

**9.11.24** Notwithstanding, it appears that there is some degree of contradiction in JPS's explanation. That is, if all the customer count data presented in the different JPS reports is retrieved from the CIS, then the data extracted at intervals, such as the end of each month, should largely be in alignment, but JPS's clarification seems to be saying otherwise. Further, JPS reasoning seemed to suggest that the customer count in the Annual Final Datasets would normally be higher than that in the Annual Outage Dataset, but the opposite has been observed in the data over the past years, As manifested in the 2022 data, there were also differentials for 2019-2021 and previous years.

**9.11.25** From a practical standpoint, it is understandable that daily variations in the system customer count is an intrinsic feature of JPS's utility operations due to the dynamics relating to service accounts, as well as constraints involving the synchronization of the relevant databases/platforms to ensure accurate updating of daily customer count in real time. However, the deployment of the new OSI OMS (early 2022) which is now fully integrated with the CIS, this setup, should provide advanced capabilities for detecting and eliminating any embedded systemic errors, thus ensuring greater accuracy, consistency and convergence in the collection, and reporting of system customer count data. In addition, it is important to highlight that the indicated variations in the customer count data are a recipe for errors in the computed quality indices, which can potentially compromise the credibility of the determined Q-Factor adjustment. Considering the potential adverse effects, this issue needs to be given serious attention, and JPS in the capacity of Single Buyer/System Operator, should ensure that the reported customer count data are appropriately verified, audited, and reconciled for regulatory reporting on an ongoing basis.

**9.11.26** Given these considerations, and to ensure clarity and transparency in the reliability performance measurement process, JPS shall provide a detailed breakdown of the CIS/OMS customer count data used in the prescribed quality indices computations, by customer categories and status, as part of the Q-Factor reporting requirements.

**OUR's Evaluation of the 2022 Forced Outage Data**

**9.11.27** In the 2023 Annual Review Application, JPS proposed that the 2022 SAIFI, SAIDI and CAIDI to be used for the 2022 quality of service measurements should be 7.5 (interruption/customer), 1,983.8 (minutes/customer), and 266.1 (minutes/interruption), respectively. As indicated in the submission, these indices were derived from the "Reportable" sustained/forced outages reported in the 2022 outage dataset. The underlying number of sustained forced outages was checked by the OUR and verified to be 76,021, as shown in the 2022 2022 system forced outage breakdown shown in Table 9.9 below.

**Table 9.9: 2022 Forced Outages Breakdown**

| 2022 SYSTEM FORCED OUTAGES CATEGORIZATION/BREAKDOWN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TOTAL SYSTEM OUTAGES (Forced & Planned) | | | SYSTEM FORCED OUTAGES (Momentary & Sustained) | | | SYSTEM FORCED OUTAGES (Reportable & Non-Reportable) | | |
| **Total** | **Planned** | **Forced** | **Total** | **Momentary** | **Sustained** | **Total** | **Reportable** | **Non-Reportable** |
| **107,663** | **2,715** | **104,948** | 104,948 | 13,883 | **91,065** | 104,948 | 89,884 | **15,064** |
| | | | | | | | | |
| **BREAKDOWN OF 2022 FORCED OUTAGES** | | | | | | | | |
| SUSTAINED FORCED OUTAGES | | | SUSTAINED FORCED OUTAGES [IPP FO Excluded] | | | IPP SUSTAINED FORCED OUTAGES | | |
| **Total** | **Reportable** | **Non-Reportable** | **Total** | **Reportable** | **Non-Reportable** | **Total** | **Reportable** | **Non-Reportable** |
| **91,065** | 76,700 | **14,365** | 90,384 | **76,021** | **14,363** | 681 | 679 | **2** |

**9.11.28** In the process of evaluating JPS's 2022 Q-Factor proposals, the OUR performed its own quality of service calculations using the total 2022 "Reportable" sustained/forced outages (IPP FO excluded).

### Non-Reportable Forced Outages Considerations

**9.11.29** As previously indicated, the number of non-Reportable forced outages reported for 2022 has significantly exceeded the established limit of 5%, which means that excess outages should be incorporated in the 2022 reliability measurements/calculations. However, having regard to the reported issues that emerged from the transition to the new OSI OMS in 2022 February – March, and the related post implementation challenges, and while the company may not have been sufficiently diligent in managing transition process, the OUR is of the view that the nature of some of the reported problems, would have disturbed the existing data calibration/normalization process that determines whether a particular should be classified as being Non-Reportable. Given the circumstances, the OUR's position is that it would not be reasonable to incorporate the non-Reportable sustained forced outages more than the 5% threshold in the calculation of the 2022 quality indices.

**9.11.30** Notwithstanding, the exclusion of the excess non-Reportable outages does not relieve JPS of its performance requirement under the Q-Factor scheme for 2022.

**9.11.31** Accordingly, the 2022 Q-Factor will be determined based on the Reportable outages included in the 2022 Annual Outage Dataset (refer to Table 9.10 below).

**Table 9.10: 2022 Sustained Forced Outage used in OUR's 2022 Q-Factor Calculations**

| 2022 SUSTAINED FORCED OUTAGES USED IN OUR 2022 Q-FACTOR CALCULATIONS | | | | | |
|---|---|---|---|---|---|
| Description | Total Sustained FO | Non-Reportable Sustained FO at 5% Limit | Non-Reportable Sustained FO in Excess of 5% Limit | Total Non-Reportable Sustained FO | Reportable Sustained FO used in OUR Q-Factor Calculations |
| **2022 Sustained FO** | **90,384** | 4,519 | 9,844 | **14,363** | **76,021** |
| **Relative Proportions** | **100.0%** | 5.0% | 10.89% | **15.89%** | **95.0%** |

## Treatment of IPP Forced Outages in the Q-Factor Calculations

**9.11.32** Based on the established Q-Factor principles, JPS shall not be penalized under the Q-Factor scheme for IPP related generation outages (sustained and/or momentary), unless the cause of such outages is due to conditions arising from JPS's action or inaction. The OUR's review of the 2022 system outage data found no IPP related outage that could be attributed to JPS. As such, all IPP-related forced outages (Reportable & Non-Reportable) listed in the 2022 Annual Outage Dataset, were excluded from the relevant 2022 Q-Factor calculations. A breakdown of the 2022 IPP-related forced outages is provided in Table 9.11 below.

**Table 9.11: 2022 IPPs Related Forced Outages and Reliability Indicators**

| 2022 IPPs FORCED OUTAGES AND RELATED RELIBILITY INDICATORS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| YEAR | IPP FORCED OUTAGES | IPP FO (Momentary & Sustained) | | IPP SUSTAINED FO (Reportable & Non-Reportable) | | **SAIFI** (Interruptions/ Customer) | **SAIDI** (Minutes/ Customer) | **CAIDI** (Minutes/ Interruption) | **MAIFI** (Interruptions/ Customer) |
| | Total | Moment. | Sustained | Reportable | Non-Rept. | | | | |
| 2020 | **991** | - | - | 884 | 7 | 4.038 | 87.436 | 21.655 | 1.122 |
| 2021 | **725** | 191 | 534 | 507 | 27 | 1.940 | 64.070 | 33.100 | 0.405 |
| **2022** | **960** | 279 | 681 | 679 | 2 | **1.478** | **30.531** | **20.662** | **0.690** |

**9.11.33** While the IPP forced outages are not featured in the existing Q-Factor scheme, the related reliability indices are recognized as key indicators of the quality-of-service impact of these outages. As shown in Table 9.11, there was an increase in IPP-related forced outages in 2022 relative to 2021, but nonetheless, yielded further improvements in the SAIFI, SAIDI and CAIDI indicators compared to the 2021 levels.

## 9.12 OUR's 2022 Quality Indices

**9.12.1** Using the applicable 2022 outage data inputs, specifically, the number/duration of supply interruptions linked to the allowed forced outages, and associated customer count, the OUR computed the 2022 quality indices required for the 2022 "Quality of service" measurements defined in the Licence. The OUR's computed 2022 quality indices are presented in Table 9.12 below.

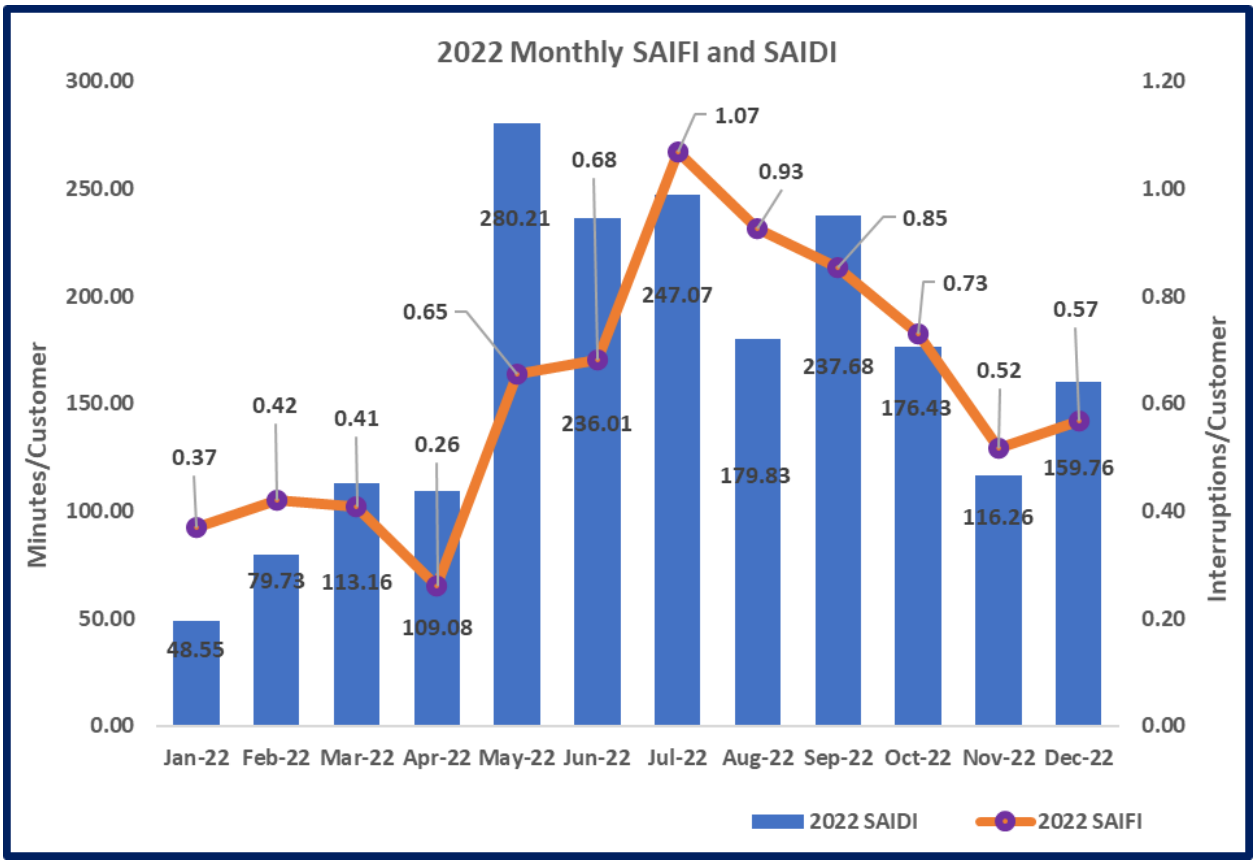
**Table 9.12: OUR Determined 2022 Quality Indices**

| OUR/JPS 2022 QUALITY INDICES (IPP FO EXCLUDED) | | | | |
|---|---|---|---|---|
| **Index** | **Unit** | **JPS Calculated Indices Reportable Sustained FO** | **OUR Calculated Indices Reportable Sustained FO** [Used for 2022 Q-Factor] | **Variance in Indices (OUR vs JPS)** |
| **SAIFI** | Interruptions/Customer | 7.5 | **7.5** | 0.0% |
| **SAIDI** | Minutes/Customer | 1,983.8 | **1,983.8** | 0.0% |
| **CAIDI** | Minutes/Interruption | 266.1 | **266.1** | 0.0% |

**9.12.2** As indicated, the OUR's computed 2022 SAIFI, SAIDI, and CAIDI, are identical to those proposed by JPS. The convergence of the results was mainly because there was no deviation in the number of Reportable forced outages used in the calculation of the quality indices, and the excess non-Reportable sustained forced outages were not allowed in the computations.

**9.12.3** Taking into consideration, the limits of error in the reported outage data and related reliability calculations, the OUR applied the computed 2022 SAIFI (7.5 interruptions/customer), SAIDI (1,938.8 minutes/customer), and CAIDI (266.1 minutes/interruption), to derive the 2022 Q-Factor, required for determining the "RC2022(1+dPCI)" component of the 2023 ART. A more granular view of the system reliability performance in 2022, in terms of the 2022 monthly SAIFI and SAIDI indicators, is provided in Figure 9.5 below.

**Figure 9.5: Variation in Monthly SAIFI and SAIDI during 2022**




## 9.13 Our Determination of the 2022 Q-Factor

**9.13.1** To determine the 2022 Q-Factor, the OUR computed SAIFI, SAIDI, and CAIDI values were measured against the corresponding 2022 SAIFI, SAIDI, and CAIDI targets approved in the 2019-2024 Rate Review Determination Notice, subject to the quality-of-service performance criteria and Q-Factor adjustment system defined under Schedule 3 (Exhibit 1) of the Licence 2016. The results from these measurements are presented in Table 9.13 below.

**OUR's Derivation of 2022 Q-Factor**

**9.13.2** As currently structured, the Q-Factor system involves the application of defined "quality points" based on specified performance levels of SAIFI, SAIDI and CAIDI relative to targets, to generate "cumulative quality points scores" from a specified range, which are then used to determine the annual Q-Factor. Following the described procedures/process, this model was executed by OUR to determine the 2022 Q-Factor as demonstrated in Table 9.13 below.

**Table 9.13: OUR's 2022 "Quality of Service" Measurement and Q-Factor Derivation**

| OUR 2022 QUALITY OF SERVICE MEASUREMENT AND 2022 Q-FACTOR ADJUSTMENT | | | | | | |
|---|---|---|---|---|---|---|
| **DESCRIPTION** | **ADJUSTMENT PERIOD** | **SAIFI (Interruptions/ Customer)** | **SAIDI (Minutes/ Customer)** | **CAIDI (Minutes/ Interruptions)** | **TOTAL QUALITY POINTS** | **Q-FACTOR** |
| Q-Factor Baseline | 2019-2024 | 12.9 | 1,582.0 | 122.7 | | |
| **Office Approved 2022 Targets** | **2023-2024** | **11.2** | **1,344.7** | **120.2** | | |
| Q-Factor Points Criteria (Schedule 3 of Licence) | | (10% < Target) **= 3 quality points** | (10% < Target) **= 3 quality points** | (10% < Target) **= 3 quality points** | | |
| Q-Factor Points Criteria (Schedule 3 of Licence) | | (+ or – 10% of Target) **= 0 quality points** | (+ or – 10% of Target) **= 0 quality Points** | (+ or – 10% of Target) **= 0 quality points** | | |
| Q-Factor Points Criteria (Schedule 3 of Licence) | | (10% > Target) **= - 3 quality points** | (10% > Target) **= - 3 quality points** | (10% > Target) **= - 3 quality points** | | |
| JPS 2022 Reliability Performance | | 7.5 | 1,983.8 | 266.1 | | |
| JPS 2022 Quality Indices Relative to Targets | | **- 33.2%** | **47.5%** | **121.3%** | | |
| 2022 Performance Outcome | | **< 10% Below Target** | **> 10% Above Target** | **> 10% Above Target** | | |
| 2022 Performance vs Targets | | **3** | **- 3** | **- 3** | **- 3** | |
| | | | | | | |
| **Q-FACTOR for cumulative quality points score of -3** | **2023-2024** | | | | | **- 0.25%** |

**9.13.3** As indicated in Table 9.13 above, the quality points applied to the 2022 SAIFI, SAIDI and CAIDI values (OUR calculated), are **3, -3,** and **-3** respectively, summing to **-3**. Based on the defined "quality points scoring system", for a cumulative score of -3, the adjustment factor, **Q = -0.25%** (refer to Figure 9.6**)**. Intuitively, this means that the 2022 Q-Factor is **-0.25%,** which represents the adjustment to be applied to the "$RC_{2022}(1+dPCI)$" component of the 2023 ART, at this 2023 Annual Review.

**Figure 9.6: "Quality of Service" Performance Criteria/Q-Factor Quality Points System**

**Exhibit 1, Schedule 3 of JPS 2016 Electricity Licence**

Until revision by the Office the quality of service performance should be classified into three categories, with the following point system:

- Above Average Performance (Greater than 10% below target) — would be worth 3 Quality Points on either SAIFI, SAIDI or CAIDI;
- Dead Band Performance (+ or – 10% of target) — would be worth 0 Quality Points on either SAIFI, SAIDI or CAIDI; and
- Below Average Performance (Greater than 10% above target) — would be worth -3 Quality Points on SAIFI, SAIDI or CAIDI.

Until revision by the Office, the adjustment factors that would be assigned to cumulative quality points scores for the three reliability indices as follows. If the sum of quality points for:

- SAIFI, SAIDI, and CAIDI is 9, then Q = +0.50%
- SAIFI, SAIDI, and CAIDI is 6, then Q = +0.40%
- SAIFI, SAIDI, and CAIDI is 3, then Q = +0.25%
- SAIFI, SAIDI, and CAIDI is 0, then Q = 0.00%
- SAIFI, SAIDI, and CAIDI is -3, then Q = -0.25%
- SAIFI, SAIDI, and CAIDI is -6 then Q = -0.40%
- SAIFI, SAIDI, and CAIDI is -9 then Q = -0.50%

## 9.14 Reliability Performance Across the Power System

**9.14.1** In the process of measuring "quality of service" performance of electric utilities generally, using reliability metrics, such as SAIFI, SAIDI and CAIDI, a major shortcoming of such approach is that these are indices that only measure average system-wide reliability performance, and do not necessarily convey discrete service quality information, such as the disparities in supply reliability across the various service areas/regions served by the electricity system. It is recognized that in some cases, some degree of variations in supply reliability across service areas may be unavoidable due to the geographical orientation of the service territories, and the configuration of the power system, among other factors. However, it should be acknowledged that the electricity network (T&D) is inherently a communal asset, that is, it is expected to provide the same level of electricity service to all customers, or to all customers within a defined area. Accordingly, the configuration of the supply network should be such that it does not easily differentiate between the electricity needs of customers in different service areas. In ensuring adherence to this condition, the electric utility must deliver service at an acceptable threshold to all customers and legitimate system users dispersed across the country. In that context, the relevant quality of service performance requirements developed for the utility must seek to assure the provision of acceptable service levels to customers on a sustained basis, through optimized system operation and reliability reinforcements.

## Variation in Reliability Performance across Service Areas

**9.14.2** In the case of JPS operations, the available historical outage data has shown a wide variation in reliability performance across services areas, with some regions, especially rural areas, experiencing extremely poor service reliability, as exhibited by the defined quality of service metrics. The submitted 2022 outage data also show a similar pattern. Of note, the Annual Outage Datasets submitted by JPS contain locational data for each outage event, which includes the parish and the specific feeder associated with that specific outage event. This information has allowed the OUR to assess the reliability performance across the different parishes and major service areas of the country, and across distribution feeders. As part of this assessment, the OUR connects outages to the affected parish/service area and estimates the corresponding reliability performance for each parish/service area, in terms of SAIFI and SAIDI. Applying this approach to the 2022 outage dataset, the OUR identified the number of outages, and corresponding SAIFI & SAIDI for each parish/major service area across the island, as shown in Table 9.14 below.

**Table 9.14: Forced Outages and related SAIFI, SAIDI & MAIFI per Parish/Service Area for 2022**

| NUMBER OF FORCED OUTAGES AND ESTIMATED SAIFI, SAIDI & MAIFI PER PARISH/REGION FOR 2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Parish/ Service Area | Total FO | Total FO (Sustained) | Total FO (Momentary) | SAIDI | SAIFI | MAIFI | REMARKS |
| Clarendon | 8,084 | 6,747 | 1,337 | 159.700 | 0.662 | 7.778 | |
| Hanover | 4,049 | 3,230 | 819 | 151.314 | 0.306 | 0.974 | |
| KSAN | 11,370 | 10,499 | 871 | 150.258 | 0.614 | 1.251 | |
| KSAS | 5,896 | 4,935 | 961 | 38.881 | 0.266 | 1.290 | |
| Manchester | 6,009 | 5,609 | 400 | 126.631 | 0.567 | 2.313 | |
| Portland | 2,880 | 2,737 | 143 | 43.962 | 0.226 | 0.406 | |
| Portmore | 4,202 | 3,971 | 231 | 57.594 | 0.218 | 0.462 | |
| St. Ann | 11,916 | 8,282 | 3,634 | 184.598 | 0.746 | 11.470 | |
| St. Catherine | 8,946 | 8,357 | 589 | 195.365 | 0.636 | 1.774 | |
| St. Elizabeth | 6,421 | 6,225 | 196 | 125.630 | 0.721 | 0.747 | |
| St. James | 12,832 | 11,858 | 974 | 262.418 | 1.068 | 1.856 | Worst Performance. |
| St. Mary | 8,224 | 6,685 | 1,539 | 188.847 | 0.422 | 1.475 | |
| St. Thomas | 2,909 | 2,785 | 124 | 64.386 | 0.253 | 0.363 | |
| Trelawny | 5,217 | 4,318 | 899 | 78.347 | 0.266 | 1.441 | |
| Westmoreland | 5,721 | 4,624 | 1,097 | 148.341 | 0.432 | 2.638 | |
| Unnamed Parish | 272 | 203 | 69 | 7.488 | 0.053 | 0.307 | |
| TOTAL | 104,948 | 91,065 | 13,883 | 1,983.8 | 7.456 | 36.544 | |

**9.14.3** As indicated in Table 9.14, the parish of St. James experienced the worst quality of service in terms of the number of forced outages, SAIFI and SAIDI in 2022, like the outcome in 2021. This is quite revealing as there have been numerous complaints from customers in this parish of frequent and extended electricity supply interruptions since 2021, which apparently have continued to the end 2022. These indications appear to corroborate the claims made by customers in this parish, and therefore will be the focus of the OUR's ongoing review of the quality of service in the north coast area of the country.

**9.14.4** Further, as can be seen, JPS service quality levels varied significantly across the different parishes/service areas during operation in 2022 in a similar way to the profile in 2021. The data also shows that on average, customers in the service areas of St. James, KSAN, St. Catherine and St. Ann, experienced approximately four (4) times more outages and much higher supply interruption durations as in other parishes. The OUR's assessment also found that 272 forced outages were not linked to a parish/service area (or region) in JPS's OSI Calibrated Data for 2022 March-December (JPS 2022 OMS Dataset Final Revision 1). This void created problems for the analysis as the OUR could not map these outages to the appropriate service area or region. These issues need to be rectified by JPS going forward.

**9.14.5** Based on these indications, it must be highlighted that while the service quality in some areas/regions have improved over the years, the reliability in other service areas continues to be very poor and lies below acceptable standards. In that regard, the company needs to take urgent action to address the obvious disparities in service quality/reliability across the defined service territories.

Reliability Performance across Distribution Feeders

**9.14.6** As part of the OUR's evaluation of JPS's 2022 quality of service performance, the reliability performance across the distribution feeders was also assessed. This assessment found that the forced outages (FO) that resulted in electricity supply/service interruptions in 2022 were associated with 113 distribution feeders. During the evaluation process, the ten (10) worst performing feeders (highest number of FO) and the ten (10) top performing feeders (lowest number of FO), were identified and analyzed. The list of these feeders and the related outage statistics/reliability indicators are presented in Table 9.15 below.

**Table 9.15: List of Ten (10) Worst and Best Performing Distribution Feeders in 2022**

| LIST OF TEN (10) WORST AND BEST PERFORMING DISTRIBUTION FEEDERS IN 2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10 WORST PERFORMING FEEDERS IN 2022 | | | | | | | |
| # | FEEDER | OUTAGE STATISTICS | | | RELIBILITY METRICS (Reportable FO) | | |
| | | Sustained FO | Momentary FO | Total FO | SAIDI | SAIFI | MAIFI |
| 1 | Cardiff Hall 310 | 3,204 | 1,900 | 5,104 | 81.0487 | 0.3589 | 7.550684 |
| 2 | Bogue 310 | 3,614 | 167 | 3,781 | 72.2381 | 0.3172 | 0.347071 |
| 3 | May Pen 110 | 2,804 | 544 | 3,348 | 101.6627 | 0.4096 | 6.006407 |
| 4 | Orange Bay 310 | 2,727 | 276 | 3,003 | 141.8646 | 0.2776 | 0.520515 |
| 5 | Bogue 610 | 2,777 | 99 | 2,876 | 69.4147 | 0.2407 | 0.201633 |
| 6 | Constant Spring 410 | 2,771 | 70 | 2,841 | 58.1128 | 0.1901 | 0.089806 |
| 7 | Queens Drive 710 | 2,338 | 315 | 2,653 | 41.9458 | 0.2639 | 0.986545 |
| 8 | Kendal 210 | 2,100 | 177 | 2,277 | 59.4014 | 0.2167 | 1.225456 |
| 9 | Maggotty 110 | 2,197 | 59 | 2,256 | 47.0999 | 0.2144 | 0.232893 |
| 10 | Maggotty 210 | 2,149 | 80 | 2,229 | 45.4684 | 0.3744 | 0.366598 |
| Subtotal | 10 Worst Feeders | 26,681 | 3,687 | 30,368 | 718.257 | 2.864 | 17.528 |
| TOTALS | All Feeders (113) | 91,065 | 13,883 | 104,948 | 1,983.759 | 7.456 | 36.544 |
| % of TOTAL | | 29.30% | 26.56% | 28.94% | 36.21% | 38.41% | 47.96% |
| | | | | | | | |
| 10 BEST PERFORMING FEEDERS IN 2022 | | | | | | | |
| # | FEEDER | OUTAGE STATISTICS | | | RELIBILITY METRICS (Reportable FO) | | |
| | | Sustained FO | Momentary FO | Total FO | SAIDI | SAIFI | MAIFI |
| 1 | Hunts Bay 610 | 5 | 0 | 5 | 0.0629 | 0.0001 | 0.000000 |
| 2 | Rockfort 310 | 0 | 9 | 9 | 0.0000 | 0.0000 | 0.000114 |
| 3 | Hunts Bay 110 | 26 | 1 | 27 | 0.0681 | 0.0003 | 0.000006 |
| 4 | Twickenham 410 | 33 | 14 | 47 | 0.1075 | 0.0008 | 0.002567 |
| 5 | Monymusk 310 | 10 | 38 | 48 | 0.0046 | 0.0000 | 0.000221 |
| 6 | Three Miles 310 | 46 | 5 | 51 | 0.3345 | 0.0005 | 0.005629 |
| 7 | Three Miles 510 | 65 | 10 | 75 | 0.2578 | 0.0011 | 0.007118 |
| 8 | Rose Hall 110 | 67 | 9 | 76 | 0.9837 | 0.0026 | 0.002430 |
| 9 | Hunts Bay 210 | 59 | 39 | 98 | 0.0456 | 0.0010 | 0.034089 |
| 10 | Hunts Bay 410 | 74 | 26 | 100 | 0.2164 | 0.0005 | 0.015018 |
| Subtotal | 10 Best Feeders | 385 | 151 | 536 | 2.081 | 0.007 | 0.067 |
| TOTALS | All Feeders (113) | 91,065 | 13,883 | 104,948 | 1983.759 | 7.456 | 36.544 |
| % of TOTAL | | 0.42% | 1.09% | 0.51% | 0.10% | 0.09% | 0.18% |

**Results and Findings – Analysis of Feeder Reliability in 2022**

**9.14.7** The results and findings of the OUR's analysis on JPS's feeder reliability performance in 2022 are set out below:

a) The 10 worst performing feeders accounted for approximately 29% of the total recorded forced outages in 2022, which is considerably high. Based on the number of sustained and momentary forced outages allowed, their aggregate contribution to the 2022 reliability indices (SAIDI, SAIFI and MAIFI) were 36.2%, 38.4% and 48%, respectively, which by any measure, represents a significant fraction of each of these indicators.

b) Eight (8) of the feeders (numbered in red) in the set of 10 worst performing feeders, were also in the list for 2020 and 2021, and five (5) of the said 8 feeders, have resided in that zone since 2016. This repeated outcome of poor and deteriorating reliability of

the feeders in question, year after year, is a major concern which must be addressed by JPS. Furthermore, where there are proposed capital projects/expenditures related to these feeders, scope and objectives should clearly address the issues raised.

c) There are clear indications that the low reliability levels associated with the listed 10 worst performing feeders, have been a primary source of most of the quality-of-service complaints being logged by customers since the start of the 2019-2024 Rate Review period.

d) With respect to the top 10 performing feeders in 2022, the data shows that the composite accounted for a relatively small number of forced outages for the year (536). Despite doubling the number reported for 2021 (259) but given the significant increase in the number force outages reported for 2022 (104,948), it is still considered to be relatively low at 0.5% of the total forced outages.

e) With respect to the top 10 performing feeders in 2022, the data shows that the composite accounted for a relatively small number of forced outages for the year (536). Despite doubling the number reported for 2021 (259) but given the significant increase in the number force outages reported for 2022 (104,948), it is still considered to be relatively low at 0.5% of the total forced outages.

f) The OUR's review of JPS's OSI Calibrated Data for 2022 March-December (JPS 2022 OMS Dataset Final Revision 1), identified 1,056 forced outages that were not linked to a distribution feeder (no feeder named). This omission constrained the analysis on the 2022 feeder reliability performance, as the OUR was not able connect these forced outages to any of the existing 113 distribution feeders. These outage data quality and completeness issues need to be immediately addressed by JPS.

**9.14.8** The obvious disparity with the 10 worst and best performing feeders that has been demonstrated in Table 9.15 above, provides further evidence of the uneven quality of service being delivered by JPS to customers across the country, where these two distinct sets of feeders, supply most of the service areas experiencing very low reliability levels and those areas receiving acceptable quality of service, respectively. In view of this reliability situation and considering the above-mentioned quality of service issues, JPS in keeping with its Licence 2016 obligation is required to take urgent action to improve the continuing poor and degrading reliability performance of the identified feeders, so to avert the resulting adverse effects on customers.

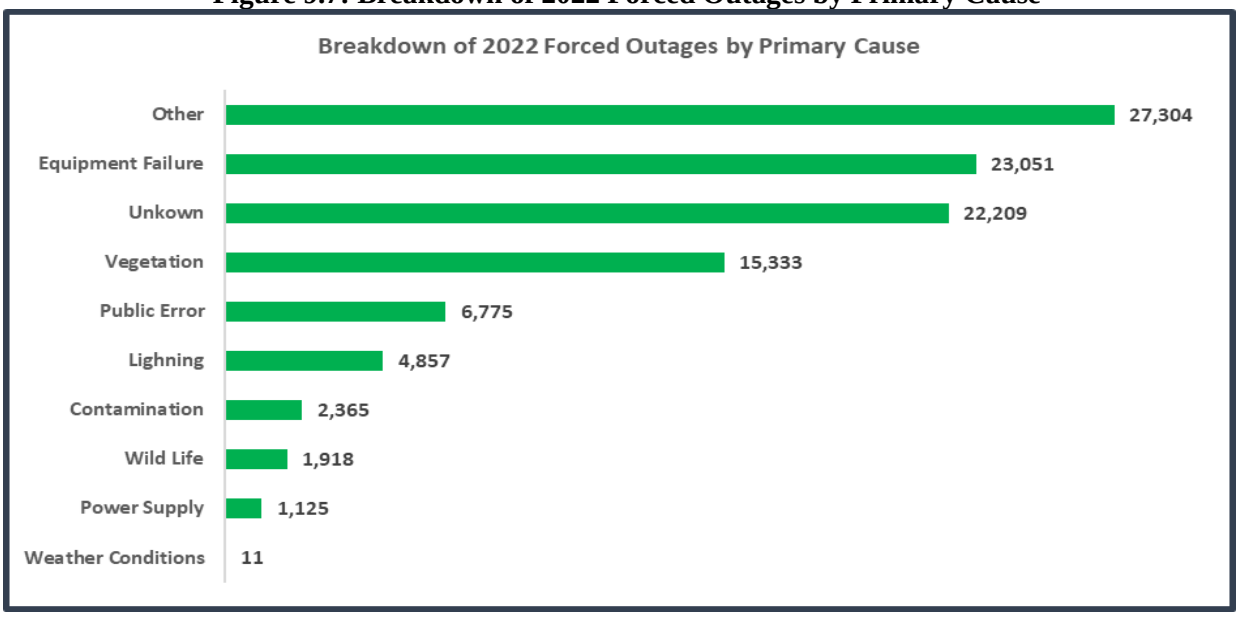
**Outage Causation**

**9.14.9** In the 2019-2024 Rate Review Determination Notice, the Office determined that going forward, JPS shall include specific outage causation information for each outage occurring on the system during each year, to facilitate the annual quality of service assessments and Q-Factor determination. In conformance with this requirement, JPS has since been linking each recorded outage to a primary and secondary cause, with a total of nine (9) primary causes for forced outages and associated secondary causes. The primary outage causes listed in the 2022 outage dataset are:

1) Contamination
2) Equipment Failure
3) Lightning
4) Power Supply
5) Public Error
6) Vegetation
7) Weather Conditions
8) Wildlife
9) Unknown
10) Other

**9.14.10** From the OUR's analysis of the primary outage causes, a breakdown of the total 2022 forced outages (Reportable and Non-Reportable) by cause was developed. This is presented in Figure 9.7 below.

**Figure 9.7: Breakdown of 2022 Forced Outages by Primary Cause**




## Secondary Outage Causes

**9.14.11** The OUR's review of the secondary outage causes described in the dataset found that in many cases there is no clear basis for linkage between the primary outage cause and the secondary cause. For example, a forced outage was reported to have a primary cause of contamination, but the secondary cause was stated as "Premises Not Found", and there are many more similar cases. In the OUR's view, these connections are not logical and raise questions about the level of quality control in the outage management process.

**9.14.12** Considering these observations, JPS needs to carry out a complete review of the outage causation aspects in the outage datasets and other areas, to ensure that there is proper

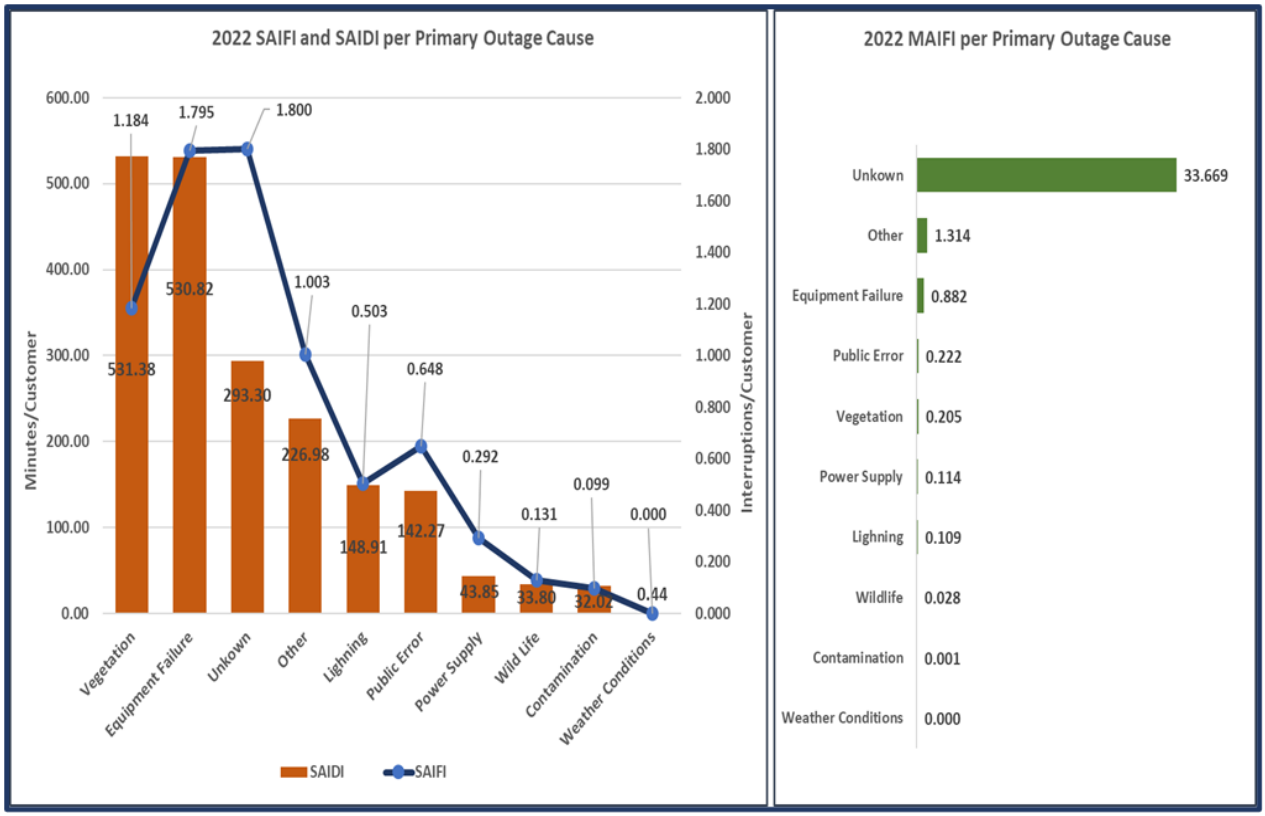
structure and uniformity in the data, and that it meets certain standards of quality, to enhance the credibility of the company's outage management and reporting process.

**9.14.13** As indicated in Figures 9.7 and 9.8, the dominant causes of forced outages in 2022 were "Equipment Failure" and "Vegetation" impingement, with both combined contributing to approximately 54% of the overall 2022 SAIDI. For the same period, forced outages with causes identified as "Unknown" were the largest contributor to SAIFI, accounting for just above 24% (1.80 interruptions/customer) of the total 2022 SAIFI. The breakdown of the 2022 SAIFI and SAIDI by primary outage cause is exhibited in Figure 9.8 below.

**Outages due to Specific Causes**

**9.14.14** By way of reference, in the 2021 and 2022 Annual Adjustment Filing, JPS indicated that the forced outages associated with "Equipment Failure" was largely due to the impact of tropical storms impacting the island in the respective performance years. The company also indicated that its T&D Structural Integrity Programme should address some of these equipment failure issues. But, as the evidence shows, the reliability situation surrounding "Equipment Failure" worsened in 2022. This outcome calls into question the effectiveness of the JPS's system reliability programme and its outage management/mitigation strategy.

**Figure 9.8: 2022 SAIDI, SAIFI and MAIFI by Primary Outage Cause**



**9.14.15** On the matter of the forced outages with causes reported as "Unknown", it must be pointed out that in 2022, there 22,209 forced outages that were given this designation, which is nearly 120% above the number reported for 2021 (10,186). Based on the trend since 2019, it appears that this is developing into an uncontrollable situation, and there is no indication that the problem is being tackled by JPS. In addition to the impact on SAIFI and SAIDI, the deteriorating situation involving forced with Unknown cause is also evident in the momentary interruptions indicator (MAIFI) shown in Figure 9.8 above.

**9.14.16** The company had previously indicated that efforts are being intensified to better identify the cause of these outages, and with the implementation the new OSI OMS, it would have advanced capabilities to be able to know the specific cause of the outages occurring on the system. The new OMS has been implemented and operational since 2022 February, but obviously this problem is not being remedied given the significant increase in the instances of these Unknown causes of forced outages in 2022. In the scheme of things, it must be underscored that outages are not known, the company will not be able to understand drivers for a significant portion of the forced outages, which has implications for the outage management process and reliability improvement strategy. In this context, it is of necessity that JPS take urgent action to rectify this problem.

**Momentary Interruptions and Regulatory Requirements - MAIFI Considerations**

**9.14.17** Although MAIFI is not featured in the Q-Factor scheme prescribed under JPS existing price control regime, the regulatory reporting requirements dictates that the company is still required to accurately record all system outages that precipitate momentary interruptions in the electricity supply to customers and report these outages/interruptions to the OUR on an on-going basis. Notwithstanding, based on the existing configuration of JPS's T&D network, and the extent of supporting communication/information and data acquisitions, presently, momentary interruptions are only captured upstream at the feeder circuit breaker level. This is a major limitation to the process of recording momentary interruption events, which JPS must seek address.

**9.14.18** With respect to momentary interruption measurements, JPS reported that the 2022 momentary interruption occurrences were recorded and included in submitted 2022 Annual Outage Dataset. The OUR's initial checks confirmed that, indeed momentary interruptions data was included in the referenced dataset.

**9.14.19** In the OUR's assessment of JPS's 2022 quality of service performance, the forced outages that resulted in momentary service disruptions were also evaluated. In the process, the OUR identified and analyzed the forced outages that initiated momentary interruption events in 2022, and estimated their effects on service quality, by means of the MAIFI metric. A summary of the 2022 momentary interruptions indicators is provided in Table 9.16 below.

**Table 9.16: 2022 Momentary Interruption Events Indicators**

| 2022 MOMENTARY INTERRUPTIONS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| YEAR | MOMENTARY FO | MOMENTARY FO (IPP Excluded) [Reportable & Non-Reportable] | | | IPP MOMENTARY FO (Reportable & Non-Reportable) | | | **MAIFI (IPP Excluded) [Interruptions/ Customer]** | **MAIFI (IPP) [Interruptions/ Customer]** |
| | Total | Reportable | Non-Rept. | Total | Reportable | Non-Rept. | Total | | |
| 2020 | 4,359 | - | - | - | - | - | - | 13.8 | 1.122 |
| 2021 | 4,671 | 3,622 | 858 | 4,480 | 187 | 27 | 191 | 12.0 | 0.405 |
| **2022** | **13,883** | 13,140 | 464 | **13,604** | 265 | 14 | **279** | **36.5** | **0.690** |

## Momentary Interruption Issues

**9.14.20** As shown in Table 9.123, the annual MAIFI measure was on a downward trajectory but reversed course in 2022, increasing from the 2021 level 0.405 interruptions/customer to 0.69 at the end of 2022. According to JPS, this increase was primarily due to a high MAIFI during 2022 September caused by an increase in feeder cycling events associated with Tropical Storm Ian. Looking back at previous Annual Review Filings since 2016, this has been the standard narrative put forward by JPS. However, there is no indication that measures are being implemented to deal with this recurring problem. The company needs to carry out a deeper investigation of this issue and formulate an appropriate mitigation strategy.

## Effects of Momentary Interruptions on Customers

**9.14.21** Regarding the effects of momentary interruptions on quality of service, the OUR understands that these occurrences can be very disruptive, particularly for industrial process equipment and electronic devices. Considering the potential detrimental effects, it is imperative for the utility to ensure that the electricity supply network is appropriately designed/configured, maintained, and reinforced through the approved capital investment programme, to minimize the interruptions experienced by customers.

## Major System Failure Events

**9.14.22** In reviewing the 2021 Outage Dataset, the OUR identified **327** forced outages that satisfied the criteria for a "Major System Failure" as defined in sub-section 45 (16) paragraph (a) of the Electricity Act, 2015 which states that:

> *"(a) "major system failure" means as a system failure that:*
> *(i) has not been planned by the System Operator.*
> *(ii) affects at least one thousand customers; and*
> *(iii)lasts at least two hours."*

**9.14.23** Based on these criteria, the 138 forced outages identified would qualify as a "major system failure", except that in real terms, such system events as recognized across the industry, did not occur. Under the referenced legal provision, there are stipulated obligations to be

discharged and specific procedures to be carried out by the System Operator (JPS) when a major system failure occurs. However, for the identified cases, such actions were not undertaken by the System Operator for the reasons cited. In the 2021 and 2022 Annual Review Filings, JPS argued that the Electricity Act's definition for a major system failure is far more restrictive than that used in other jurisdictions and recommended that it be amended. In the 2023 Annual Review Application, JPS further proposed that the definition of "major system failure" be aligned with international utility best practices. The OUR concurs with that position but notes that until the definition is in fact amended, the procedures set out thereunder should be adhered to.

**9.14.24** Nonetheless, JPS would be aware that as System Operator, it has specific obligations in relation to major system failures. In that regard, the company should take the lead in making the necessary representations to rectify the issue.

**9.14.25** Recognizing the scope of the referenced provision of the Electricity Act, 2015, the OUR intends to collaborate with JPS on this issue, where possible, to facilitate resolution of the issue. Additionally, based on the review of the Electricity Act, 2015 which is ongoing, it is expected this matter will be settled during this process.

**Force Majeure Outages**

**9.14.26** In the 2023 Annual Review Application, JPS proffered that it is seeking to establish a mechanism with OUR/MSET for the timely approval of Force Majeure applications, as provisioned in the Licence 2016, contending that outages caused by Force Majeure events are adversely impacting its quality-of-service performance. JPS also included a comparison of its quality-of-service measurements with and without Force Majeure events, as shown in Figure 9.9 below.

**Figure 9.9: JPS 2020-2022 Quality of Service Measurements (with and without Force Majeure Events)**

| | JPS REPORTED 2019 & 2022 SYSTEM RELIABILITY PERFORMANCE | | | | | |
|---|---|---|---|---|---|---|
| | YEAR | # Reportable forced outages | SAIDI (mins/customer) | SAIFI (interruptions/customer) | CAIDI (mins/interruption) | MAIFI (interruptions/customer) |
| With FM | 2019 | 44,389 | 1,375.2 | 11.7 | 117.1 | 7.6 |
| | 2020 | 57,726 | 1,486.8 | 8.6 | 173.2 | 13.8 |
| | 2021 | 57,333 | 1862.7 | 7.7 | 243.2 | 12.0 |
| | 2022 | 89,884 | 1983.8 | 7.5 | 266.1 | 36.5 |
| Without FM | 2020 | - | 1278.3 | 7.9 | 161.8 | - |
| | 2021 | - | 1187.8 | 6.8 | 175.2 | - |
| | 2022 | - | 1935.0 | 7.4 | 263.3 | - |

**9.14.27** In the 2022 Annual Review Filing, JPS purported that during 2021 there three (3) Tropical Storms (Ida, Elsa, and Grace) materially and adversely affected its quality-of-service performance and requested that forced outages associated with these events be excluded

from the Q-Factor evaluation pending the Minister's approval of the classification of the 2021 Tropical Storms as "Force Majeure" (FM) events. For the 2022 operating period, JPS also claimed that the passage of Tropical Storm Ian in 2022 September negatively impacted its quality-of-service performance and proposed that the associated power outages should be classified as Forced Majeure events.

OUR's Position

**9.14.28** In the 2019-2024 Rate Review Determination Notice, the Office made it clear that the quality-of-service provisions set out under Schedule 3, Exhibit 1 of the Licence 2016, do not include any condition for the treatment of Force Majeure events in the Q-Factor adjustment scheme. The Office also intimated that exemption being sought for Force Majeure claims must be pursued through Condition 11(2) of the Licence 2016. However, based on JPS's proposal in the 2023 Annual Review Application, it appears that approval for JPS's request for Force Majeure treatment in relation to the mentioned 2021 and 2022 outage events is yet to be granted. Accordingly, the proposed 2022 values for SAIFI, SAIDI and CAIDI (with the Force Majeure related forced outages excluded from the calculations), were Not Allowed, and as such, they were not considered in the 2022 Q-Factor determination. It is also notable that based on JPS's 2022 SAIFI, SAIDI and CAIDI performance under each scenario (with and without FM forced outages), the 2022 Q-Factor result (based on the allowed reportable FO) would be the same at **–3,** which would result in financial penalty to JPS in either case. Issues And Findings Emanating from The OUR's Q-Factor Review

## 9.15 Issues and Findings from the OUR's Q-Factor Review

**9.15.1** The findings and issues resulting from the OUR's evaluation of JPS's 2021 quality of service performance and 2021 Q-Factor proposals at this 2022 Annual Review, are delineated below:

**System Customer Count Data**

1) Consistent with the Q-Factor requirements in the Final Criteria, the daily system customer counts were included in the 202 Outage Dataset and were utilized by JPS and the OUR in the relevant reliability calculations. However, the OUR continues to identify certain issues and disparities with this data as described in this Determination Notice. Specifically, significant disparities in the customer count data are observed from different data sources, which creates uncertainties for the quality-of-service calculations/measurements. Even with the implementation of the new OSI OMS, there continues to be some deviations in the reported data. To allow for greater clarity in the reporting of this parameter, the measurement process, JPS is required to provide a at least detailed monthly breakdown of the CIS/OMS customer count data used in the relevant Q-Factor computations, by customer categories and account status. This must be included in the reliability reports to be submitted to the OUR.

**Outage Data Calibration Issues**

2) As was highlighted in the OUR's previous reliability assessments, in this 2023 Annual Review, it was also found that the adjustments made by JPS to the "Raw Data" reported in the 2022 Annual Outage Dataset to compile the "Calibrated Data", were not clearly and specifically shown, and the specific reasons for these modifications were also not stated in the schedule. Furthermore, the OUR, having examined the outage data records generated by the new OSI OMS for 2022 March – December, has identified several issues/deficiencies relating to data structures, contents, and calibration requirements, which are described herein. Considering these findings, going forward, the company is required to resolve and eliminate these problems from the relevant outage datasets and reliability reports to be submitted to the OUR. This is considered critical to assure transparency, quality and efficiency in the outage management and regulatory process.

**Reliability Performance Disparities**

3) According to the Licence 2016, the existing Q-Factor scheme is based on average reliability performance of the entire system, and not for discrete service areas. And, since the legal & regulatory framework dictates that there should be no discrimination in electricity rate based on customer location, it would be reasonable for customers dispersed across the country to expect similar levels of service, regardless of location. However, despite this service equality principle, OUR's analysis of the 2022 outage data, as well as previous annual outage datasets, has revealed significant disparities in reliability performance across the distribution network feeders and defined service areas across the country. This was evident in the number of forced outages and related SAIFI and SAIDI for the respective feeders and service areas. With respect to the distribution feeders, it is recognized that the characteristics of each feeder can vary considerably, but it has been found that a number of these feeders have exhibited consistently poor performance, in terms of number of outages, and SAIFI & SAIDI, from year to year. Given these findings and the scope of JPS's reliability improvement programme approved for the 2019-2024 period, there needs to be greater focus by the company on elevating the reliability level of these consistently poor performing feeders, and to ensure greater consistency in the quality of service to customers in all service areas across the network.

**Outage Causation Issues**

4) The OUR's analysis of the reported causes of the 2022 forced outages revealed that a significant percentage of these outages were linked to causes described by JPS as "Unknown" for which the specific cause was not determined. Given the importance of the outage drivers in the reliability improvement process, JPS needs to investigate this issue with a view to identifying the precise causes of these forced outages. In addition, the OUR is of the view that with the commissioning of the new OSI OMS, JPS should now be better equipped to remedy this problem.

**New OMS Issues**

5) Regarding the new OSI OMS, at the 2022 Annual Review, JPS indicated at the time that it was in the process of conducting post-commissioning performance validation

and stress testing on the OMS platform to ensure technical compliance, system integration compliance and regulatory compliance, which was projected to be completed by the end of 2022 June. JPS also stated that it was working with suppliers to resolve technical hitches and hiccups encountered since the start of commercial operation. Citing these developments, JPS noted that during the stress testing period, the quality of the OMS outputs cannot be assured for Q-Factor reporting purposes, as the company may not be able to accurately reproduce and represent all the reliability/outage performance data for analysis as required for regulatory compliance. On those assumptions, the company requested that the OUR grant a waiver of the reliability reporting requirement for the period 2022 March – June.

In response to JPS's request, the OUR via letter (dated 2022 June 20), indicated that it has taken note of the developments regarding the new Electra OSI OMS. The OUR also conveyed that based on the design orientation of these information systems, it accepts that there is a likelihood for certain glitches to surface in the early stages of operation. Notwithstanding, the OUR made it clear that it was not pre-empting a particular result/outcome and noted that the anxieties expressed by JPS about the prospects of the OMS stress testing results, appeared to be overblown or premature, as the testing process at that time was not yet concluded. Furthermore, the specific anomalies/errors JPS claimed that it encountered since the start of commercial operations of the new OMS had not been reported to the OUR. It is important to note that up to the end of 2022, JPS did not provide proper justification (supported by data accumulated since the commencement of the new OMS operations) to substantiate its request for exemption from the 2022 March-June system reliability reporting requirements. Due to this information gap, the OUR was unable to make any informed decision regarding the requested waiver. Notwithstanding, the OUR conveyed that it was not averse to looking at the OMS issues, but this cannot be accommodated until the referenced "stress testing" process is fully completed and a "testing & validation" report covering the testing scope/procedures, results, findings, and all data quality issues identified, and a copy of the full OMS commissioning report are presented to the OUR for review.

Despite repeated reminders, follow-ups from the OUR, and meetings with JPS on the issues in 2022, up to the end of 2022, the company did not submit these deliverables to the OUR.

On 2023 March 3, JPS submitted to the OUR, the following OMS related documents, titled:

a) Electra OSI OMS Commission Report OMvr4
b) JPS11_SAT_OMS-v3.0

The requested "stress test & validation" report was not submitted. The report was only submitted on 2023 June 14 as part of its response to the OUR's 2023 June 2 additional Information request in relation to the 2023 Annual Review. The late submission of these documents contained the OUR's assessment and monitoring of the developments involving the new OSI OMS. Specifically, it prevented the OUR from fully examining the reported post-commissioning OMS issues that were reportedly being encountered

by JPS and providing feedback on the issues. The lack of timely response also constrained the OUR in establishing a position as to how the associated outage data and quality of service measurements may be treated at the 2023 Annual Review.

Although it was reported that there were OMS implementation/operations challenges that may have introduced some problems in the data collection process, at the same, customers were experiencing service interruptions due to sustained forced outages in the electricity network throughout the year (2022). While the OUR would acknowledge that there might have been some impact, given that there are established quality of service performance targets and obligations for 2022, JPS's proposal for full removal of the 2022 performance requirements (Q-Factor = 0), cannot stand. Notwithstanding, as previously indicated, the OUR allowed JPS some relief by not applying the excess non-Reportable outages in the Q-Factor calculations, which if this done would have resulted in a Q-Factor of -0.50%, with commensurate financial penalties.

**Rules-Based Data Dictionary Issues**

6) With the implementation of the new OSI OMS, and the reported post-commissioning troubles, this would have caused some degree of misalignment in the data calibration and normalization. Based on this development, going forward there will be need for collaboration between the OUR and JPS to restructure and modify the calibration rules to ensure that there is proper integration and harmonization of the processes.

**JPS 2022 Capital Projects Reliability Impact**

7) For 2022, the OUR approved a total CAPEX of US$17.03M for the implementation of JPS's planned reliability projects in year. However, the 2022 project update included in the 2023 Annual Review Application did not provide any details, including project scope, actual capital expenditure and impact for the Distribution Line Re- Conducting and Relocation, Transmission Line Structural Integrity, and Substation Structural Integrity projects, which is major deficiency in the reporting. The project status information is deemed critical for ongoing regulatory assessment of the cost effectiveness and benefits of the approved reliability projects. Therefore, this important project information must be provided by the company.

**Monthly Reliability Report**

8) Since late 2021, the OUR has been receiving numerous complaints from customers across the country about regular power supply interruptions and poor service quality from JPS. With increasing complaints of these interruptions, the OUR initiated an in-depth review of the system operations and reliability performance since the start of the 2019-2024 Rate Review period. However, due to certain constraints such as the existing lag in the reliability reporting process in effect at that time, coupled with untimely submissions from JPS, have caused delays in the investigations. To alleviate this problem, and to enable more effective regulatory monitoring of JPS's quality of service performance, the OUR in the 2022 Annual Review Determination Notice, determined that JPS should start submitting a monthly reliability report (capturing all system outages and resulting supply interruptions in the applicable period) to the Office to enhance the regulatory process. . Being mindful that at the end of each year, the full

and final compilation of the outage data should be submitted to the Office for full corroboration of the monthly submissions and evaluation/measurement of the annual quality of service performance. However, despite repeated reminders, follow-up, and meetings on this deliverable in 2022, JPS did not satisfy this requirement, which is found to be unacceptable and untenable. Further, the absence of the monthly reliability reports contained the OUR efforts to review the data generated by new OSI OMS and to fully evaluate the reported implementation/operational issues encountered by JPS. Irrespective of these developments, the regulatory requirement for JPS to submit the monthly reliability reports to the Office still stands, and these reports are expected in 2023, starting from 2023 January.

**OUR Summary Comments**

**9.15.2** From the OUR's 2022 Q-Factor review, it can be deduced that while there have been some advances in certain areas, JPS's overall quality of service performance has deteriorated since the start of the 2019-2024 Rate Review period. Considering these findings, JPS needs to take urgent action to resolve the identified issues and to improve its declining quality of service performance.

### 9.16 OUR 2022 Annual Review Q-Factor Determination

**9.16.1** In making its determination on JPS's 2022 Q-Factor, the Office took into consideration, among other things, the following:

- The results of the OUR's 2022 Q-Factor evaluation.
- The relevant provisions of the Licence, and Legal & Regulatory Framework; and
- The quality of service and Q-Factor determinations set out in the 2019-2024 Rate Review Determination Notice.

**9.16.2** Accordingly, the Office determines that the 2022 Q-Factor applicable to the "RC2022(1+dPCI)" component of the 2023 ART is **- 0.25%**.

**Q-Factor Determination Summary**

**9.16.3** The Office's determinations on JPS's Q-Factor at this 2022 Annual Review are summarized in Determination 9 below:

**Determination 9**

1) The Q-Factor to be applied in the 2023 PBRM is **- 0.25%.**

2) JPS shall submit to the Office a detailed "Monthly Reliability Report", which shall be structured in MS Excel format, and shall include all the data requirements/contents as represented in the "Annual Outage Dataset" template, for the applicable month. The report shall also include the following:
3) A clear separation of planned outages from forced outages in the Calibrated Data (to be included a separate work sheet).
4) The column for "Reportable Outage Type shall only include the text "Reportable" or "Non-Reportable."
5) The specific "cause" of each recorded outage (forced and planned).
6) Clear indication of all the adjustments made to the "Raw Data" to compile the "Calibrated Data", with the specific reasons for each amendment clearly stated.
7) The status/progress of the Reliability Improvement Projects being implemented.

8) This report shall be submitted within fifteen (15) days after the end of each applicable month, starting with the month of 2023 January.

9) JPS is required to carry out an investigation into the circumstances and sources that are allowing the company to designate the cause of over 21% of the reported forced outages as "Unknown". This report of this investigation should be submitted to the OUR within three (3) months of the effective date of this Determination Notice.

10) JPS shall include all momentary interruptions that occurred on the system each month, along with the related MAIFI measurements, in the Monthly Reliability Reports to be submitted to the Office.

11) In reference to Determination #22(d) of the 2019-2024 Rate Review Determination Notice, the Office will continue to factor non-Reportable forced outages (sustained) above the 5% limit in the relevant Q-Factor calculations. As such, JPS needs to put measures in place to ensure that non-Reportable sustained forced outages do not exceed 5% of total sustained forced outages recorded for each year.

12) JPS shall comply with all the requirements relating to Quality of Service/Q-Factor as specified in this Determination Notice.

# 10 ANNEX 1

## 10.1 US and Jamaican Consumer Price Indices

### 10.1.1 U.S. Consumer Price Index

**U.S. Consumer Price Index - All Urban Consumers**

**Series Id:** CUUR0000SA0
Not Seasonally Adjusted
**Area:** U.S. city average
**Item:** All items
**Base Period:** 1982-84=100

The Consumer Price Index (CPI-U) is compiled by the Bureau of Labor Statistics and is based upon a 1982 Base of 100. A Consumer Price Index of 168 indicates 68% inflation since 1982. The commonly quoted inflation rate of say 3% is actually the change in the Consumer Price Index from a year earlier.

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual | HALF1 | HALF2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000 | 168.8 | 169.8 | 171.2 | 171.3 | 171.5 | 172.4 | 172.8 | 172.8 | 173.7 | 174.0 | 174.1 | 174.0 | 172.2 | 170.8 | 173.6 |
| 2001 | 175.1 | 175.8 | 176.2 | 176.9 | 177.7 | 178.0 | 177.5 | 177.5 | 178.3 | 177.7 | 177.4 | 176.7 | 177.1 | 176.6 | 177.5 |
| 2002 | 177.1 | 177.8 | 178.8 | 179.8 | 179.8 | 179.9 | 180.1 | 180.7 | 181.0 | 181.3 | 181.3 | 180.9 | 179.9 | 178.9 | 180.9 |
| 2003 | 181.7 | 183.1 | 184.2 | 183.8 | 183.5 | 183.7 | 183.9 | 184.6 | 185.2 | 185.0 | 184.5 | 184.3 | 184.0 | 183.3 | 184.6 |
| 2004 | 185.2 | 186.2 | 187.4 | 188.0 | 189.1 | 189.7 | 189.4 | 189.5 | 189.9 | 190.9 | 191.0 | 190.3 | 188.9 | 187.6 | 190.2 |
| 2005 | 190.7 | 191.8 | 193.3 | 194.6 | 194.4 | 194.5 | 195.4 | 196.4 | 198.8 | 199.2 | 197.6 | 196.8 | 195.3 | 193.2 | 197.4 |
| 2006 | 198.3 | 198.7 | 199.8 | 201.5 | 202.5 | 202.9 | 203.5 | 203.9 | 202.9 | 201.8 | 201.5 | 201.8 | 201.6 | 200.6 | 202.6 |
| 2007 | 202.4 | 203.5 | 205.4 | 206.7 | 207.9 | 208.4 | 208.3 | 207.9 | 208.5 | 208.9 | 210.2 | 210.0 | 207.3 | 205.7 | 209.0 |
| 2008 | 211.1 | 211.7 | 213.5 | 214.8 | 216.6 | 218.8 | 220.0 | 219.1 | 218.8 | 216.6 | 212.4 | 210.2 | 215.3 | 214.4 | 216.2 |
| 2009 | 211.1 | 212.2 | 212.7 | 213.2 | 213.9 | 215.7 | 215.4 | 215.8 | 216.0 | 216.2 | 216.3 | 215.9 | 214.5 | 213.1 | 215.9 |
| 2010 | 216.7 | 216.7 | 217.6 | 218.0 | 218.2 | 218.0 | 218.0 | 218.3 | 218.4 | 218.7 | 218.8 | 219.2 | 218.1 | 217.5 | 218.6 |
| 2011 | 220.2 | 221.3 | 223.5 | 224.9 | 226.0 | 225.7 | 225.9 | 226.5 | 226.9 | 226.4 | 226.2 | 225.7 | 224.9 | 223.6 | 226.3 |
| 2012 | 226.7 | 227.7 | 229.4 | 230.1 | 229.8 | 229.5 | 229.1 | 230.4 | 231.4 | 231.3 | 230.2 | 229.6 | 229.6 | 228.8 | 230.3 |
| 2013 | 230.3 | 232.2 | 232.8 | 232.5 | 232.9 | 233.5 | 233.6 | 233.9 | 234.1 | 233.5 | 233.1 | 233.0 | 233.0 | 232.4 | 233.5 |
| 2014 | 233.9 | 234.8 | 236.3 | 237.1 | 237.9 | 238.3 | 238.3 | 237.9 | 238.0 | 237.4 | 236.2 | 234.8 | 236.7 | 236.4 | 237.1 |
| 2015 | 233.7 | 234.7 | 236.1 | 236.6 | 237.8 | 238.6 | 238.7 | 238.3 | 237.9 | 237.8 | 237.3 | 236.5 | 237.0 | 236.3 | 237.8 |
| 2016 | 236.9 | 237.1 | 238.1 | 239.3 | 240.2 | 241.0 | 240.6 | 240.9 | 241.4 | 241.7 | 241.4 | 241.4 | 240.0 | 238.8 | 241.2 |
| 2017 | 242.8 | 243.6 | 243.8 | 244.5 | 244.7 | 245.0 | 244.8 | 245.5 | 246.8 | 246.7 | 246.7 | 246.5 | 245.1 | 244.1 | 246.2 |
| 2018 | 247.9 | 249.0 | 249.6 | 250.5 | 251.6 | 252.0 | 252.0 | 252.1 | 252.4 | 252.9 | 252.0 | 251.2 | 251.1 | 250.1 | 252.1 |
| 2019 | 251.7 | 252.8 | **254.2** | 255.5 | 256.1 | 256.1 | 256.6 | 256.6 | 256.8 | 257.3 | 257.2 | 257.0 | 255.7 | 254.4 | 256.9 |
| 2020 | 258.0 | 258.7 | 258.1 | 256.4 | 256.4 | 257.8 | 259.1 | 259.9 | 260.3 | 260.4 | 260.2 | 260.5 | 258.8 | 257.6 | 260.1 |
| 2021 | 261.6 | 263.0 | 264.9 | 267.1 | 269.2 | 271.7 | 273.0 | 273.6 | 274.3 | 276.6 | 277.9 | 278.8 | 271.0 | 266.2 | 275.7 |
| 2022 | 281.1 | 283.7 | 287.5 | 289.1 | 292.3 | 296.3 | 296.3 | 296.2 | 296.8 | 298.0 | 297.7 | 296.8 | 292.7 | 288.3 | 297.0 |
| 2023 | 299.2 | 300.8 | **301.8** | 303.4 | | | | | | | | | | | |

Source: United States Department of Labour Bureau of Labor Statistics — Bureau of Labor Statistics Data https://data.bls.gov/timeseries/CUUR0000SA0?amp%253bdata_tool=XG

### 10.1.2 Jamaican Consumer Price Index

**Monthly Consumer Price Index**

All Jamaica All Division Monthly Consumer Price Index (Base Year = 2019)

Jamaica Revised CPI April2020

| Year | January | February | March | April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | 95.20 | 95.10 | 95.00 | 94.60 | 94.60 | 95.00 | 95.9 | 96.8 | 97.9 | 98.6 | 98.60 | 97.60 |
| 2019 | 97.40 | 97.40 | **98.20** | 98.30 | 99.10 | 99.00 | 100.00 | 100.80 | 101.20 | 101.80 | 103.20 | 103.60 |
| 2020 | 102.50 | 103.20 | 102.90 | 103.70 | 103.80 | 105.20 | 105.7 | 105.9 | 106.1 | 106.9 | 107.60 | 109.00 |
| 2021 | 107.30 | 107.10 | 108.30 | 107.70 | 109.00 | 109.80 | 111.40 | 112.30 | 114.90 | 116.00 | 116.00 | 117.00 |
| 2022 | 117.6 | 118.6 | 120.5 | 120.4 | 120.9 | 121.8 | 122.7 | 123.8 | 125.5 | 127.4 | 128.0 | 127.9 |
| 2023 | 127.20 | 127.80 | **128.0** | 127.40 | | | | | | | | |

Source: https://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx

## 10.2 Estimated Bill Impact of OUR's Approved Annual Tariff Adjustment

### 10.2.1 Bill Comparison for a Typical Rate 10 Consumer with Consumption < 100 kW

**Usage 90 kWh**

| Rate 10 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| Below 100 kWh | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 90 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| ENERGY | | | | | | | |
| Energy 1st | 90 | **7.93** | $ 713.70 | **8.31** | $ 747.86 | $ 34.16 | 4.79% |
| Energy Next | 0 | **22.76** | $ - | **23.86** | $ - | $ - | 0.00% |
| Customer Charge | | **575.72** | $ 575.72 | **603.54** | $ 603.54 | $ 27.82 | 4.83% |
| **SUBTOTAL** | | | **$ 1,289.42** | | **$ 1,351.40** | **$ 61.98** | **4.81%** |
| FX Adjust | | -0.196% | $ (2.52) | -0.196% | $ (2.64) | $ (0.12) | 4.81% |
| Fuel Charge | 90 | 21.115 | $ 1,900.36 | 21.101 | $ 1,899.10 | $ (1.25) | -0.07% |
| IPP Variable Charge | 90 | 12.365 | $ 1,112.89 | 12.365 | $ 1,112.89 | $ - | 0.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 4,300.15** | | **$ 4,360.75** | **$ 60.61** | **1.41%** |
| **G.C.T** | | | **Not Applicable** | | **Not Applicable** | | |
| **BILL TOTAL** | | | **$ 4,300.15** | | **$ 4,360.75** | **$ 60.61** | **1.41%** |

### 10.2.2 Bill Comparison for a Typical Rate 10 Consumer with Consumption 101kWh </= 150kWh

**Usage 150 kWh**

| Rate 10 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| Above 100 but ≤ 150 kWh | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 150 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| ENERGY | | | | | | | |
| Energy 1st | 100 | **7.93** | $ 793.00 | **8.31** | $ 830.96 | $ 37.96 | 4.79% |
| Energy Next | 50 | **22.76** | $ 1,138.00 | **23.86** | $ 1,193.07 | $ 55.07 | 0.00% |
| Customer Charge | | **575.72** | $ 575.72 | **603.54** | $ 603.54 | $ 27.82 | 4.83% |
| **SUBTOTAL** | | | **$ 2,506.72** | | **$ 2,627.56** | **$ 120.84** | **4.82%** |
| FX Adjust | | -0.196% | $ (4.90) | -0.196% | $ (5.14) | $ (0.24) | 4.82% |
| Fuel Charge | 150 | 21.115 | $ 3,167.26 | 21.101 | $ 3,165.17 | $ (2.09) | -0.07% |
| IPP Variable Charge | 150 | 12.365 | $ 1,854.82 | 12.365 | $ 1,854.82 | $ - | 0.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 7,523.90** | | **$ 7,642.42** | **$ 118.52** | **1.58%** |
| **G.C.T** | | | **Not Applicable** | | **Not Applicable** | | |
| **BILL TOTAL** | | | **$ 7,523.90** | | **$ 7,642.42** | **$ 118.52** | **1.58%** |

### 10.2.3 Bill Comparison for a Typical Rate 10 Consumer with consumption 150kWh and above

## Usage 214 kWh

| Rate 10 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| Above 150 kWh | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 214 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| ENERGY | | | | | | | |
| Energy 1st | 100 | 7.93 | $ 793.00 | 8.31 | $ 830.96 | $ 37.96 | 4.79% |
| Energy Next | 114 | 22.76 | $ 2,594.64 | 23.86 | $ 2,720.20 | $ 125.56 | 0.00% |
| Customer Charge | | 575.72 | $ 575.72 | 603.54 | $ 603.54 | $ 27.82 | 4.83% |
| SUBTOTAL | | | $ 3,963.36 | | $ 4,154.69 | $ 191.33 | 4.83% |
| FX Adjust | | -0.196% | $ (7.75) | -0.196% | $ (8.12) | $ (0.37) | 4.83% |
| Fuel Charge | 214 | 21.115 | $ 4,518.63 | 21.101 | $ 4,515.65 | $ (2.98) | -0.07% |
| IPP Variable Charge | 214 | 12.365 | $ 2,646.21 | 12.365 | $ 2,646.21 | $ - | 0.00% |
| TOTAL ELECTRICITY CHARGES | | | $ 11,120.44 | | $ 11,308.42 | $ 187.98 | 1.69% |
| G.C.T | | | 539.48 | | 549.90 | | |
| BILL TOTAL | | | $ 11,659.93 | | $ 11,858.33 | $ 198.40 | 1.70% |

### 10.2.4 Bill Comparison for a Typical Rate 20 Consumer with consumption ≤ 100 kWh

## Usage 90 kWh

| Rate 20 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 90 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy | 90 | 9.78 | $ 880.20 | 10.25 | $ 922.43 | $ 42.23 | 4.80% |
| Customer Charge | | 1,227.56 | $ 1,227.56 | 1,286.87 | $ 1,286.87 | $ 59.31 | 4.83% |
| SUBTOTAL | | | $ 2,107.76 | | $ 2,209.31 | $ 101.55 | 4.82% |
| FX Adjust | | -0.196% | $ (4.12) | -0.196% | $ (4.32) | $ (0.20) | 4.82% |
| Fuel Charge | 90 | 21.115 | $ 1,900.36 | 21.101 | $ 1,899.10 | $ (1.25) | -0.07% |
| IPP Variable Charge | 90 | 18.132 | $ 1,631.84 | 18.132 | $ 1,631.84 | $ - | 0.00% |
| TOTAL ELECTRICITY CHARGES | | | $ 5,635.83 | | $ 5,735.93 | $ 100.10 | 1.78% |
| G.C.T | | | 845.37 | | 860.39 | | |
| BILL TOTAL | | | $ 6,481.21 | | $ 6,596.32 | $ 115.11 | 1.78% |

### 10.2.5 Bill Comparison for a Typical Rate 20 Consumer with consumption 101kWh - 1000kWh

## Usage 750 kWh

| Rate 20 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 750 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy | 750 | 9.78 | $ 7,335.00 | 10.25 | $ 7,686.95 | $ 351.95 | 4.80% |
| Customer Charge | | 1,227.56 | $ 1,227.56 | 1,286.87 | $ 1,286.87 | $ 59.31 | 4.83% |
| SUBTOTAL | | | $ 8,562.56 | | $ 8,973.82 | $ 411.26 | 4.80% |
| FX Adjust | | -0.196% | $ (16.74) | -0.196% | $ (17.54) | $ (0.80) | 4.80% |
| Fuel Charge | 750 | 21.115 | $ 15,836.30 | 21.101 | $ 15,825.87 | $ (10.44) | -0.07% |
| IPP Variable Charge | 750 | 18.132 | $ 13,598.63 | 18.132 | $ 13,598.63 | $ - | 0.00% |
| TOTAL ELECTRICITY CHARGES | | | $ 37,980.75 | | $ 38,380.77 | $ 400.02 | 1.05% |
| G.C.T | | | 5,697.11 | | 5,757.12 | | |
| BILL TOTAL | | | $ 43,677.86 | | $ 44,137.89 | $ 460.02 | 1.05% |

### 10.2.6 Bill Comparison for a Typical Rate 20 Consumer with consumption 1001kWh - 7500kWh

## Usage 5000 kWh

| Rate 20 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 5000 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy | 5,000 | **9.78** | $ 48,900.00 | **10.25** | $ 51,246.31 | $ 2,346.31 | 4.80% |
| Customer Charge | | **1,227.56** | $ 1,227.56 | **1,286.87** | $ 1,286.87 | $ 59.31 | 4.83% |
| **SUBTOTAL** | | | **$ 50,127.56** | | **$ 52,533.19** | **$ 2,405.63** | **4.80%** |
| FX Adjust | | -0.196% | $ (98.00) | -0.196% | $ (102.71) | $ (4.70) | 4.80% |
| Fuel Charge | 5,000 | 21.115 | $ 105,575.36 | 21.101 | $ 105,505.78 | $ (69.58) | -0.07% |
| IPP Variable Charge | 5,000 | 18.132 | $ 90,657.53 | 18.132 | $ 90,657.53 | $ - | 0.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 246,262.44** | | **$ 248,593.78** | **$ 2,331.34** | **0.95%** |
| **G.C.T** | | | **36,939.37** | | **37,289.07** | | |
| **BILL TOTAL** | | | **$ 283,201.80** | | **$ 285,882.85** | **$ 2,681.05** | **0.95%** |

### 10.2.7 Bill Comparison for a Typical Rate 40 (Std.) Consumer

## Usage 34,417 kWh
## Demand 117 kVA

| Rate 40 LV (Std) | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 34,417 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy (kWh) | 34,417 | **6.59** | $ 226,808.03 | **6.91** | $ 237,799.35 | $ 10,991.32 | 4.85% |
| Demand (kVa) | 117 | **2962.42** | $ 346,603.14 | **3105.57** | $ 363,351.98 | $ 16,748.84 | 4.83% |
| Customer Charge | | **8,648.74** | $ 8,648.74 | **9,066.66** | $ 9,066.66 | $ 417.92 | 4.83% |
| **SUBTOTAL** | | | **$ 582,059.91** | | **$ 610,218.00** | **$ 28,158.09** | **4.84%** |
| FX Adjust | | -0.196% | $ (1,137.98) | -0.196% | $ (1,193.04) | $ (55.05) | 4.84% |
| Fuel Charge | 34,417 | 20.270 | $ 697,648.71 | 20.257 | $ 697,188.92 | $ (459.79) | -0.07% |
| IPP Variable Charge | 34,417 | 2.016 | $ 69,399.92 | 2.016 | $ 69,399.92 | $ - | 0.00% |
| IPP Fixed Charge | 117 | 664.666 | $ 77,765.94 | 664.666 | $ 77,765.94 | $ - | 0.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 1,425,736.50** | | **$ 1,453,379.75** | **$ 27,643.25** | **1.94%** |
| **G.C.T** | | | **213,860.47** | | **218,006.96** | | |
| **BILL TOTAL** | | | **$ 1,639,596.97** | | **$ 1,671,386.71** | **$ 31,789.74** | **1.94%** |

### 10.2.8 Bill Comparison for a Typical Rate 50 (Std.) Consumer

## Usage 500,000 kWh
## Demand 1500 kVA

| Rate 50 MV (Std) | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 11,748 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy (kWh) | 11,748 | **4.67** | $ 54,863.16 | **4.90** | $ 57,574.87 | $ 2,711.71 | 4.94% |
| Demand (kVa) | 566 | **2052.65** | $ 1,162,620.96 | **2151.84** | $ 1,218,802.27 | $ 56,181.31 | 4.83% |
| Customer Charge | | **8,648.74** | $ 8,648.74 | **9,066.66** | $ 9,066.66 | $ 417.92 | 4.83% |
| **SUBTOTAL** | | | **$ 1,226,132.86** | | **$ 1,285,443.80** | **$ 59,310.94** | **4.84%** |
| FX Adjust | | -0.196% | $ (2,397.21) | -0.196% | $ (2,513.17) | $ (115.96) | 4.84% |
| Fuel Charge | 11,748 | 20.270 | $ 238,137.46 | 20.257 | $ 237,980.52 | $ (156.94) | -0.07% |
| IPP Variable Charge | 11,748 | 3.357 | $ 39,437.92 | 3.357 | $ 39,437.92 | $ - | 0.00% |
| IPP Fixed Charge | 566 | 1745.294 | $ 988,534.49 | 1745.294 | $ 988,534.49 | $ - | 0.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 2,489,845.52** | | **$ 2,548,883.56** | **$ 59,038.04** | **2.37%** |
| **G.C.T** | | | **373,476.83** | | **382,332.53** | | |
| **BILL TOTAL** | | | **$ 2,863,322.35** | | **$ 2,931,216.09** | **$ 67,893.74** | **2.37%** |

### 10.2.9 Bill Comparison for a Typical Rate 70 (Std.) Consumer

**Usage 1,331,784 kWh**

**Demand 566.4 kVA**

| Rate 70 Power Service (Std) | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 1,331,784 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy (kWh) | 1,331,784 | **4.66** | $ 6,206,113.44 | **4.89** | $ 6,511,552.67 | $ 305,439.23 | 4.92% |
| Demand (kVa) | 566 | **2720.58** | $ 1,540,936.51 | **2852.04** | $ 1,615,394.39 | $ 74,457.87 | 4.83% |
| Customer Charge | | **8,648.74** | $ 8,648.74 | **9,066.66** | $ 9,066.66 | $ 417.92 | 4.83% |
| **SUBTOTAL** | | | **$ 7,755,698.69** | | **$ 8,136,013.71** | **$ 380,315.02** | **4.90%** |
| FX Adjust | | -0.196% | $ (15,163.14) | -0.196% | $ (15,906.69) | $ (743.55) | 4.90% |
| Fuel Charge | 1,331,784 | 20.270 | $ 26,995,885.26 | 20.257 | $ 26,978,093.60 | $ (17,791.66) | -0.07% |
| IPP Variable Charge | 1,331,784 | 0.036 | $ 47,940.61 | 0.036 | $ 47,940.61 | $ - | 0.00% |
| IPP Fixed Charge | 566 | 424.136 | $ 240,230.77 | 424.136 | $ 240,230.77 | $ - | 0.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 35,024,592.19** | | **$ 35,386,371.99** | **$ 361,779.80** | **1.03%** |
| **G.C.T** | | | **5,253,688.83** | | **5,307,955.80** | | |
| **BILL TOTAL** | | | **$ 40,278,281.02** | | **$ 40,694,327.79** | **$ 416,046.77** | **1.03%** |

## 10.3 Estimated Bill Impact of JPS's Proposed Annual Tariff Adjustment

### 10.3.1 Bill Comparison for a Typical Rate 10 Consumer with consumption < 100 kW

**Usage 90 kWh**

| Rate 10 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| Below 100 kWh | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 90 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| ENERGY | | | | | | | |
| Energy 1st | 90 | **7.93** | $ 713.70 | **9.15** | $ 823.50 | $ 109.80 | 15.38% |
| Energy Next | 0 | **22.76** | $ - | **25.86** | $ - | $ - | 0.00% |
| Customer Charge | | **575.72** | $ 575.72 | **660.32** | $ 660.32 | $ 84.60 | 14.69% |
| **SUBTOTAL** | | | **$ 1,289.42** | | **$ 1,483.82** | **$ 194.40** | **15.08%** |
| FX Adjust | | -0.196% | $ (2.52) | -0.196% | $ (2.90) | $ (0.38) | 15.08% |
| Fuel Charge | 90 | 21.115 | $ 1,900.36 | 21.115 | $ 1,900.36 | $ - | 0.00% |
| IPP Variable Charge | 90 | 12.365 | $ 1,112.89 | 12.365 | $ 1,112.89 | $ - | 0.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 4,300.15** | | **$ 4,494.17** | **$ 194.02** | **4.51%** |
| **G.C.T** | | | **Not Applicable** | | **Not Applicable** | | |
| **BILL TOTAL** | | | **$ 4,300.15** | | **$ 4,494.17** | **$ 194.02** | **4.51%** |

### 10.3.2 Bill Comparison for a Typical Rate 10 Consumer with consumption 101kWh </= 150kWh

**Usage 150 kWh**

| Rate 10 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| Above 100 but ≤ 150 kWh | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 150 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| ENERGY | | | | | | | |
| Energy 1st | 100 | **7.93** | $ 793.00 | **9.15** | $ 915.00 | $ 122.00 | 15.38% |
| Energy Next | 50 | **22.76** | $ 1,138.00 | **25.86** | $ 1,293.00 | $ 155.00 | 0.00% |
| Customer Charge | | **575.72** | $ 575.72 | **660.32** | $ 660.32 | $ 84.60 | 14.69% |
| **SUBTOTAL** | | | **$ 2,506.72** | | **$ 2,868.32** | **$ 361.60** | **14.43%** |
| FX Adjust | | -0.196% | $ (4.90) | -0.196% | $ (5.61) | $ (0.71) | 14.43% |
| Fuel Charge | 150 | 21.115 | $ 3,167.26 | 21.115 | $ 3,167.26 | $ - | 0.00% |
| IPP Variable Charge | 150 | 12.365 | $ 1,854.82 | 12.365 | $ 1,854.82 | $ - | 0.00% |
| True-Up Adjustment | 150 | -0.113 | $ (16.95) | 0.000 | $ - | $ 16.95 | -100.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 7,506.95** | | **$ 7,884.79** | **$ 377.84** | **5.03%** |
| **G.C.T** | | | **Not Applicable** | | **Not Applicable** | | |
| **BILL TOTAL** | | | **$ 7,506.95** | | **$ 7,884.79** | **$ 377.84** | **5.03%** |

### 10.3.3 Bill Comparison for a Typical Rate 10 Consumer with consumption 150kWh and above

**Usage 214 kWh**

| Rate 10 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| Above 150 kWh | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 214 | | 155.00 | 155.83 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| ENERGY | | | | | | | |
| Energy 1st | 100 | **7.93** | $ 793.00 | **9.15** | $ 915.00 | $ 122.00 | 15.38% |
| Energy Next | 114 | **22.76** | $ 2,594.64 | **25.86** | $ 2,948.04 | $ 353.40 | 0.00% |
| Customer Charge | | **575.72** | $ 575.72 | **660.32** | $ 660.32 | $ 84.60 | 14.69% |
| **SUBTOTAL** | | | **$ 3,963.36** | | **$ 4,523.36** | **$ 560.00** | **14.13%** |
| FX Adjust | | -0.196% | $ (7.75) | -0.196% | $ (8.84) | $ (1.09) | 14.13% |
| Fuel Charge | 214 | 21.115 | $ 4,518.63 | 21.115 | $ 4,518.63 | $ - | 0.00% |
| IPP Variable Charge | 214 | 12.365 | $ 2,646.21 | 12.365 | $ 2,646.21 | $ - | 0.00% |
| True-Up Adjustment | 214 | -0.113 | $ (24.18) | 0.000 | $ - | $ 24.18 | -100.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 11,096.26** | | **$ 11,679.35** | **$ 583.09** | **5.25%** |
| **G.C.T** | | | **539.48** | | **561.12** | | |
| **BILL TOTAL** | | | **$ 11,635.74** | | **$ 12,240.47** | **$ 604.72** | **5.20%** |

### 10.3.4 Bill Comparison for a Typical Rate 20 Consumer with consumption ≤ 100 kWh

## Usage 90 kWh

| Rate 20 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 90 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy | 90 | **9.78** | $ 880.20 | **10.93** | $ 983.70 | $ 103.50 | 11.76% |
| Customer Charge | | **1,227.56** | $ 1,227.56 | **1,409.86** | $ 1,409.86 | $ 182.30 | 14.85% |
| **SUBTOTAL** | | | **$ 2,107.76** | | **$ 2,393.56** | **$ 285.80** | **13.56%** |
| FX Adjust | | -0.196% | $ (4.12) | -0.196% | $ (4.68) | $ (0.56) | 13.56% |
| Fuel Charge | 90 | 21.115 | $ 1,900.36 | 21.115 | $ 1,900.36 | $ - | 0.00% |
| IPP Variable Charge | 90 | 18.132 | $ 1,631.84 | 18.132 | $ 1,631.84 | $ - | 0.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 5,635.83** | | **$ 5,921.07** | **$ 285.24** | **5.06%** |
| **G.C.T** | | | **845.37** | | **888.16** | | |
| **BILL TOTAL** | | | **$ 6,481.21** | | **$ 6,809.23** | **$ 328.03** | **5.06%** |

### 10.3.5 Bill Comparison for a Typical Rate 20 Consumer with consumption 101kWh - 1000kWh

## Usage 750 kWh

| Rate 20 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 750 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy | 750 | **9.78** | $ 7,335.00 | **10.93** | $ 8,197.50 | $ 862.50 | 11.76% |
| Customer Charge | | **1,227.56** | $ 1,227.56 | **1,409.86** | $ 1,409.86 | $ 182.30 | 14.85% |
| **SUBTOTAL** | | | **$ 8,562.56** | | **$ 9,607.36** | **$ 1,044.80** | **12.20%** |
| FX Adjust | | -0.196% | $ (16.74) | -0.196% | $ (18.78) | $ (2.04) | 12.20% |
| Fuel Charge | 750 | 21.115 | $ 15,836.30 | 21.115 | $ 15,836.30 | $ - | 0.00% |
| IPP Variable Charge | 750 | 18.132 | $ 13,598.63 | 18.132 | $ 13,598.63 | $ - | 0.00% |
| True-Up Adjustment | 750 | -0.113 | $ (84.75) | 0.000 | $ - | $ 84.75 | -100.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 37,896.00** | | **$ 39,023.51** | **$ 1,127.51** | **2.98%** |
| **G.C.T** | | | **5,684.40** | | **5,853.53** | | |
| **BILL TOTAL** | | | **$ 43,580.40** | | **$ 44,877.04** | **$ 1,296.63** | **2.98%** |

### 10.3.6 Bill Comparison for a Typical Rate 20 Consumer with consumption 1001kWh - 7500kWh

## Usage 5000 kWh

| Rate 20 | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate | Billing F/X Rate | Base Exch. Rate | Billing F/X Rate | JMD Change | % Change |
| 5000 | | 155.00 | 154.62 | 155.00 | 154.62 | | |
| | Usage kWh | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy | 5,000 | **9.78** | $ 48,900.00 | **10.93** | $ 54,650.00 | $ 5,750.00 | 11.76% |
| Customer Charge | | **1,227.56** | $ 1,227.56 | **1,409.86** | $ 1,409.86 | $ 182.30 | 14.85% |
| **SUBTOTAL** | | | **$ 50,127.56** | | **$ 56,059.86** | **$ 5,932.30** | **11.83%** |
| FX Adjust | | -0.196% | $ (98.00) | -0.196% | $ (109.60) | $ (11.60) | 11.83% |
| Fuel Charge | 5,000 | 21.115 | $ 105,575.36 | 21.115 | $ 105,575.36 | $ - | 0.00% |
| IPP Variable Charge | 5,000 | 18.132 | $ 90,657.53 | 18.132 | $ 90,657.53 | $ - | 0.00% |
| True-Up Adjustment | 5,000 | -0.113 | $ (565.00) | 0.000 | $ - | $ 565.00 | -100.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 245,697.44** | | **$ 252,183.14** | **$ 6,485.70** | **2.64%** |
| **G.C.T** | | | **36,854.62** | | **37,827.47** | | |
| **BILL TOTAL** | | | **$ 282,552.05** | | **$ 290,010.61** | **$ 7,458.56** | **2.64%** |

### 10.3.7 Bill Comparison for a Typical Rate 40 (Std.) Consumer

**Usage 35,000 kWh**

**Demand 100 kVA**

| Rate 40 LV (Std) | July bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate 155.00 | Billing F/X Rate 154.62 | Base Exch. Rate 155.00 | Billing F/X Rate 154.62 | JMD Change | % Change |
| 34,417 | Usage | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy (kWh) | 34,417 | **6.59** | $ 226,808.03 | **7.56** | $ 260,192.52 | $ 33,384.49 | 14.72% |
| Demand (kVa) | 117 | **2,962.42** | $ 346,603.14 | **3,485.27** | $ 407,776.59 | $ 61,173.45 | 17.65% |
| Customer Charge | | **8,648.74** | $ 8,648.74 | **9,857.53** | $ 9,857.53 | $ 1,208.79 | 13.98% |
| **SUBTOTAL** | | | **$ 582,059.91** | | **$ 677,826.64** | **$ 95,766.73** | **16.45%** |
| FX Adjust | | -0.196% | $ (1,137.98) | -0.196% | $ (1,325.22) | $ (187.23) | 16.45% |
| Fuel Charge | 34,417 | 20.270 | $ 697,648.71 | 20.270 | $ 697,648.71 | $ - | 0.00% |
| IPP Variable Charge | 34,417 | 2.016 | $ 69,399.92 | 2.016 | $ 69,399.92 | $ - | 0.00% |
| IPP Fixed Charge | 117 | 664.666 | $ 77,765.94 | 664.666 | $ 77,765.94 | $ - | 0.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 1,425,736.50** | | **$ 1,521,315.99** | **$ 95,579.50** | **6.70%** |
| **G.C.T** | | | **213,860.47** | | **228,197.40** | | |
| **BILL TOTAL** | | | **$ 1,639,596.97** | | **$ 1,749,513.39** | **$ 109,916.42** | **6.70%** |

**Comparison for a Typical Rate 50 (Std.) Consumer**

**Usage 11,748 kWh**

**Demand 566.40 kVA**

| Rate 50 MV (Std) | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate 155.00 | Billing F/X Rate 154.62 | Base Exch. Rate 155.00 | Billing F/X Rate 154.62 | JMD Change | % Change |
| 11,748 | Usage | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy (kWh) | 11,748 | **4.67** | $ 54,863.16 | **5.15** | $ 60,502.20 | $ 5,639.04 | 10.28% |
| Demand (kVa) | 566 | **2,052.65** | $ 1,162,620.96 | **2,368.78** | $ 1,341,676.99 | $ 179,056.03 | 15.40% |
| Customer Charge | | **8,648.74** | $ 8,648.74 | **9,857.53** | $ 9,857.53 | $ 1,208.79 | 13.98% |
| **SUBTOTAL** | | | **$ 1,226,132.86** | | **$ 1,412,036.72** | **$ 185,903.86** | **15.16%** |
| FX Adjust | | -0.196% | $ (2,397.21) | -0.196% | $ (2,760.67) | $ (363.46) | 15.16% |
| Fuel Charge | 11,748 | 20.270 | $ 238,137.46 | 20.270 | $ 238,137.46 | $ - | 0.00% |
| IPP Variable Charge | 11,748 | 3.357 | $ 39,437.92 | 3.357 | $ 39,437.92 | $ - | 0.00% |
| IPP Fixed Charge | 566 | 1745.294 | $ 988,534.49 | 1745.294 | $ 988,534.49 | $ - | 0.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 2,489,845.52** | | **$ 2,675,385.92** | **$ 185,540.40** | **7.45%** |
| **G.C.T** | | | **373,476.83** | | **401,307.89** | | |
| **BILL TOTAL** | | | **$ 2,863,322.35** | | **$ 3,076,693.81** | **$ 213,371.46** | **7.45%** |

### 10.3.8 Bill Comparison for a Typical Rate 70 (Std.) Consumer

**Usage 1,331,784 kWh**

**Demand 566.40 kVA**

| Rate 70 Power Service (Std) | July Bill | | | July New Bill | | Bill Impact | |
|---|---|---|---|---|---|---|---|
| | 2023 Current Rates | | | 2023 Adjusted Rates | | | |
| Description | | Base Exch. Rate 155.00 | Billing F/X Rate 154.62 | Base Exch. Rate 155.00 | Billing F/X Rate 154.62 | JMD Change | % Change |
| 1,331,784 | Usage | Rate (J$) | Total (J$) | Rate (J$) | Total (J$) | | |
| Energy (kWh) | 1,331,784 | **4.66** | $ 6,206,113.44 | **5.05** | $ 6,725,509.20 | $ 519,395.76 | 8.37% |
| Demand (kVa) | 566 | **2,720.58** | $ 1,540,936.51 | **3,046.56** | $ 1,725,571.58 | $ 184,635.07 | 11.98% |
| Customer Charge | | **8,648.74** | $ 8,648.74 | **9,857.53** | $ 9,857.53 | $ 1,208.79 | 13.98% |
| **SUBTOTAL** | | | **$ 7,755,698.69** | | **$ 8,460,938.31** | **$ 705,239.62** | **9.09%** |
| FX Adjust | | -0.196% | $ (15,163.14) | -0.196% | $ (16,541.95) | $ (1,378.81) | 9.09% |
| Fuel Charge | 1,331,784 | 20.270 | $ 26,995,885.26 | 20.270 | $ 26,995,885.26 | $ - | 0.00% |
| IPP Variable Charge | 1,331,784 | 0.036 | $ 47,940.61 | 0.036 | $ 47,940.61 | $ - | 0.00% |
| IPP Fixed Charge | 566 | 424.136 | $ 240,230.77 | 424.136 | $ 240,230.77 | $ - | 0.00% |
| **TOTAL ELECTRICITY CHARGES** | | | **$ 35,024,592.19** | | **$ 35,728,453.00** | **$ 703,860.81** | **2.01%** |
| **G.C.T** | | | **5,253,688.83** | | **5,359,267.95** | | |
| **BILL TOTAL** | | | **$ 40,278,281.02** | | **$ 41,087,720.95** | **$ 809,439.93** | **2.01%** |

## 10.4 Approved Fuel Rates: Simulated as at 2023 June

| BILLING EXCHANGE RATE J$154.6212 = US$1.00 | | | | |
|---|---|---|---|---|
| **OUR Approved Heat Rate Target** | | | | **9,470** |
| **Fuel Rates for June 2023** | | | | |
| *Class* | Std. | Off Peak | Partial Peak | On Peak |
| Rate 10 | | | | |
| - 1st. 100 kWh | 21.101 | | | |
| - Over 100 kWh | 21.101 | | | |
| Rate 20 | 21.101 | | | |
| Rate 40 LV | 20.257 | 16.881 | 22.038 | 27.465 |
| Rate 40A LV | 20.257 | | | |
| Rate 50 MV | 20.257 | 16.881 | 22.038 | 27.465 |
| Rate 60 | 20.257 | | | |
| Rate 70 | 20.257 | 16.881 | 22.038 | 27.465 |
| Traffic Signal | 20.257 | | | |
| Electric Vehicles | 21.101 | 16.881 | 22.038 | 27.465 |

| IPP Rates for June 2023 | | | |
|---|---|---|---|
| *Class* | IPP Variable TOU Rate J$/kWh | IPP Variable Rate J$/kWh | IPP Fixed Rate J$/kVa |
| Rate 10 | | 12.37 | |
| - 1st. 100 kWh | | | |
| - Over 100 kWh | | | |
| Rate 20 | | 18.13 | |
| Rate 40 LV | | 2.02 | 664.67 |
| Rate 40 TOU | 2.53 | | 1,003.76 |
| Rate 50 MV | | 3.36 | 1,745.29 |
| Rate 50 TOU | 2.83 | | 831.79 |
| Rate 60 & Traffic Signal | | 23.95 | |
| Rate 70 | | 0.04 | 424.14 |
| Rate 70 TOU | 0.06 | | 92.71 |
| Electric Vehicles | | | |