Office of Utilities Regulation

Jamaica Public Service Company Limited

Annual Review and Extraordinary Rate Review 2022

Determination Notice

OFFICE OF UTILITIES REGULATION

2022 August 19

DOCUMENT TITLE AND APPROVAL PAGE

1. DOCUMENT NUMBER: 2022/ELE/007/DET.001

2. DOCUMENT TITLE: Jamaica Public Service Company Limited Annual Review and Extraordinary Rate Review 2022: Determination Notice

3. PURPOSE OF DOCUMENT:

This document sets out the Office's decisions on issues related to the 2022 annual rate adjustment for the Jamaica Public Service Company Limited's Tariff Review Period 2019 – 2024, the second such under the Revenue Cap regime established pursuant to the Electricity Licence, 2016 and an application for extraordinary rate review by the company.

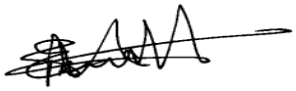
4. ANTECEDENT DOCUMENTS:

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

APPROVAL:

This document is approved by the Office of Utilities Regulation and this Determination becomes effective as of 2022 August 22.

On behalf of the Office:



Ansord E. Hewitt
Director- General

2022 August 19

Abstract

On 2022 May 10, the Jamaica Public Service Company Limited (JPS) submitted to the Office of Utilities Regulation (OUR/Office) its annual tariff review application in addition to an extraordinary rate review application. The applications were made in accordance with the provisions of the Performance Based Rate-making Mechanism ("PBRM") outlined in the Electricity Licence, 2016.

The annual tariff review application is the second 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.

1 Table of Contents

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
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

2 Executive Summary

2.1 The JPS Tariff Proposal

2.1.1 The Jamaica Public Service Company Limited (JPS) in its 2022 Annual Review submission to the Office of Utilities Regulation (OUR/Office), among other things, made the following requests:

- An increase of 32.77% in the 2022 Annual Revenue Cap adjustment factor (dPCI)
- A Q-Factor adjustment of -0.25% to the 2022 Annual Revenue Cap (RC_{2022})
- Zero Z-Factor adjustment in relation to its capital project transactions
- Annual Revenue Target for 2022 (ART_{2022}) of J$51.3B
- An additional US$M1.03M increase in the ART_{2022} by way of an Extraordinary Rate Filing in relation to a capacitor banks project and a hot gas path project for a generating unit.

2.1.2 According to JPS, the changes requested would result in an average increase in the non-fuel rate and average overall rate of 6.6% and 1.6% respectively.

2.2 The Analysis of the Proposal

2.2.1 The OUR's review of the components of the Performance Based Rate-making Mechanism (PBRM) revealed the following:

2.2.1.1 The proposed Growth Rate in Inflation/Exchange Rate factor (***dI***) of 33.02% was verified. The computation used 2019 March Consumer Price Indices (CPI) data as base indices.

2.2.1.2 A Q-Factor adjustment of -0.40 was deemed applicable, instead of the -0.25% proposed.

2.2.1.3 The OUR determined a Z-Factor adjustment of -0.40%. JPS did not propose a Z-Factor adjustment.

2.2.1.4 All components of the PBRM considered, the OUR has approved a Rate of Change factor (dPCI) of 32.22%, which has been applied to the 2022 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 2022	CPI @ March 2022	120.50	120.50
CPI @ March 2019	CPI @ March 2019	**98.20**	**98.20**
US Inflation Index	US Inflation Index		
CPI @ March 2022	CPI @ March 2022	287.50	287.50
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	22.71%	22.71%
US Inflation Factor	US Inflation Factor	13.10%	13.10%
The Growth Rate (dI)	**The Growth Rate (dI)**	**33.02%**	**33.02%**
Q Factor	Q Factor	-0.25%	**-0.40%**
Z Factor	Z Factor	**0.00%**	**-0.40%**
The Rate of Change of the Revenue Cap (dPCI)	**The Rate of Change of the Revenue Cap (dPCI)**	**32.77%**	**32.22%**

2.2.2 The OUR's review of the revenue true-up calculations show significant variances between the proposed values of a number of the proposed parameters versus the values approved by the OUR. The largest variance was observed for the foreign exchange surcharge. JPS proposed the amount of J$1.45B and the amount approved by the OUR was J$558.63M. The total amount approved for the 2021 Revenue True-Up is an offset of J$477.05M. JPS had proposed an addition to the revenue cap of J$907.32M (see Table 1.2 below).

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

2021 Revenue True-Up		
Parameters	**JPS Proposed (J$M)**	**OUR Approved (J$M)**
FX Surcharge (SFX_{2021})	1,454.98	558.63
Interest Surcharge (SIC_{2021})	(44.91)	(371.77)
Volumetric ($TUVol_{2021}$)	464.63	464.63
System Losses ($TULos_{2021}$)	(1,063.65)	(1,764.96)
WACC	96.27	(132.17)
Total	**907.32**	**(1,245.64)**

2.3 System Losses Performance and Y-Factor Adjustment

2.3.1 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 2022 Annual Revenue Target adjustment is -2.42%

2.4 H-Factor and Fuel Cost Adjustment Mechanism

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

1. JPS's proposed revised Heat Rate target of 9,791 kJ/kWh for the 2022-2023 period, was deemed unrepresentative and therefore, was not accepted.
2. The 2022-2023 Heat Rate target was set at **9,495 kJ/kWh,** consistent with the level established in the 2019-2024 Rate Review Determination Notice.

2.5 Quality of Service (Q-Factor Adjustment)

2.5.1 Based on the OUR's review of JPS's performance under the Quality of Service Standards for 2021, the Office, among other things, determined the following:

1. The Q-Factor applicable in the 2022 PBRM is -0.40%.
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.

2.6 Capital Projects Assessment (Z-Factor Adjustment)

2.6.1 Arising from the OUR's review, of JPS's performance in relation to the approved Capital Projects for 2021, the Office, among other things, determined the following:

1. The required Z-Factor adjustment outcome, including the WACC amounts to J$151.5M. This translates to a relative Z-Factor adjustment of -0.4% to the PBRM adjustment factor dPCI.
2. JPS's proposal that major projects that exceeded their approved budgets in 2021, should await the 2022 review and be assessed on their 2-year cumulative expenditure was not accepted.
3. JPS's request that the Z-Factor adjustment be waived on the 138KV transmission line project has not been accepted. The 138KV transmission line project was underspent

by -96.2%. Even though, the under spending was attributable to high escalation in costs. It was deemed unreasonable for customers to still pay the company for investments, which were delayed and did not occur.

4. An exception has been made for JPS's Smart Meter project and the project was assessed cumulatively over 2020 and 2021, in keeping with JPS's request. The project was overspent in 2020 and underspent in 2021. This may have been the result of late publication of the 2019-2024 Rate Review Determination Notice.
5. Given that there were changes to the scope of the Grid Modernization project, that resulted in a 20.4% capital cost reduction relative to the approved budget, the OUR has approved the sharing of the savings equally between JPS and customers.

Prepaid Rates: RT10 and RT20

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

(i) J$15.00/kWh for the first 117kWh within a thirty (30)-day consumption cycle.

(ii) J$22.76/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 Annual Rate Review.

2.6.3 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$132.536/kWh

(ii) Each additional kWh J$9.78/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 Annual Rate Review.

Electric Vehicles

2.6.4 The decision that was established in the 2019-2024 Rate Review Determination Notice for Electric Vehicle (EV) rates at public charging facilities stands. The energy charge shall be $64.57/kWh, $13.05/kWh and $10.06/kWh for the on-peak, partial peak and off-peak periods respectively.

Comparative Analysis

2.6.5 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 an average bill impact of 1.6%, the OUR's analysis suggests that using JPS's data, yielded approximately 2.0%. The OUR expects the average overall bill impact of the approved increase to be approximately 0.7%.

Table 1.3 - Comparative Results

Comparative Results			
Description	**JPS Proposed (J$M)**	**OUR Approved (J$M)**	
Approved Revenue Cap	37,957	37,957	
Annual Rate of Change	32.77%	32.22%	
Adjusted Revenue Cap	50,394	50,185	
2021 Revenue True-Up (incl.WACC)	907	(1,246)	
2022 Annual Revenue Target	**51,301**	**48,160**	
Heat Rate Target (kJ/kWh)	**9,791**	**9,495**	
Overall Bill Impact (incl.fuel and IPP charges)**:**	**2.0%**	**0.7%**	
Residential Customers (RT10)	3.30%	Average	0.7%
Small Commercial Customers (RT20)	0.9%	Average	0.5%
Large Commercial Customers LV (RT40)	1.93%	Average	0.8%
Large Commercial Customers HV (RT50)	2.13%	Average	1.2%
Large Commercial Customers HV Standard (RT70)	1.61%	Average	0.4%

2.7 Extra-ordinary Rate Review

2.7.1 The Offices has approved US$22.498M in additional capital expenditure for JPS in relation to four (4) projects. One of the projects involves the life-extension of 171.5MW of capacity of existing generation plant until 2026. This is to avoid wide-spread outages. The other three projects target stability and reliability on the grid particularly in the Corporate Area Energy System (CAES) and the North-Eastern region of the island,

2.7.2 The allocation of the additional capital budget to the four projects are as follows:

- Generation plant life-extension project –US$12.98M
- GT10 hot gas path project – US$2.00M
- Corporate Area 40 MVar capacitor bank project – US$1.34M
- North-East Coast Voltage Security Improvement project – US$6.182M

2.8 Other Regulatory Matters

JPS Proposal on the Adaptation of *IFRS 16 Leases*

2.8.1 Having reviewed JPS's proposed treatment of IPP leases, the Office has concluded that the matter requires deeper regulatory investigation and further discussions with JPS. In the meantime, the current treatment of these expenses as O&M costs, and the pass through to JPS's customers of the actual IPP charges paid by JPS under the PPAs, will continue through to the end of the current five-year tariff period. At the 2024-2029 Rate Review,

the matter will be accorded the treatment that satisfies the requirements that are consistent with proper regulatory accounts.

JPS Smart LED Streetlight Programme (SSP)

2.8.2 Based on the findings from the review of the Smart Streetlight Programme (SSP), the OUR's determinations are as follows:

1. JPS shall be required to submit a formal project completion report to the OUR, within ninety (90) days after the effective date of this Determination Notice.
2. JPS shall submit to the OUR, within thirty (30) days, after the effective date of this Determination Notice, the complete smart LED streetlight inventory of the 105,000 streetlights, which have been replaced.

2.9 The 2022 Non-Fuel Rate Schedule

2.9.1 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 2022 Non-Fuel Rate Schedule

RATE SCHEDULE - 2022 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	575.72	7.93							
	> 100	575.72	22.76							
Rate 10 Pre-Paid	0 - 117		15.00							
	> 117		22.76							
Rate 10 TOU	0 -300	-								
	301 - 500	-		-	-	-				
	501 - 800	-								
	> 800	-								
Rate 20 STD		1,227.56	9.78							
Rate 20 Pre-Paid	0 - 10		132.536							
	> 10		9.78							
Rate 20 TOU		-		-	-	-				
Rate 40 STD		8,648.74	6.59				2,962.42			
Rate 40 TOU		8,648.74	-	6.35	5.68	5.54	-	1,652.34	1,219.48	353.97
Rate 50 STD		8,648.74	4.67				2,052.65			
Rate 50 TOU		8,648.74	-	5.27	4.72	4.60	-	1,274.13	944.15	336.89
Rate 60 Streetlight		3,487.40	13.41							
Rate 60 Traffic Signal		3,487.40	12.93							
Rate 70 STD		8,648.74	4.66				2,720.58			
Rate 70 TOU		8,648.74		5.75	5.15	5.01		1,443.65	942.24	338.23
Electric Vehicles		-		64.57	13.05	10.06				

3 Summary of JPS's Annual Review Submission 2022

3.1 Introduction

3.1.1 On 2022 May 10, the Jamaica Public Service Company Limited (JPS) applied for its Annual Tariff Review, pursuant to Schedule 3 of the Licence 2016. The company's application, among other things, outlined its proposed Performance-Based Ratemaking Mechanism (PBRM) parameters. It also submitted a request for an Extraordinary Rate Review.

3.2 JPS Annual Review Submission

3.2.1 2022 Annual Revenue Target (ART2022)

3.2.2 The company requested a 2022 Annual Revenue Target (ART2022) of $51.302M. Table 2.1 shows JPS's proposed 2022 Annual Tariff Adjustment.

Table 2.1: JPS Proposed 2022 Annual Tariff Adjustment Summary

JPS Proposed 2022 Annual Tariff Adjustment Summary	
Item	**Amount (J$'M)**
Revenue Cap 2022	37,957
dI Adjustment (33.02%)	12,533
Revenue Cap 2022 (Adjustment for Growth -dI)	**50,490**
Q-Factor (-0.25%)	(95)
Z-Factor Adjustments	-
RC2022 * (1 + dPCI) 32.77%	50,395
Performance Adjustments	
Revenue Surcharge - RS_{2021}	(671)
FX Surcharge - FX_{2021}	1,628
Interest Surcharge - SIC_{2021}	(50)
2021 Adjustments - (RS_{2021} +FX_{2021} - SIC_{2021}) * (1+WACC)	**907**
2022 Annual Revenue Target -ART_{2022}	**51,302**

Adjusted Revenue Cap

3.2.3 JPS requested a growth rate (dPCI) of 32.77%, which is to be used to adjust the approved 2022 Revenue Cap (RC2022). This was derived from an annual growth rate (dI) factor of 33.02% and a Q-Factor adjustment of negative 0.25%. JPS did not propose a Z-factor adjustment.

3.2.4 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 33.02% is the composite inflation and foreign exchange adjustment factor, applicable to the annual growth rate.

3.2.5 With JPS's proposed dPCI of 32.77%, the approved revenue cap (RC_{2022}) of $37,957M would be adjusted upwards, resulting in an adjusted 2022 revenue cap (Adjusted RC_{2022}) of $51,302M.

Revenue True-Up

3.2.6 JPS's revenue true-up has three components:

1) The revenue surcharge that 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.

3.2.7 These true-ups reconcile JPS's actual performance during 2021, against the targets set for that year. Based on its performance during 2021, JPS has proposed the following surcharge adjustments for 2022:

- Revenue Surcharge (RS_{2021}): -$599,019,282 (reduction)
  - Volume adjustment true-up ($TUVol_{2021}$): $464,631,375
  - System losses adjustment true-up ($TULos_{2021}$): -$1,063,650,657
- Foreign Exchange Surcharge (FX_{2021}): $1,454,976,000 (increase)
- Annual Net Interest Surcharge (SIC_{2021}): $44,910,051 (increase)

3.2.8 JPS's proposed total revenue true-up derived from computing the three (3) surcharge components, is $900,866,769. 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 $907,317,906.37.

3.3 Proposed 2022 Tariff Basket and Rates

3.3.1 Based on the proposed ART_{2022}, JPS stated that an overall non-fuel tariff adjustment of 6.6% would be required. The company explained that the 6.6% increase on non-fuel tariff, would have an impact of approximately 1.6% increase on customers' total bill.

3.3.2 Table 2.2 below shows a breakdown of revenues per customer category required to recover the proposed ART_{2022}. The respective proposed tariffs for achieving these revenues are shown in Table 2.3.

Table 2.2: JPS's Proposed 2022 Revenue Basket

Class	Voltage Level	Block	Customer Charge	Energy	Demand	Total Revenue
			($)	($)	($)	($)
Rate 10	LV	≤100	4,532,839,750	4,617,669,361.00	-	9,150,509,111.00
Rate 10	LV	>100		14,063,473,148.00	-	14,063,473,148.00
Rate 20	LV		1,093,930,538	5,822,779,770.00	-	6,916,710,308
Rate 40-STD	LV		197,214,875	4,569,515,865.00	7,061,788,769.00	11,828,519,509.00
Rate 40-TOU	LV		12,360,417	685,456,007.00	892,272,012.00	1,590,088,436.00
Rate 50-STD	MV		13,905,470	989,400,377.00	1,537,552,216.00	2,540,858,063.00
Rate 50-TOU	MV		2,538,300	223,161,850.00	413,572,749.00	639,272,899.00
Rate 70-STD	MV		2,207,217	1,012,306,287.00	2,266,045,166.00	3,280,558,670.00
Rate 70-TOU	MV		441,443	243,174,567.00	320,822,690.00	564,438,700.00
Rate 60-S	LV		8,366,057	696,072,169.00	-	704,438,226.00
Rate 60-T	LV		14,106,596	8,002,816.00	-	22,109,412.00
TOTAL			**5,877,910,663**	**32,931,012,217.00**	**12,492,053,602.00**	**51,300,976,482.00**

Table 2.3: JPS's Proposed 2022 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	608.13	8.59	-	-	-	-	-	-	-
Rate 10	LV	>100		25.44	-	-	-	-	-	-	-
Rate 20	LV		1,284.83	9.85	-	-	-	-	-	-	-
Rate 40-STD	LV		9,063.83	6.74	-	-	-	3,095.77	-	-	-
Rate 40-TOU	LV		9,063.83	-	5.84	5.98	6.68	-	357.72	1,314.46	1,770.44
Rate 50-STD	MV		9,063.83	4.52	-	-	-	2,339.04	-	-	-
Rate 50-TOU	MV		9,063.83	-	5.88	6.31	6.02	-	332.10	1,004.76	1,447.20
Rate 70-STD	MV		9,063.83	4.04	-	-	-	3,115.68	-	-	-
Rate 70-TOU	MV		9,063.83	-	7.36	5.31	3.61	-	354.10	1,061.66	1,653.31
Rate 60-S	LV		3,708.36	15.77	-	-	-	-	-	-	-
Rate 60-T	LV		3,708.36	15.24	-	-	-	-	-	-	-

3.4 Quality of Service (Q-Factor)

3.4.1 The Q-Factor is a price adjustment allowed for changes in the quality of service. JPS stated that its 2021 reliability performance resulted in negative three (-3) points and consequently a negative 0.25% Q-Factor adjustment.

3.4.2 The company, however, disclosed that it plans to submit an application for Force Majeure to MSET based on its Licence. If the request is approved, JPS stated that excluding the Force Majeure events, would instead, result in a positive 0.25% Q-Factor adjustment.

3.4.3 JPS requested that the OUR consider the following:

1. A reprieve from the targets for an initial/trial period of four (4) months, to address any unforeseen issues that may arise with the introduction of a new OSI OMS.

2. Allowing the exclusion of the reliability impact of Motor Vehicle Accidents, which are "unavoidable" and the addition of power quality calls to be considered as Non-Reportable.
3. Re-consideration for the adoption of the 2.5 beta methodology in the IEEE Standard.
4. Request for the re-adjustment of annual reliability targets to align with current local and global occurrences, thereby affording JPS a reasonable ability to achieve the established targets.

3.5 System Losses (Y-Factor)

3.5.1 JPS disclosed that it has not revised its mechanism for determining the responsibility of the non-technical losses (NTL) proposed in its 2019-2024 Rate Review application.

3.5.2 Table 2.4 shows the targets for the losses spectrum proposed by JPS.

Table 2.4: JPS Proposed System Losses Targets

System Loss Component	Target
Technical loss	*7.90%*
Non-technical loss fully within the control of JPS	*6.89%*
Non-technical loss not fully within the control of JPS	*12.71%*
Total	**27.50%**

3.6 Heat Rate (H-Factor)

3.6.1 JPS proposed that the 2022 July – 2023 June thermal heat rate target be revised from 9,495kJ/kWh, as stated in the 2019-2024 Rate Review Determination Notice, to 9,791kJ/kWh. The company stated that the target adjustment would account for the impact of Bogue ST14 major overhaul and other known factors that continue to affect its thermal performance.

3.7 Extraordinary Rate Review Requests

3.7.1 JPS filed an Extraordinary Rate Review for four (4) distinct capital investment projects:

- Generation plant life-extension project
- GT10 hot gas path project
- Corporate Area 40 Mvar capacitor bank project
- North East Coast Voltage Security Improvement project

3.7.2 The generation plant life –extension project was proposed because it would not be practical to replace 171.5MW of capacity by 2023, as required by the Minister's retirement schedule. Consequently, additional capital expenditure to rehabilitate and maintain existing generating units until 2026 when the replacement 171.5MW of capacity is now expected occur. The total cost of the project based on JPS estimate is US$12.98M.

3.7.3 The GT10 Hot Gas Path project is aimed at minimizing the incidence of unserved energy and maintaining voltage quality and grid stability. The Corporate Area 40 Mvar capacitor bank project and the North East Coast Voltage Security Improvement project company

are designed voltage quality and grid stability. Together these three projects are expected to require an additional US$9.52M of capital expenditure.

4 Legal Framework

4.1 The Office 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."*

4.2 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…"

4.3 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; …

4.4 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."

4.5 Schedule 3 of the Licence 2016 outlines the procedures for determination and review of JPS's electricity tariff. Schedule 3outlines 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 otherwise 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:

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

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

4.6 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"*

4.7 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).

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

5 OUR's Analysis of the Proposal

5.1 Computation of the Annual Rate of Change (dPCI)

5.2 Background

5.2.1 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*)

5.2.2 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.

5.2.3 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. 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.

Adjusted Revenue Cap = RCy (1 + dPCI)

5.3 JPS's Proposals

5.3.1 2022 Revenue Cap (RC_{2022})

5.3.1.1 In its submission, JPS argued that in the absence of an order from the Electricity Tribunal, for a stay of Determination #29 in the 2019-2024 Rate Review Determination Notice and certain other determinations, it is proposing the retention of the determined revenue cap of J$37,957M.

5.3.2 Rate of Change of the Revenue Cap (dPCI)

5.3.2.1 JPS requested an inflation and foreign exchange growth rate (dI) of 33.02% and that the growth rate (dPCI) be set at 32.77%. It predicated its request on the following factors:

- Jamaican point-to-point inflation (INF_J) of 22.71% for the period 2019 March - 2022 March
- U.S. point-to-point inflation rate (INF_{US}) of 13.10% for the period 2019 March - 2022 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 -0.25%
- No Z-Factor adjustment proposed

5.3.3 Foreign Exchange and Interest Surcharges

5.3.3.1 In its submission, JPS stated that the 2021 revenue requirement for FX losses and interest income are as follows:

- **FX Losses (TFX)**: The FX target was J$280M. When adjusted for the 2021 growth rate (dI) of 33.02%, the proposed FX losses provision for 2021 is J$372.5M.
- **Net interest expense (TIC)**: The TIC target was J$119.2M including adjustment for the 2021 growth rate (dI) of 16.16%.

5.3.3.2 JPS presented actual foreign exchange losses (AFX) of J$1.78B, which the company stated, was the actual recorded FX losses at the average exchange rate for 2021 of J$152: US$1. Similarly, JPS presented actual net interest income (AIC) of $164.1M at the same exchange rate.

5.3.3.3 Based on those assumptions, JPS proposed foreign exchange and interest surcharges of J$1.455B and J$44.9M respectively.

5.3.4 Revenue Surcharge

5.3.4.1 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.

5.3.4.2 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. The reduction is as follows:

a) Volumetric performance adjustment of **$464.6 Million**.
b) System losses performance adjustment of **negative $1.064 Billion**.

5.3.5 The OUR's Position

5.3.5.1 The 2022 Revenue Cap (RC_{2022})

5.3.5.1.1 In accordance with Determination #29 in the 2019-2024 Rate Review Determination Notice, the revenue cap applicable for the review period, Year 2022 is J$37,957M.

5.3.6 The Rate of Change of the Revenue Cap (dPCI)

5.3.6.1 The Office reiterates that all costs used to determine 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 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.

5.3.6.2 The OUR approves an inflation and foreign exchange growth rate (dI) of 33.02% and a revenue cap growth rate (dPCI) of 32.22%. These rates are based on the following factors:

- Jamaican point-to-point inflation[1] (INF_J) of 22.71% for the period 2019 March - 2022 March
- U.S. point-to-point inflation rate[2] (INF_{US}) of 13.10% for the period 2019 March - 2022 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 -0.40%
- A Z-Factor adjustment of -0.40%

[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

5.3.6.3 The Q-factor is based on three quality of supply indices and was determined by the Office to be -0.40%. The details of the Q-Factor analysis are set out in Chapter 9 of this Determination Notice.

5.3.6.4 The Z-factor adjustment has been determined to be -0.40%. The adjustment is based on the evaluation and analysis of JPS's Capital Projects for year 2021. The details of the review are outlined in Chapter 5 of this Determination Notice.

5.3.6.5 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 32.22%.

5.3.6.6 Details of the computations are shown in Table 4.1 below.

Table 4.1: The 2022 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 2022		120.5
L5	CPI @ March 2019		**98.2**
L6	US Inflation Index		
L7	CPI @ March 2022		287.5
L8	CPI @ March 2019		**254.2**
L9	Exchange Rate Factor	(L2-L1)/L1	21.09%
L10	Jamaican Inflation Factor	(L4-L5)/L5	22.71%
L11	US Inflation Factor	(L7-L8)/L8	13.10%
L12	**The Growth Rate (dI)**	L9*{0.8+(0.8-0.0688)*L11}+(0.8-0.0688)*L11+(1-0.8)*L10	**33.02%**
L13	Q Factor		**-0.40%**
L14	Z Factor		**-0.40%**
L15	**The Rate of Change of the Revenue Cap (dPCI)**	**dI +/- Q +/- Z**	**32.22%**

5.3.7 The Adjusted Revenue Cap

5.3.7.1 The Adjusted Revenue Cap for 2022 ($Adj.RC_{2022}$) = RC_{2022} * (1 + dPCI)

= J$ 37,956,729,824 x (1 + 32.22%)
= J$ 50,185,346,705.00

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 33.02%
- A Rate of Change of the Revenue Cap (dPCI) of 32.22%
- An Adjusted Revenue Cap of J$50,185,346,705.00

5.4 The Foreign Exchange and Interest Surcharges (SFX_{2021} - SIC_{2021})

5.4.1 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."

5.4.2 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 years 2020 to 2023. The TFX amount was set at J$280 million (2019 dollars) for each year of the Rate Review period. The J$280M was based on the actual foreign exchange loss/gain balance for the year 2018, as was recorded in the JPS 2018 audited accounts.

5.4.3 JPS in its submission presented TFX_{2021} = J$280M (2019) and states that when adjusted for the 2021 growth rate (dI) of 33.02%, the approved FX losses provision for 2021 is J$372.5M. However, it would appear that JPS inadvertently applied 33.02%, which is, the 2022 growth rate instead of 16.16%, which is the 2021 growth rate.

5.4.4 In this regard, the application of the 2021 growth rate of 16.16%, yields the approved TFX provisions for 2021 of J$325.3M.

5.4.5 In making its claim for 2021 actual foreign exchange adjustment (AFX_{2021}), JPS argued that the amount applicable should be the "realised foreign exchange losses", excluding completely the unrealised foreign exchange gain".

5.4.6 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).

5.4.7 Since the introduction of the revenue cap adjustment mechanism in 2016, the OUR has applied the "net foreign exchange losses" in the Foreign Exchange Surcharge calculation as stated in the company Audited Financial Accounts and consistent with Licence 2016. Furthermore, it represents a fair treatment of JPS's foreign exchange exposure.

5.4.8 In light of 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.

5.4.9 JPS proposed an AFX_{2021} adjustments of J$1.78B. The OUR's assessment indicates that the actual amount was J$883.9M. This was derived by converting the "net foreign exchange losses" of US$5.815M to the Jamaican dollar, equivalent at the average 2021 exchange rate provided by JPS (i.e. J$152.00:US$1.00).

5.4.10 JPS proposed a TIC_{2021} provision of J$119.2M, when adjusted for the 2021 growth rate (dI) of 16.16%. This value for the TIC_{2021}, JPS explained, was derived from a formulation of interest on Customer Deposits, Debt Issuance Costs and Expense/Income.

5.4.11 In establishing the $TIC_{2021,}$ 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_{2021} is the Interest Surcharge provision of J$50M plus the 2021 growth rate (dI) of 16.16%. This translates to the final TIC_{2021} of J$58.08M.

5.4.12 It should also be pointed out that in the Reconsideration Decision 2021, the OUR posited that the TIC for all the years of the Rate Review period, was zero. However, on review the model has confirmed that it is $50M in real 2019 terms. Consequently, the actual interest surcharge (AIC_{2020}) for 2020 set out in the Reconsideration Decision 2021, requires revision. This is addressed in Section 4.3.5 below.

5.4.13 In its 2021 audited accounts, JPS reported total Interest Income of US$5.004M. Additionally, JPS provided the breakdown components of total Interest Income, which showed the total amount of US$2.738M for Interest Income on Government accounts and Interest Income on Other Commercial Accounts (See details in Table 4.2 below).

Table 4.2 – Interest Income and Net Late Payment Fees for 2021

Interest Income Breakdown	Amount (US$'000) 2021
Interest Income on Government Accounts	86
Interest Income on Other Commercial Customers Accounts	2,652
Interest Income on Deposits and Bank Accounts	2,266
Total Interest Income	**5,004**
	J$
Early Payment Incentive	858,414,507
Late Payment Fee	(872,093,444)
Net Late Payment Fees	**(13,678,937)**

5.4.14 JPS also provided information, which shows that the total Net Late Payment Fees for 2021 is J$13.68M (See Table 4.2 above for details).

5.4.15 Using the foregoing data analysis, the OUR's computation shows TIC_{2021} of J$58.08M when adjusted for the 2021 growth rate (dI) of 16.16% and AIC_{2021} of J$429.86. (See Table 4.3 below for details).

Table 4.3 – Computation of the Target and Actual Net Interest Expenses for 2021

2022 Annual Adjustment					
	Target Interest Cost (TIC)			Actual Interest Cost (AIC)	
	JPS	OUR		JPS Data	
	J$'000' Gross up @16.16%	J$'000'	J$'000' Gross up @16.16%	US$'000'	J$'000'
Interest on Government and Commercial Accounts	-			(2,738)	(416,176)
Net Late Payment Fees				(90)	(13,679)
Net Interest Expense/(Income)-Annual Adjustment	(119,189)	(50,000)	(58,080)		
Total	**(119,189)**	**(50,000)**	**(58,080)**	**(2,828)**	**(429,855)**

5.4.16 Based on the foregoing, the OUR's approved amount as FX Surcharge and Interest Surcharge offset adjustment is $186.9 million. Details of the computation are shown in Table 4.4 below.

Table 4.4 – Computation of the FX Surcharge and Interest Surcharge offset (SFX_{2021} - SIC_{2021})

FX and Interest Surcharge for 2021 (SFX_{2021} - SIC_{2021})			
Line	**Description**	**Formula**	**Value (J$)**
	FX Surcharge		
L1	TFX_{2021}		325,249,275
L2	AFX_{2021}		883,880,000
L3	**SFX_{2021}**	**L2-L1**	**558,630,725**
	Interest Surcharge		
L4	Actual Interest on Government and Commercial Accounts for 2021		(416,176,000)
L5	Actual Net Late Payment fees for 2021		(13,678,937)
L6	AIC_{2021}	L4+L5	(429,854,937)
L7	TIC_{2021}		(58,080,228)
L8	**SIC_{2021}**	**L6-L7**	**(371,774,709)**
L9	**SFX_{2021} offset SIC_{2021}**	**L3 offset L8**	**186,856,016**

5.5 Revision of 2020 Annual Interest Surcharge Recalculation

5.5.1 As indicated in paragraph 4.28 above, the 2020 Annual Interest Surcharge (SIC) in the Reconsideration Decision 2021, was calculated based on a net interest expense/(income) target, TIC, of zero. However, it has now been confirmed that the annual TIC for the rate review period is $50M in real 2019 terms. Accordingly, the amount $326.43M to which JPS was deemed to have been overcompensated in the 2021 Annual Review is revised, as shown in the computation in Tables 4.5 and 4.6 below.

Table 4.5: Revised Recalculation of the 2020 Annual Interest Surcharge (SIC)

Line		Formula	US$'000	J$'000
L1	Interest Income on GOJ Bills		410	58,564.40
L2	Interest Income on Comm/ Industial Bills		2,980	425,663.20
L3	Payment/Incentive on Residential Bills			162,000.25
L4	**Revised AIC**	**(L1+L2+L3)**		**646,227.85**
L5	TIC			56,500.00
L6	**Revised SIC**	**(L4-L5)**		**589,727.85**
Exchange Rate (Based on the 2020 Audited Financials) J$.		*142.84*		
Growth Rate Factor (dI)		*13.0%*		

Table 4.6: Revised Recalculation of 2020 SFX-SIC

Line	Item	Formula	Original	Revision	Difference
			J$'000	J$'000	J$'000
L1	SFX		731,272.51	731,272.51	-
L2	SIC		354,437.2	589,727.85	235,290.69
L3	**SFX - SIC**	**(L1 - L2)**	**376,835.36**	**141,544.66**	**(235,290.69)**
L4	**(SFX - SIC)*(1+WACC)**	**L3*(1+0.1187)**	**421,565.71**	**158,346.01**	**(263,219.70)**
WACC (%)		*11.87*			

5.5.2 The essential difference between the calculation in the Reconsideration Decision 2021 is a TIC of J$56.5M, whereas before, it was zero. The J$56.5M was derived from the application of the 2020 growth factor (dI) to the annual TIC of J$50.0M. This resulted in an interest surcharge (SIC) of J$589.7M (see Table 4.5 above). In the Reconsideration Decision 2021, the value was J$646.2M

5.5.3 As shown in Table 4.6 above, using the SIC value of J$589.7M there is an over recovery of J$263.2M (including adjustment for WACC). In this regard, the 2022 revenue requirement should be adjusted downward by J$263.2M, instead of the J$326.4M, stated in the Reconsideration Decision.

5.6 The Revenue Surcharge (RS_{2021})

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

1. *Revenue Surcharge* (RS_{y-1}): 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)

Taken all together, the revenue true-up component of the PBRM can be expressed as:

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

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

5.6.2 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.

5.7 True-Up Volumetric Adjustment ($TUVol_{2021}$)

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

5.7.2 The billing determinants for the Volumetric Adjuster (TUVoly-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:

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

Where:

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

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

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

5.7.3 The non-fuel revenue targets for energy, demand and customer charge are matched to the respective components of the target billing determinants. The approved billing determinant targets for 2021 are as follows:

- Energy sales : 2,996 GWh
- Billing demand : 5,345,186 kVA
- Customer forecast : 689,437

5.7.4 The overall total annual revenue target for 2021 was $44,578,820,493 and the assignment based on the tariff type as shown in Table 4.7 below:

Table 4.7 – Annual Revenue Target 2021

Target	Total
Energy Revenue Target	$28,615,940,338
Demand Revenue Target	$10,855,173,786
Customer Charge Revenue Target	$ 5,107,706,370
Total	**$ 44,578,820,493**

5.7.5 As shown in Table 4.8 below, the volumetric adjustment based on actual 2021 billing determinants is $464.6M. This is the aggregate of surcharge adjustments for Energy, Demand and Customer charges in the amounts of $175.6M, $296.2M and -$7.2M respectively. The result of the computation accords with the proposal from JPS.

Table 4.8 – Computation of the Volumetric Adjustment ($TUVol_{2020}$)

Volumetric Adjustment for 2021 ($TUVol_{2021}$)			
Line	**Description**	**Formula**	**Value (J$)**
	Energy Surcharge		
L1	kWh $Target_{2021}$		**2,995,809,473**
L2	kWh $Sold_{2021}$		2,977,423,181
L3	Revenue Target for Energy		**28,615,940,338**
L4	kWh Surcharge	(L1-L2)/L1*L3	175,625,665
	Demand Surcharge		
L5	kVA $Target_{2021}$		**5,345,186**
L6	kVA $Sold_{2021}$		5,199,352
L7	Revenue Target for Demand		**10,855,173,786**
L8	kVA Surcharge	(L5-L6)/L5*L7	296,164,471
	Customer Count Surcharge		
L9	#Customer Charges Billed $Target_{2021}$		**689,437**
L10	#Customer Charges $Billed_{2021}$		690,403
L11	Revenue Target for Customer Charges		**5,107,706,370**
L12	Customer Charges Surcharge	(L9-L10)/L9*L11	(7,158,761)
L13	**$TUVol_{2021}$**	**L4+L8+L12**	**464,631,375**

5.8 True-Up System Losses Adjustment ($TULos_{2021}$)

5.8.1 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

5.8.2 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%.

5.8.3 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:

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

5.8.4 $TULos_{y-1}$ for year "y-1" (the year preceding the adjustment year) is computed as:

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

5.8.5 JPS proposed that the total actual system losses of 28.29% should be allocated as follows:

- Technical losses (TL) : 7.91%
- Non-technical losses (NTL) : 20.38%
  - JNTL : 6.25%
  - GNTL : 14.13%

5.8.6 JPS proposed system losses performance adjustment of negative $1.064 billion, which represents Y_{2021} of -2.39%. However, JPS contended that the system losses targets were set at the height of COVID-19 pandemic, and they are unreasonable and unachievable.

5.8.7 The OUR's assessment results in a true-up system losses adjustment of negative $1.765B, which represents a variance, Y_{2021}, of -2.42% (see Table 4.9 below).

5.8.8 As stated in paragraph 10.3.5 of the **JPS Annual Review 2021 Reconsideration Decision**:

> *"In all previous annual reviews since 2016, and consistent 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 costs categories for reasons of transparency and optics cannot be deemed as the basis of eliminating the IPP component from the equation."*

5.8.9 Considering this, the Office determined in Reconsideration Decision #8 of the **JPS Annual Review 2021 Reconsideration Decision** that the proposal to exclude the IPP costs from the system losses calculation was not accepted and the 2021 Annual Review Determination Notice, which reflected the 2020 true-up adjustment, should be corrected in the 2022 Annual Review. Consequently, the incremental true-up system losses adjustment for IPP revenues omitted in 2020 and the total system losses true-up for 2021 are captured in this Annual Review.

5.8.10 Table 4.9 below shows the required system losses true-up calculation for 2020 and 2021 which appropriately includes the actual IPP Non-fuel revenues in the respective years. The actual IPP Non-fuel revenues were derived from the monthly fuel and IPP reports the OUR receives from JPS.

Table 4.9 – The Required System Losses Adjustments for 2020 &2021

DESCRIPTION	Symbol	2020 J$	2021 J$
TARGET -JPS's Non-fuel revenue	ART (JPS)	41,211,019,369	44,578,820,493
ACTUAL -IPP Non-fuel revenue	ART (IPP)	25,003,968,051	28,413,595,791
TOTAL TARGET -Non-fuel revenue		66,214,987,420	72,992,416,284
Required System Losses Adjustment		**(1,366,677,340)**	**(1,764,956,626)**
System Losses Factor	Y	-2.064%	-2.418%

5.8.11 Even though the required system losses adjustment in 2020 was -$1,366,677,340 only $516,081900 would be applicable in this Annual Review since an adjustment amounting to -$850,595,440 was already in the 2021 Annual Review (see Table 4.13).

5.8.12 The complete system losses adjustment for 2021 is shown in Table 4.10 below.

Table 4.10 – Computation of the 2021 System Losses Adjustment

System Losses Adjusment ($TULos_{2021}$)			
	Losses Surcharge		
L14	Actual TL_{2021}		**7.91%**
L15	Target TL_{2021}		**7.72%**
L16	Ya_{2021}	(L15-L14)	-0.19%
L17	Actual $JNTL_{2021}$		**6.29%**
L18	Target $JNTL_{2021}$		**4.58%**
L19	Yb_{2021}	(L18-L17)	-1.71%
L20	Actual $GNTL_{2021}$		**14.09%**
L21	Target $GNTL_{2021}$		**11.50%**
L22	RF		**20.00%**
L23	Yc_{2021}	(L21-L20)*L22	-0.5180%
L24	Y_{2021}	L16+L19+L23	-2.42%
L25	ART_{2021} Plus IPP Costs		72,992,416,284
L25	**$TULos_{2021}$**	**L24*L25**	**(1,764,956,626)**

5.8.13 Based on the OUR's analysis, the Revenue Surcharge for 2021;

(RS_{2021}) = $TUVol_{2021}$ + $TULos_{2021}$ = -J$613,284,504 (See Table 4.10 below)

Table 4.11 – Computation of the 2021 Revenue Surcharge

Revenue Surcharge for 2021 (RS_{2021} = $TUVol_{2021}$ +$TULos_{2021}$)			
L13	**$TUVol_{2021}$**	**L4+L8+L12**	**464,631,375**
L25	**$TULos_{2021}$**	**L24*L25**	**(1,764,956,626)**
L26	**RS_{2021}**	**L25+L13**	**(1,300,325,251)**

5.9 The Revenue True-Up 2021 and the 2022 Annual Revenue Target (ART_{2022})

5.9.1 In accordance with the Licence 2016, the WACC, which is the opportunity cost adjustment, was applied to the 2021 true-ups. The applicable WACC for the 2021 Annual Adjustment is 11.87%. As shown in Table 4.12 below, the total revenue true-up for 2021 is -$1,245.6 inclusive of the opportunity cost. This represents a net reduction to the 2022 Adjusted Revenue Cap (Adj.RC_{2022}) instead of the JPS proposed $907.3M increase.

Table 4.11 – Computation of the 2021 Revenue True-Up

2021 Revenue True-Up				
Line	**Description**	**Formula**	**JPS Value (J$)**	**OUR Value (J$)**
L1	Revenue Surcharge 2021 (RS_{2021} = $TUVol_{2021}$ +$TULos_{2021}$)		(599,019,282)	(1,300,325,251)
L2	FX and Interest Surcharge (SFX_{2021} offset SIC_{2021})		1,410,065,949	186,856,016
L3	WACC		11.87%	11.87%
L4	**2021 Revenue True-Up**	**(L1+L2)x(1+L3)**	**907,317,906**	**(1,245,638,033)**

5.9.2 In addition to the 2021 revenue true-up of –J$1,245.6M, as indicated in Section 4.3.5, JPS was overcompensated in the amount of J$263.2M, in relation to the FX and interest surcharge and J$516.1M in relation to the exclusion of IPP costs, from the system losses calculation. Consequently, the annual revenue target, ART_{2022}, includes downward adjustment of J$779.3.

5.9.3 As a result of the computations set out above, the ART_{2022} is J$48.16B. This is J$3.14B less than the ART_{2022} of J$51.30B proposed by JPS. See Table 4.12 below for details.

Table 4.13 – Computation of the 2022 Annual Revenue Target (ART_{2022})

2022 Annual Revenue Target (J$)		
Description	**Formula**	**Value**
Approved Revenue Cap	RC_{2022}	37,956,729,824
Annual Rate of Change	dPCI	32.22%
Adjusted Revenue Cap	RC_{2022} * (1 + dPCI)	50,185,346,705
Revenue Surcharge	RS_{2021}	(1,300,325,251)
FX Surcharge	SFX_{2021}	558,630,725
Interest Surcharge	-SIC_{2021}	(371,774,709)
WACC		11.87%
2021 Adjustments	(RS_{2021} + SFX_{2021} - SIC_{2021}) * (1 + WACC)	(1,245,638,033)
2021 Reconsideration Decision #8		**(516,081,901)**
2021 Reconsideration Decision #1 (Revised)		**(263,219,698)**
2022 Annual Revenue Target	**ART_{2022}**	**48,160,407,073**

Determination 2

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

1 Revenue True-up for 2021 shall be negative $1,245,638.033.00 inclusive of the application of the opportunity cost (or WACC)

2 JPS Non-fuel Annual Revenue Target for 2022 (ART_{2022}) is J$48,160,407,073.00

6 Capital Projects Assessment – Z-Factor Adjustment

6.1 Introduction

6.1.1 In the 2019-2024 Rate Review Determination Notice, the approval of JPS's capital investment plan, as shown in table 5.1 below, was done on the forecast basis as required by the Licence 2016. Consequently, the budget for each project in the capital investment plan, has been broken-down in terms of their allocation for each year of the 2019-2024 tariff period.

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

Project Area	Total Cost Approved (2019-2024)	Annual Approval			2021 Actual	2021 Variance	
		2019	2020	2021		(US$'000)	%
	(US$'000)	(US$'000)	(US$'000)	(US$'000)	(US$'000)		
Generation	**78,808**	16,826	15,503	12,784	11,332	-1,452	-11.36%
Transmission	**69,746**	16,377	9,514	11,543	6,181	-5,362	-46.45%
Distribution	**144,840**	30,815	31,259	30,849	30,264	-585	-1.90%
System Losses Mitigation	**89,930**	26,259	12,199	19,568	13,924	-5,644	-28.84%
Information Technology	**26,481**	2,991	6,050	7,181	6,127	-1,054	-14.68%
General Plant	**14,184**	3,096	3,532	2,083	1,357	-726	-34.85%
Totals	**423,989**	**96,364**	**78,057**	**84,008**	**69,185**	**-14,823**	**-11.37%**

6.1.2 In accordance with the Licence 2016, the annual variances from the capital investment budget are captured by way of the Z-Factor adjustment in the revenue requirement. The rules governing the Z-Factor adjustment are delineated in the Final Criteria.

6.2 JPS's Proposal

6.2.1 Project Overview

6.2.1.1 For 2021, JPS stated that there was an approval for forty-five (45) projects, which amounted to US$84.0M. These projects were categorized as ten (10) Major and Extraordinary Maintenance projects and thirty-five (35) minor projects.

6.2.1.2 In its 2022 Annual Review submission, JPS indicated the following:

- The scope of the GT10 and Corporate Area Capacitor Bank projects were revised, and these projects were therefore, not a part of the 2021 revenue requirement.
- A total of US$70.2M was spent towards its capital investment plan. Of this amount, US$40.7M went towards the Major and Extraordinary Maintenance projects and US$29.3M was used for Minor projects.
- The Old Harbour-Hunts Bay 138kV project, from the major project category, was halted at the procurement stage due to the impact of inflation on the project. Consequently, the project was significantly underspent, relative to the approved budget.

- Overspend was registered on three (3) of the major projects, namely: (1) Customer Growth (CCMA); (2) Distribution Structural Integrity; and (3) Meters and Service Wires (Replacement and Growth). Table 5.2 below, shows the 2021 expenditure presented by JPS for the Major and Extraordinary Maintenance projects.
- JPS underspent 11.7% of the approved budget in 2021 for the Minor projects. However, eleven (11) projects reported on, went above the approved budget. The break-out of the minor projects is seen in Table 5.3 below.

6.2.1.3 JPS noted that many of the deviations in the projects, were the result of the ongoing repercussions of the global COVID-19 pandemic.

Table 5.2: JPS's Major and Extraordinary Maintenance Projects in 2021

Major and Extraorindary Maintenance Projects	2021 Actual (US$ '000)
Critical Capital Spares-Generation	1,283
Customer Growth (CCMA)	5,256
Old Harbour - Hunt's Bay 138 kV Line	206
Voltage Standardization Program (VSP)	2,864
Distribution Line Structural Integrity	5,325
Meters & Service Wires (Replacement and Growth)	4,246
Smart Meter Program	8,977
Rami Projects	4,715
Grid Modernization Program (FCI, DA, Trip Savers)	1,829
Smart Streetlight	6,062

Table 5.3: JPS's Minor Projects in 2021

Minor Projects	2021 Actual (US$ '000)
Interbus Transformers	1,243
Tools and Equipment	254
Distribution Transformers	360
Capital Spares T&D (CKT Breaker, Recloser, DA switch, etc)	435
Grid Interconnection	425
Replace Padmounted Transformers	397
Battersea Operations Building	757
Bulk Capacitor Banks (40 MVARS)	19
Metering Infrastructure Replacements	212
Sub Station Structural Integrity	1,524
Transmission Line Structural Integrity	1,761
N-1 Protection Upgrade	1,193
Replace Pole Mounted Transformers	1,458
Rockfort Major Overhaul - RF 1	4,446
Rockfort Major Overhaul - RF 2	382
Renewables - Woodstave Pipeline Repairs Program	962
Renewables - Turbine & Generator Overhaul	1,188
Renewables Equipment Procurement and Replacement	16
Hunt's Bay - GT10 and GT 5 Hot Gas Path Inspection	457
Hunt's Bay - Plant Auxiliaries Rehabilitation	226
Bogue Peaking-Plants	2,372
Bogue - Inlet Air Chiller Major Overhaul	29
Install Charging Stations (Electric Vehicle Roll out)	483
Analytical software procurement and Development	-
Expansion of Enterprise Architecture, Business Intelligence and Analytics Capability	550
Information Technology Security Program	168
Business Efficiency	456
Upgrade CS	887
Enterprise Asset Management	506
IT Infrastructure Modernization	619
Data Centre Operations Modernization	-
Oracle Modification Project (Seperation of Accounts)	-
Purchase of laptops, desktops, Tablets	489
Electric Grid Communication Network Rehabilitation and Upgrade	1,021
Unified Communications Platform	-
Replacement of OMS	1,920
Video Wall Upgrade	61
Facilities Improvements	289
Security Cameras and Systems	96
Distribution Line Reconductoring and Relocation	1,607

6.2.2 Proposed Z-factor Adjustment Treatment

6.2.2.1 JPS in its presentation of the status of its capital investment projects, reiterated its disagreement with the treatment of major projects, set out in the Final Criteria. Based on the Final Criteria, major projects are assessed individually, to ascertain whether there are variations that would trigger a Z-factor adjustment, rather than as a part of the sum of all capital projects. This is an element of JPS's appeal to the Electricity Appeals Tribunal. In the treatment of the variances in the projects, JPS has proposed that the methodology of evaluating Major projects individually, not be used in this Annual Review period.

6.2.2.2 Further, JPS has proposed several variations in the determination of Z-Factor capital adjustments. Specifically, JPS has requested that there be "**no Z-Factor adjustment**" to:

1. The Smart Meter project JPS argued that the company was not compensated for its $4.66M overspend in 2020, even though the capital expenditure was prudently incurred. Therefore, its underspend in 2021 should not trigger an adjustment in the revenue requirement. Instead, the assessment should be made on the cumulative expenditure for 2020 and 2021.
2. Projects that exceeded their approved budgets in 2021. The adjustment should await the 2023 Annual Review, where they should be assessed on the cumulative expenditure.
3. The 138KV transmission line project. No adjustment should be applied since the underspend was attributable to the escalation of costs and the resulting suspension of the project.

6.2.2.3 In addition, JPS stated that it believes that the Meters and Service Wire (Replacement and Growth) project, will exceed the approved budget. As such, the company intends to apply in the 2023 Annual Review for a reconsideration of the approved budget made in the 2019-2024 Rate Review Determination Notice.

6.2.2.4 JPS also signaled its intention to revise the budget and timeline for the 138KV transmission line project, as it is now expected to go beyond the 2023 regulatory window.

6.3 OUR's Decision

6.3.1 Z-Factor Adjustment Procedures and Principles

6.3.1.1 The decisions taken by the OUR in relation to JPS's capital investment projects are guided by the Final Criteria, which is derived from the Z-Factor clauses set out in 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 arise 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 ratios 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.

6.3.1.2 Criterion 13 is designed to encourage timely project execution, disincentivize project cost overruns and encourage cost savings. In this regard, the Z-Factor adjustments are asymmetrical in its treatment of the deviations from the OUR's approved cost. In other words, if actual expenditure is zero or at least 5% below the approved budget in a given 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 and extraordinary maintenance projects, and the minor projects as a whole, no adjustments are required to the revenue requirement.

6.3.1.3 This methodology is logical, given that with the forward-looking revenue cap regulation employed, and the computation includes the cost of JPS's capital expenditure in its revenue requirement before the projects are implemented. In this respect, once it is established that the project was not implemented or the cost is below 5% of the approved expenditure, the revenue requirement should be adjusted downwards. Otherwise, regardless of the reason for the delay or underspend, JPS would be rewarded additional revenues for investments not made. This is the principle that informed the Z-Factor decisions below.

6.3.2 Major Projects

6.3.2.1 Old Harbour - Hunts Bay 138 kV Line

6.3.2.1.1 JPS provided the OUR with an update on the Old Harbour - Hunts Bay 138 kV Line project, in the first quarter of 2022. In the 2019-2024 Rate Review, OUR had approved a budget of US$28.96M for this project, based on the company's assessment that costs had increased significantly. Consequently, JPS requested a revised budget of

US$48.54M, along with a change in the timeline as this project would now fall outside of the 2019-2024 period.

6.3.2.1.2 In response to the 67% hike in the proposed project budget presented by JPS, the OUR in a letter to JPS dated 2022 May 06, acknowledged the adverse effect that the COVID-19 pandemic has had on costs. However, the OUR noted that not only the price of the materials required for the project has been affected by the COVID-19 pandemic, but also the demand for electricity. Consequently, peak demand on the grid was still below the pre-pandemic level. As such, the absence of the 138kV line is not expected to increase the risks to the overall grid security and stability. In this context, the OUR indicated to JPS that other options should be examined. Further, the options should be aligned with the updated Integrated Resource Plan.

6.3.2.1.3 In light of this, the project was put on hold until the 2023 Annual Review. It is expected that at this review period, JPS will present other options that will mitigate system reliability and security risks at a lower cost.

6.3.2.1.4 In the matter of the Z-Factor adjustment, JPS had approval in the amount of US$5.93M for the project. As reported in its submissions, only US$0.206M was spent arising from the project being halted. Consistent with the Final Criteria and despite the effects of the COVID-19 pandemic, having registered a -96.2% variance from the approved budget, a Z-Factor adjustment has been deemed applicable.

6.3.2.2 Smart Meter Program

6.3.2.2.1 As indicated before, JPS, in 2020, overspent $4.66M or 52.4% on its Smart Meter project. However, JPS incorrectly assumed that it would have been compensated for its over-expenditure. This is not consistent with the Final Criteria. Notwithstanding, JPS has made the case that it has effectively balanced its over-expenditure in 2020, with a 38.3% under-expenditure in 2021. In light of this, JPS has requested a cumulative assessment over the two-year period as the basis for the Z-Factor adjustment.

6.3.2.2.2 Even though, JPS would have had an opportunity to see the regulatory approved capital budgets in 2020 August, the OUR acknowledges that the 2020 December publication of the 2019-2024 tariff determination, could have put the company at a disadvantage in terms of its spending on this project. Consequently, the proposed cumulative assessment for this particular project appears to be reasonable and has been applied in this instance.

6.3.2.2.3 The analysis indicates that when both years are examined, 2020 and 2021, the approved budget of US$23.27M and the expenditure of US$22.22M resulting in a variance of -4.7%, JPS's expenditure remains below the summed approved budget. The OUR takes the view that this particular case merits special treatment. Therefore, even though the

one-year variance from the approved budget was -38.3%, given that the two-year cumulative variance was -4.7%, no Z-Factor adjustment will be applied.

6.3.2.3 **Critical Capital Spares-Generation**

6.3.2.3.1 The approved budget for 2021 as stipulated in the 2019-2024 Rate Review Determination Notice for the Critical Capital Spares-Generation project, was US$1.56M. As reported by JPS, the expenditure for this project in 2021 amounted to US$1.28M. This resulted in a variance of -17.5%. Given that the variance exceeds -5% limit, in accordance with the Final Criteria, the Z-Factor adjustment will be applied.

6.3.2.4 **Customer Growth (CCMA)**

6.3.2.4.1 The Customer Growth project had an approved budget of US$4.91M, the company, however, reported an expenditure of US$5.26M, which is 7% above the budget. The company indicated that this was due to the number of complex connections request made by customers, which required the construction of the necessary infrastructure needed to connect them to the distribution network. As stated in the 2019-2024 Rate Review Determination Notice, when these requests are made, the customer is expected to cover a high percentage of this cost. Further, the overall increase in average customer count in 2021 was less than 0.2%, which is insignificant. In this regard, the request for the non-application of the Z-Factor adjustment in this Annual Review has been denied.

6.3.2.5 **Voltage Standardization Program (VSP)**

6.3.2.5.1 In the 2019-2024 Rate Review Determination Notice, JPS was given an approval of US$3.2M for its Voltage Standardization Program project budget. JPS reported in its submissions that the expenditure for 2021 was US$2.86M. This translates to an underspend of 10.4%.

6.3.2.5.2 JPS attributed this underspend to challenges arising from the COVID-19 pandemic, which among other things, created supply chain disruption which affected the purchasing of critical material. However, given that the expected capital additions to the rate base did not occur, the OUR has a responsibility to adjust JPS's revenue requirement based on the procedures set out in the Final Criteria.

6.3.2.6 **Distribution Line Structural Integrity**

6.3.2.6.1 For 2021, the approved budget for this project was US$4.56M. JPS reported that an overspend occurred in this year and the expenditure was US$5.33M. This is a 16.67% increase over the approved budget. In accordance with the Final Criteria, no Z-Factor adjustment is warranted.

6.3.2.7 **Meters & Service Wires (Replacement and Growth)**

6.3.2.7.1 In the 2019-2024 Rate Review Determination Notice, OUR gave an approval for the budget of US$2.72M for the year 2021. The approved budget represented the acceptance of JPS's proposed cost and allocation. However, JPS's expenditure exceeds the approved budget by 55.9%.

6.3.2.7.2 JPS contended that the original budget for the project was for the installation of 13,000 meters. However, JPS has installed over 21,000 meters and build out 449km of service wires over Jamaica. The company further stated that, the demand for meter installation has outpaced the OUR's approved budget. This argument does not seem to tie back to the statistics on customer growth. For instance, the customer forecast by JPS for the year 2021 was 694,457, the actual reported for 2021 is 690,522 which is lower than the 2019-2024 forecast. The forecast that was done for 2022 (in the 2019-2024 Rate Review application) by JPS was 705,897 and due to the impact of COVID-19 pandemic, JPS's current customer forecast was reduced to 694,708, which is understandable, as the pandemic presented various unknowns that impacted the electricity sector.

6.3.2.7.3 Given the above-mentioned reasons, this project shall not have a Z-Factor adjustment to the revenue requirement.

6.3.2.8 Rami Projects

6.3.2.8.1 The approved budget for the Rami Projects US$4.79M for 2021. JPS reported that the 2021 expenditure amounted to US$4.72M, a variance of -1.52%. Consequently, by virtue of being within the -5.0%, the project will not have a Z-Factor adjustment.

6.3.2.9 Grid Modernization Program

6.3.2.9.1 The Grid Modernization project was assigned an approved budget of US$2.3M in 2021. JPS stated that the 300 Trip Savers, 104 Fault Circuit indicators and 25DA switches were all installed at a cost of US$1.83M. This compares with 300 Trip Savers, 25 DA switches, 4 Pole Mounted Reclosers and 100 Fault Circuit indicators at the cost of the approved budget. This translates to variance of -20.4%. This achievement on JPS's part is noteworthy, given that the target was achieved and there were no delays.

6.3.2.9.2 The Final Criteria allow for a 50:50 split in the cost savings associated with projects for which there is a change in scope which generate a reduction in expenditure of 10% and more relative to the original budget. Further, the Final Criteria stipulates that *"any change in scope of a project shall be subject to the OUR's approval".* In this particular case, even though there was a change in the scope of the project, the OUR's approval was not sought and therefore, the OUR has no obligation to split the cost savings. Notwithstanding, the OUR wishes to reaffirm the significance of the incentive, and urges JPS to explore project scope changes, at least a year before the Annual Review, in which the project cost will be assessed. Therefore, the OUR has taken the decision to

approve a Z-Factor adjustment that allows the 20.4% capital cost savings from this project cost to be shared equally between JPS and customers, by way of a commensurate adjustment to the revenue requirement.

6.3.2.10 Smart Streetlight

6.3.2.10.1 The approved budget allocated to the Smart Streetlight project for 2021 was US$6.86M. JPS reported that its 2021 expenditure amounted to US$6.06M, which resulted in a variance of -11.65%.

6.3.2.10.2 The company stated that the project was not completed as planned, due to the delay in delivery of smart controllers. As such, the deviation in the cost of US$0.8M, would be spent in 2022. Given the delay, which has resulted in a negative variance greater that the -5% stipulated in the Final Criteria, a Z-Factor adjustment is applicable to this project.

6.3.2.10.3 All the decisions pertaining to which projects will have a Z-Factor adjustment for major projects, are summarized in Table 5.4 below.

Table 5.4: Summary of all the Major and Extraordinary Projects for 2021

JPS' Update on the Major Projects (US$'000)					
	2021 Approved	2021 Actuals	Variance		Z-Factor Adjustment
	(US$'000)	(US$'000)	(US$'000)	(%)	
Combine Cycle Plant	-	-	-	-	
Critical Capital Spares-Generation	1,555	1,283	-272	-17.5%	Yes
Old Harbour - Hunt's Bay 138 kV Line	5,393	206	-5187	-96.2%	Yes
Distribution Line Structural Integrity	4,564	5,325	761	16.7%	No
Customer Growth (CCMA)	4,912	5,256	344	7.0%	No
Smart Streetlight	6,861	6,062	-799	-11.6%	Yes
Voltage Standardization Program (VSP)	3,196	2,864	-332	-10.4%	Yes
Meters & Service Wires	2,723	4,246	1523	55.9%	No
Grid Modernization Program *	2,299	1,829	-470	-20.4%	Yes, 50%
Smart Meter Program	14,588	8,997	-5,591	-38.3%	No
Rami Projects	4,788	4715	-73	-1.5%	No
Totals	**50,879**	**40,783**	**-10,096**	**-19.8%**	

6.3.3 Minor Projects

6.3.3.1 The approved budget for all the minor projects slated for 2021 was US$33.13M. JPS reported that the total expenditure amounted to US$29.27M. This translates to a variance of 11.65%, when all of the minor projects are examined as a whole. The projects and variances are shown in Table 5.5 below.

Table 5.5: The Approved 2021 Budget for the Minor Projects Against the Actual Incurred Expenditure for 2021

Minor Projects for 2021				
Minor Projects	Approved Budget (US$ '000)	Actual Expenditure (US$ '000)	Variance %	Z-Factor Adjustment
Interbus Transformers	1,034	1,243	20.21%	
Tools and Equipment	285	254	-10.88%	
Distribution Transformers	2,203	360	-83.66%	
Capital Spares T&D (CKT Breaker, Recloser, DA switch, etc)	451	435	-3.55%	
Grid Interconnection	358	425	18.72%	
Replace Padmounted Transformers	212	397	87.26%	
Battersea Operations Building	-	757		
Bulk Capacitor Banks (40 MVARS)	-	19		
Metering Infrastructure Replacements	192	212	10.42%	
Sub Station Structural Integrity	1,722	1,524	-11.50%	
Transmission Line Structural Integrity	1,870	1,761	-5.83%	
N-1 Protection Upgrade	1,239	1,193	-3.71%	
Replace Pole Mounted Transformers	946	1,458	54.12%	
Rockfort Major Overhaul - RF 1	4,129	4,446	7.68%	
Rockfort Major Overhaul - RF 2	422	382	-9.48%	
Renewables - Woodstave Pipeline Repairs Program	1,000	962	-3.80%	
Renewables - Turbine & Generator Overhaul	2,394	1,188	-50.38%	
Renewables Equipment Procurement and Replacement	517	16	-96.91%	
Bogue - GT3 Overhaul	700		-100.00%	
Hunt's Bay - GT10 and GT 5 Hot Gas Path Inspection	589	457	-22.41%	
Hunt's Bay - Plant Auxiliaries Rehabilitation	201	226	12.44%	
Bogue Peaking-Plants	1,277	2,372	85.75%	
Bogue - Inlet Air Chiller Major Overhaul	-	29		
Install Charging Stations (Electric Vehicle Roll out)	393	483	22.90%	
Analytical software procurement and Development	-	-		
Expansion of Enterprise Architecture, Business Intelligence and Analytics Capability	776	550	-29.12%	
Information Technology Security Program	524	168	-67.94%	
Business Efficiency	552	456	-17.39%	
Upgrade CS	1,375	887	-35.49%	
Enterprise Asset Management	662	506	-23.56%	
IT Infrastructure Modernization	659	619	-6.07%	
Data Centre Operations Modernization	270	-	-100.00%	
Oracle Modification Project (Seperation of Accounts)	139	-	-100.00%	
Purchase of laptops, desktops, Tablets	440	489	11.14%	
Electric Grid Communication Network Rehabilitation and Upgrade	1,028	1,021	-0.68%	
Unified Communications Platform	196	-	-100.00%	
Replacement of OMS	1,000	1,920	92.00%	
Video Wall Upgrade	-	61		
Facilities Improvements	1,000	289	-71.10%	
Security Cameras and Systems	250	96	-61.60%	
Distribution Line Reconductoring and Relocation	2,124	1,607	-24.34%	
Total	**33,129**	**29,268**	**-11.65%**	**Yes**

6.3.4 Capital Projects Z-Factor Assessment Summary

6.3.4.1 Based on the above findings, a commensurate Z-Factor adjustment to the 2022 tariff amounting to a total of US$1.058, before the application of the WACC, is required. Of

this amount, US$0.707M is attributable to the major projects and the remaining US$0.351M comes from the minor projects (see Table 5.6 below).

Table 5.6 – Computation of Z-Factor Adjustment for Annual Revenue Requirements

Capital Projects	Asset Life	2021 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	-	-		-					
Critical Capital Spares-Generation	30	1,555	17.9%	82.1%	1,283	48.7	223.3	5.8	7.4	13.2
Old Harbour - Hunt's Bay 138 kV Line	25	5,393	100.0%	0.0%	206	5,187.0	0.0	615.7	0.0	615.7
Distribution Line Structural Integrity	30	4,564	34.2%	65.8%	5,325	-260.2	-500.8	N/A	N/A	N/A
Customer Growth (CCMA)	25	4,912	57.8%	42.2%	5,256	-198.8	-145.2	N/A	N/A	N/A
Smart Streetlight	15	6,861	0.0%	100.0%	6,062	0.0	799.0	0.0	53.3	53.3
Voltage Standardization Program (VSP)	25	3,196	14.8%	85.2%	2,864	49.1	282.9	5.8	11.3	17.1
Meters & Service Wires	20	2,723	13.2%	86.8%	4,246	-201.7	-1,321.3	N/A	N/A	N/A
Grid Modernization Program*	30	2,299	0.0%	100.0%	1,829	0.0	470.0	0.0	7.8	7.8
Smart Meter Program	10	14,588	0.7%	99.3%	8,997	41.7	5,549.3	N/A	N/A	N/A
Rami Projects	10	4,788	17.1%	82.9%	4,715	12.5	60.5	N/A	N/A	N/A
Major Project Sub-total		**50,879**			**40,783**	**4,678.4**	**5,417.6**	**627.3**	**79.9**	**707.2**
Minor Projects	**15.82**	**33,129**	**50%**	**50%**	**29,268**	**1,930.5**	**1,930.5**	**229.2**	**122.0**	**351.2**
TOTAL		**84,008**			**70,051**	**6,608.9**	**7,348.1**	**856.5**	**201.9**	**1,058.3**

** **Note:** Capital Over-recovery shared 50:50 between JPS and Customers*

6.3.4.2 Based on the above requirements, the OUR has computed the adjustment to the revenue requirements, based on its assessment of JPS's performance against the 2021 approved Capital Project budgets. This includes the conversion of the US$ over-recovery to J$ and the application of a WACC of 11.87% to account for the opportunity cost.

6.3.4.3 As summarized in Table 5.7, the Z-Factor adjustment outcome inclusive of the WACC amounts to J$151.5M. This translates to a relative Z-Factor adjustment of 0.4%.

Table 5.7 - Computation of JPS's Capital Projects Z-Factor adjustment

Project Category	2021 OUR	2021 JPS	Capex Over - Recovery		
	Approved CAPEX	Actual Capex	ROI	Depreciation	Total
	US$'000'	US$'000'	US$'000'	US$'000'	US$'000'
Major Project	50,879	40,783	627	80	707
Minor Project	33,129	29,268	229	122	351
Total US$	84,008	70,051	856	202	1,058
Total J$'000'					**135,468**
Total adjusted for WACC (J$'000)					**151,548**
Z-Factor (Capital Projects)					**-0.40%**

Calculation Parameters

Parameter	Unit	Value
Base Exch. Rate	J$:US$	128.00
WACC	%	11.87%
Revenue Cap 2022	J$'M	37,957

Determination 3

Having reviewed JPS's performance under the Approved Capital Projects for 2021, the Office determined the following:

a) JPS's proposal that major projects that exceeded their approved budgets in 2021, should await the 2023 Annual Review, at which time, they should be assessed on the cumulative expenditure for 2021 and 2022 that was not accepted. Instead, the rules applicable based on the Final Criteria was applied, as it is consistent with good project management.

b) JPS's request that the Z-Factor adjustment be waived on the 138KV transmission line project was not accepted. The 138KV transmission line project was underspent by -96.2%. This was attributable to a pause put on the project, arising from the high escalation of costs associated with the effects of COVID-19 pandemic. Notwithstanding, given that the investments were not made, and admittedly for good reasons, it would be unreasonable to ask customers to still pay the company for such investments.

c) An exception has been made for JPS's Smart Meter project and the project was assessed cumulatively over 2020 and 2021, in keeping with JPS's request. The OUR acknowledges that the overspend may have been the result of late information, concerning the approved budget. Accordingly, no Z-Factor adjustment was made to the revenue requirement as the cumulative variance was within the -5% limit stipulated in the Final Criteria.

d) Given that there were changes to the scope of the Grid Modernization project, that resulted in a 20.4% capital cost reduction relative to the approved budget, the OUR has approved that the savings from the project be shared equally between JPS and customers, by way of a commensurate adjustment to the revenue requirement.

e) Based on the decisions above, the required Z-Factor adjustment outcome, including the WACC amounts to J$151.5M. This translates to a relative Z-Factor adjustment of 0.4%.

7 Tariff Design

7.1 Revenue Basket Compliance

7.1.1 Under the revenue cap regime, the revenue basket is compliant if for a given target demand (quantity demand), the price of electricity (within the basket of rates) is set so that the product of the two, yield the approved Revenue Target for 2022 (ART_{2022}).

7.1.2 With the advent of Covid-19 pandemic and the government efforts, commencing 2020 mid-March, to contain the spread of the pandemic, it was evident that the 'normal' demand forecast was no longer plausible. Considering this, the billing determinants approved in the 2019-2024 Rate Review Determination Notice, were revised in 2021 by the OUR in collaboration with the JPS. In 2022 Annual Review, the original forecast for the year has been reviewed. The methodology and outcome are set out in Section 6.7 below.

7.1.3 The existing rates, shown in Table 6.1 below, were approved in the 2021 Annual Review Determination Notice and were set to allow the JPS to recover the 2021 Approved Revenue Cap of J$44,578,820,493.00

Table 6.1: 2021 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	531.93	7.32							
Rate 10	LV > 100		21.03							
Rate 20	LV	1,134.20	9.03							
Rate 40	LV - Std	7,990.99	6.09				2,737.13			
Rate 40	LV - TOU	7,990.99		5.12	5.25	5.87		327.05	1,126.73	1,526.68
Rate 50	MV - Std	7,990.99	4.32				1,896.55			
Rate 50	MV - TOU	7,990.99		4.25	4.36	4.87		311.27	872.34	1,177.23
Rate 70	MV -STD	7,990.99	4.31				2,513.67			
Rate 70	MV -TOU	7,990.99		4.63	4.75	5.31		312.50	870.58	1,333.86
Rate 60	S	3,222.17	12.39							
Rate 60	T	3,222.17	11.95							

7.1.4 In order for JPS to recover the approved ART_{2022} of J$48,160,407,073.00 in 2022, the tariff structure approved in the 2019- 2024 Rate Review Determination Notice has been maintained. Additionally, the 2021 rates were evenly adjusted by a derived factor of 9.48%.

7.1.5 The product of the revised 2022 Target Billing Determinants and the Approved Non-Fuel Tariffs for 2022, yields the approved ART_{2022} of J$48.16B, which was derived and set out in Section 4.3.6 above.

Tables 6.2, 6.3 and 6.4 below, show the details of the Target Billing Determinants 2022 (revised), the 2022 Approved Non-Fuel Tariffs and the ART_{2022} Revenue Basket respectively.

Table 6.2: Target Billing Determinants 2022 (Revised)

Class		Average 2020 Customer	Energy kWh				Demand-KVA			
			Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak
Rate 10	LV < 100	621,150	537,594,801	-	-	-	-	-	-	-
Rate 10	LV > 100	-	552,835,994	-	-	-	-	-	-	-
Rate 20	LV	70,952	591,198,451	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
Rate 40	LV - STD	1,813	677,695,528	-	-	-	2,317,231	-	-	-
Rate 40	LV - TOU	113	-	53,536,000	48,317,019	12,575,512	-	279,640	281,885	230,412
Rate 50	MV -STD	127	214,549,376	-	-	-	657,344	-	-	-
Rate 50	MV -TOU	24	-	21,870,076	18,535,747	5,039,589	-	189,156	177,425	125,747
Rate 70	MV -STD	20	250,642,323	-	-	-	699,779	-	-	-
Rate 70	MV -TOU	4	-	15,169,547	18,555,367	9,164,218	-	118,805	120,284	101,700
Rate 60	S	188	44,134,343	-	-	-	-	-	-	-
Rate 60	T	317	525,142	-	-	-	-	-	-	-
TOTAL		**694,708**	**2,869,175,958**	**90,575,623**	**85,408,133**	**26,779,319**	**3,674,354**	**587,601**	**579,594**	**457,859**

Table 6.3: Approved Non-Fuel Tariffs for 2022

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							

Table 6.4: Revenue Basket - Approved Revenue Target for 2022 (ART_{2022})

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	4,291,275,466	4,261,283,281	-	-	-					8,552,558,747
Rate 10	LV > 100	-	12,583,387,782	-	-	-					12,583,387,782
Rate 20	LV	1,045,171,063	5,780,049,081	-	-	-					6,825,220,144
		-	-	-	-	-					-
Rate 40	LV - Std	188,162,048	4,466,608,529	-	-	-	6,864,621,949	-	-	-	11,519,392,525
Rate 40	LV - TOU	11,727,695	-	296,580,925	274,545,462	79,854,694	-	98,983,968	343,752,223	380,719,083	1,486,164,050
Rate 50	MV - Std	13,213,244	1,003,002,257	-	-	-	1,349,299,398	-	-	-	2,365,514,899
Rate 50	MV - TOU	2,458,278	-	100,564,887	87,464,970	26,539,150	-	63,724,865	167,515,658	160,218,328	608,486,136
Rate 70	MV -STD	2,075,698	1,168,989,973	-	-	-	1,903,801,059	-	-	-	3,074,866,730
Rate 70	MV -TOU	417,734	-	76,065,000	95,480,390	52,674,630	-	40,182,814	113,337,008	146,819,551	524,977,129
Rate 60	LV	7,867,564	591,915,257	-	-	-					599,782,822
Rate 60	LV	13,266,053	6,790,057	-	-	-					20,056,110
TOTAL		**5,575,634,843**	**29,862,026,217**	**473,210,812**	**457,490,822**	**159,068,474**	**10,117,722,405**	**202,891,647**	**624,604,890**	**687,756,962**	**48,160,407,073**

7.2 Prepaid-Rates: Residential Customers (Rate 10)

7.2.1 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$37.1M/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	32.61	15.00	62,719,634.77	28,849,878.00	(33,869,756.77)	(406,437,081.24)
50-100 kWh	111,262	103,177	77.28	15.38	15.00	132,242,274.80	128,974,910.40	(3,267,364.40)	(39,208,372.80)
100-200 kWh	203,929	354,278	144.77	16.49	16.49	486,830,993.93	486,830,993.93	-	-
200-300 kWh	80,328	232,621	241.32	19.00	19.00	368,310,306.24	368,310,306.24	-	-
300-400 kWh	27,945	114,811	342.37	20.11	20.11	192,403,021.26	192,403,021.26	-	-
400-500 kWh	11,225	59,760	443.67	20.72	20.72	103,185,059.52	103,185,059.52	-	-
500-1000 kWh	12,396	97,893	658.10	21.38	21.38	174,413,926.49	174,413,926.49	-	-
>1000 kWh	3,540	86,835	2,044.14	22.32	22.32	161,513,224.99	161,513,224.99	-	-
Total						**1,618,898,807**	**1,615,631,443**	**(37,137,121)**	**(445,645,454)**

7.2.2 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$15.00/kWh for the first 117kWh within a thirty (30)-day consumption cycle

(ii) J$22.76/kWh for each additional kWh, thereafter, within that thirty (30)-day consumption cycle

Determination 4

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

(i) J$15.00/kWh for the first 117kWh within a thirty (30)-day consumption cycle.

(ii) J$22.76/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 Annual Review.

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

7.3.1 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	67.79	67.79	15,692,734	15,692,734	-	-
(50-100] kWh	7,781	6,982	74.78	26.20	26.20	15,244,815	15,244,815	-	-
(100-1000] kWh	30,850	128,470	347.03	13.32	13.32	142,602,262	142,602,262	-	-
(1000-7500] kWh	9,482	283,614	2,492.56	10.27	10.27	242,725,842	242,725,842	-	-
>7500 kWh	1,002	218,449	18,172.28	9.85	9.85	179,310,203	179,310,203	-	-
Total						**579,883,122**	**579,883,122**	**-**	**-**

7.3.2 The rates to be charged are as follows:

- First 10kWh J$132.536/kWh
- Additional kWhs J$9.78/kWh

Determination 5

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$132.536/kWh

(ii) Each additional kWh J$9.78/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 Annual Review.

7.4 The 2022 Non-Fuel Rate Schedule

7.4.1 Table 6.7 below shows the rate schedule which sets out the approved rates and charges by customer categories for the 2022 Annual Review.

Table 6.7: JPS Rate Schedule 2022

RATE SCHEDULE - 2022 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	575.72	7.93							
	> 100	575.72	22.76							
Rate 10 Pre-Paid	0 - 117		15.00							
	> 117		22.76							
Rate 10 TOU	0 -300	-								
	301 - 500	-		-	-	-				
	501 - 800	-								
	> 800	-								
Rate 20 STD		1,227.56	9.78							
Rate 20 Pre-Paid	0 - 10		132.536							
	> 10		9.78							
Rate 20 TOU		-		-	-	-				
Rate 40 STD		8,648.74	6.59				2,962.42			
Rate 40 TOU		8,648.74	-	6.35	5.68	5.54	-	1,652.34	1,219.48	353.97
Rate 50 STD		8,648.74	4.67				2,052.65			
Rate 50 TOU		8,648.74	-	5.27	4.72	4.60	-	1,274.13	944.15	336.89
Rate 60 Streetlight		3,487.40	13.41							
Rate 60 Traffic Signal		3,487.40	12.93							
Rate 70 STD		8,648.74	4.66				2,720.58			
Rate 70 TOU		8,648.74		5.75	5.15	5.01		1,443.65	942.24	338.23
Electric Vehicles		-		64.57	13.05	10.06				

7.5 Demand Forecast

7.5.1 Introduction

7.5.1.1 Due to the impact that COVID-19 pandemic had on electricity demand, the five-year demand forecast developed for the 2019-2024 rate review period, was no longer a useful guide for the Annual Reviews. Against this backdrop, JPS was requested to submit a demand forecast in its 2021 Annual Review application. The OUR also developed its own demand forecast based on the Auto-Regressive Integrated Moving Average (ARIMA) methodology and the final approved forecast employed in the 2021 Annual Review, was derived by the rationalization JPS's and the OUR's forecasts after a process of consultation. As was the case in 2021, JPS submitted a demand forecast for 2022. The forecasts broken out into energy, KVA-demand, and customer projections are set out below.

7.5.2 JPS's 2022 Demand Forecast

7.5.2.1 Energy Sales Forecast 2022

7.5.2.1.1 In its submissions, JPS proposed a total of **3,067GWh** for the energy sales for the 2022 regulatory period. The company also presented a forecast for the energy sales based on the 'variance rule' employed by the OUR to arrive at the final approved forecast in 2021. As discussed in its submissions, JPS found that the use of the variance rule to the 2022 forecast resulted in a trajectory, the company considered unsatisfactory, and therefore retained its initial forecast of energy sales of **3,067 GWh**. See details in Table 6.8 below.

Table 6.8: JPS's forecast for Energy Sales, Demand, and Number of Customers

Rate Class	2022 JPS's Expected Energy Sales (GWh)	2022 JPS's Customer Numbers	2022 JPS's Expected Energy Demand (KVA)
Rate 10	1,090	621,150	n/a
Rate 20	591	70,952	n/a
Rate 40	792	1,926	3,092,896
Rate 50	255	151	1,139,718
Rate 60	45	24	n/a
Rate 70	294	505	1,050,354
Toatal	**3,067**	**694,708**	**5,282,968**

7.5.2.1.2 JPS had assumed that the OUR would use the forecast presented in its 2019 – 2024 Rate Review Determination Notice, which is not the case. Given the dynamics of the COVID-19 pandemic and the availability of more relevant data, the OUR has opted to generate a new forecast for the 2022 Annual Review.

7.5.2.2 Demand Forecast (KVA) 2022

7.5.2.2.1 JPS expressed that they expected the demand (KVA) to remain relatively flat for the 2022 regulatory period. The company explained that the demand (KVA) is less volatile when compared to energy consumption. As such, JPS's outlook anticipates the continued recovery of demand (KVA) from RT70 customers, which will result in an increase of **4.5%.** Additionally, RT50 is expected to remain roughly flat, and RT40 to show a marginal increase of **1.1%.**

7.5.2.2.2 JPS proposed a total of **5,283 MVA** for the demand (KVA) for the 2022/23 regulatory period, see Table 6.8 above.

7.5.2.3 Customer Count Forecast 2022

7.5.2.3.1 JPS, in its submissions, forecasted a customer count of **694,708,** which is a **0.61%** increase from the actual count recorded in 2021.

7.5.2.3.2 In JPS's proposal for both the energy sales and the demand (KVA), the company references the use of a 'variance rule' used in the 2021 Annual Review to formulate the final forecast. However, the 'variance rule', used might be ineffective if the underlying assumptions are incorrect. In this case, JPS applied the 'variance rule' to update its forecast while using a dated forecast previously generated by the OUR. Accordingly, the results were not to found to be acceptable.

7.5.2.3.3 Additionally, even though the OUR took the stance that the 2022 – 2024 Forecasts determined for the five-year period, set out in the 2019-2024 Rate Review Determination Notice remained valid, due to the uncertainties of the COVID-19 pandemic, requested JPS to submit a 2022 Demand Forecast.

7.5.2.3.4 Currently, the implications of the COVID-19 pandemic on the electricity sector are better known, hence the OUR to the decision to revisit the Energy Sales, Demand (KVA), and Customer forecast that were determined in the five-year review period 2019-2024, in its reconstruction of the 2022 forecast.

7.5.2.4 2021 Demand Forecast versus Actual Performance

7.5.2.4.1 In developing the 2021 demand forecast, the OUR used the ARIMA methodology. The ARIMA methodology is advantageous because of the availability of large spans of time-series data, and it allows for a better understanding of time series patterns. Secondly, with so little understanding of the relationship between the variables impacted by the pandemic, the methodology gets around the complication associated with multivariate models. Thirdly, the methodology provides a more robust estimate, when compared to forecasting methods based on a constant increase. Fourthly, ARIMA models are suitable

for non-stationary time series, as they deliver stable and relatively accurate short to medium-term forecasts.

7.5.2.4.2 As indicated before, the final approved forecast was based on the rationalization of JPS and the OUR forecast, derived from the application of a simple set of rules.

7.5.2.4.3 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's 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's forecasts for energy sales and the demand (KVA) was more than ± 3%. The mean of both forecasts would be used as the final forecast.

7.5.2.4.4 Given that the variation between JPS's and the OUR's customer count forecast was insignificant, the OUR accepted JPS's Forecast for 2021 as the final approved forecast.

7.5.2.4.5 Prior to deciding the approach which would be used for the methodology for the 2022 Demand Forecast, it was deemed prudent that the OUR validates its models utilized in 2021.

7.5.2.4.6 Table 6.9 below, shows the actual energy consumption against the OUR's initial forecast based on the ARIMA model and the final approved forecasts for 2021. There was a **0.8%** variance between actual and initial forecasted energy consumption, the initial forecast was **23.30 GWh** lower 2021 actual energy consumption. While there was a negative **0.5%** variance between the final forecast and the actual energy consumption, the approved forecast is **15.60 GWh** higher than the actual energy consumption.

Table 6.9: OUR's 2021 Initial and Final Approved Forecast versus Actual Energy Sales

Rate Class	2021 Actual Energy Sales (GWH)	2021 OUR's Forecast (ARIMA): GWH	Variance (ARIMA models vs Actual)	OUR's Approved Forecast (GWH)	Variance (OUR's approve vs Actual)
Rate 10	1,123.3	1,106.6	1.52%	1,129.3	-0.53%
Rate 20	545.9	558.5	-2.25%	560.3	-2.57%
Rate 40	742.6	746.3	-0.50%	765.0	-2.93%
Rates 50 & 70	518.0	496.8	4.27%	491.2	5.46%
Rate 60	49.4	47.7	3.56%	49.0	0.82%
Total	**2,979.2**	**2,955.9**	**0.79%**	**2,994.8**	**-0.52%**

7.5.2.4.7 The initial forecast for the demand (KVA) was based on the growth forecasted in the energy sales, which was derived from the ARIMA model. Table 6.10 below shows the OUR's initial forecast against the actual demand (KVA), resulting in a negative variance

of **2.64%.** While the final forecast against the actual recorded demand (KVA), resulted in a negative variance of **2.73%.** Both of the forecasts had a higher demand (KVA), than the actual demand (KVA) for 2021.

Table 6.10: OUR's Initial and Final Approved Forecast against the Actual Demand (KVA) for JPS in 2021

Rate Class	Mode	2021 Actual Demand (KVA)	2021 OUR's Initial Forecast (KVA)	Variance	2021 OUR's Final Forecast (KVA)	Variance
Rate 40	STD	2,280,965	2,188,948	4.20%	2,241,744	1.75%
	TOU	778,974	788,499	-1.21%	802,908	-2.98%
	Total	**3,059,939**	**2,977,447**	**2.77%**	**3,044,652**	**0.50%**
Rate 50	STD	647,615	728,518	-11.11%	704,421	-8.06%
	TOU	486,861	498,277	-2.29%	477,283	2.01%
	Total	**1,134,476**	**1,226,795**	**-7.53%**	**1,181,704**	**-4.00%**
Rate 70	STD	661,594	801,227	-17.43%	783,298	-15.54%
	TOU	343,344	335,116	2.46%	335,532	2.33%
	Total	**1,004,938**	**1,136,343**	**-11.56%**	**1,118,830**	**-10.18%**
OVERALL		**5,199,353**	**5,340,585**	**-2.64%**	**5,345,186**	**-2.73%**

7.5.2.4.8 In determining the customer count for 2021, the OUR made the decision to use the actual customer as at 2021 May. However, as previously stated, due to the insignificant variance with the OUR's and JPS's forecasts, the OUR has accepted the customer count forecast from JPS. The details of the variance between the actual customer count for 2021, against the initial and approved forecast, is shown in Table 6.11 below.

Table 6.11: OUR's Initial Forecast and Final Approved Forecast versus Actual Customer Numbers in 2021

Rate Class	Actual Customer Numbers	OUR's Initial Forecast	Variance	OUR's Final Forecast	Variance
Rate 10	618,726	610,893	1.28%	617,023	0.28%
Rate 20	69,251	69,232	0.03%	69,837	-0.84%
Rate 40	1,890	1,891	-0.05%	1,899	-0.47%
Rate 50	149	149	0.00%	149	0.00%
Rate 70	24	24	0.00%	24	0.00%
Rate 60	482	483	-0.21%	504	-4.37%
Total	**690,522**	**682,672**	**1.15%**	**689,436**	**0.16%**

7.5.2.4.9 From the above-mentioned review, it can be concluded that the models performed well. As such, the OUR has opted to reuse the ARIMA methodology for the 2022 Annual Review period.

7.6 OUR's Decision

7.6.1 Energy Sales Forecast 2022

7.6.1.1 For the 2022 Annual Review period, the ARIMA models generated the forecast. The OUR is excepting energy consumption to be **2.5% (3,054 GWh)** higher, than what was recorded in 2021 **(2,979 GWh)**.

Table 6.12: OUR's Energy Sales Forecast for the 2022 Annual Review Period

Rate Class	2021 Actual Energy Sales (GWh)	OUR 2022 Expected Energy Sales (GWh)	Percentage Change
Rate 10	1,123	1,094	-2.6%
Rate 20	546	588	7.7%
Rate 40	743	774	4.2%
Rate 50	236	265	12.1%
Rate 60	49	45	-9.8%
Rate 70	282	289	2.3%
Toatal	**2,979**	**3,054**	**2.5%**

7.6.1.2 Table 6.12 above, shows OUR's energy sales forecast by rate class. The energy consumption for residential customers (Rate 10) is expected to decline by **2.6%** in 2022 compared to 2021. This can be attributed to the government and most private-sector ending their work-from-home orders for staff. Likewise, the energy consumption for rate 60 is expected to decline in 2022 by **9.8%**, with the expected full roll out of JPS's LED Smart Street Lighting project.

7.6.1.3 Rate classes for 20, 40, 50 and 70 (these classes are all linked to business activities) are expected to increase by **7.7%, 4.2%, 12.1%,** and **2.3%** respectively. These increases are due in part to the removal of curfew hours and the increased economic activity.

Table 6.13: Comparison between JPS and OUR's 2022 Energy Sales Forecast

Rate Class	2022 JPS's Expected Energy Sales (GWh)	OUR 2022 Expected Energy Sales (GWh)	Percent Variance
Rate 10	1,090	1,094	-0.37%
Rate 20	591	588	0.48%
Rate 40	792	774	2.33%
Rate 50	255	265	-3.59%
Rate 60	45	45	1.03%
Rate 70	294	289	1.89%
Toatal	**3,067**	**3,054**	**0.43%**

7.6.1.4 Table 6.13 above, shows a comparison of the 2022 energy sales forecast between JPS and OUR. JPS's expected energy consumption is approximately **0.43%** higher than that of the OUR's. In examining all the rate classes, the variance for each of the classes are less than **4.0%.** With Rate 50 having the highest variance of **3.59%**, as the OUR is expecting a larger increase in the energy consumption of this class than JPS, the details are shown in Table 6.13 above and Table 6.14 below.

Table 6.14: Detail Energy Forecast Breakout

Rate Class	JPS 2022 Forecast (GWh)	OUR 2022 Forecast (GWh)	Variance JPS vs. OUR %
Rate 10	**1,090**	**1,094**	**-0.37%**
LV < 100	538	538	
LV > 100	553	556	
Rate 20	**591**	**588**	**0.48%**
Rate 40	**792**	**774**	**2.33%**
LV - STD	678	659	
LV - TOU	114	115	
Off-Peak	54	54	
Part Peak	48	49	
On-Peak	13	12	
Rate 50	**255**	**265**	**-3.59%**
MV - STD	219	218	
MV - TOU	37	46	
Off-Peak	16	22	
Part Peak	15	19	
On-Peak	6	5	
Rate 60	**45**	**45**	**1.03%**
Streetlights	44	44	
Traffic lights	1	1	
Rate 70	**294**	**289**	**1.89%**
MV - STD	251	258	
MV - TOU	43	31	
Off-Peak	15	14	
Part Peak	19	13	
On-Peak	9	3	
Total	**3,067**	**3,054**	**0.43%**

7.6.2 Demand Forecast (KVA) 2022

7.6.2.1 In developing the demand (KVA) forecast, the OUR decided on an approach based on the conversion of kWh to KVA using the power factor. A conversion from kWh to KVA was done using the formula **kW = KVA * PF.**

7.6.2.2 Below are the following assumptions used in the OUR computations:

1. To convert from kWh to kW, the OUR used the time associated with TOU peak, partial peak, and off-peak and assumed a 5-day work week, for each category for Rates 40, 50, and 70.

2. The power factors for 2021 were calculated, and the OUR applied these power factors to the 2022 forecasts.

7.6.2.3 From the demand (KVA) forecast, the OUR is expecting a total of **5,328 MVA**. This amount represents a **2.5%** and **0.86%** increase, when compared to actual recorded KVA for 2021 and JPS' 2022 prediction respectively. The details are shown in Table 6.15 below.

Table 6.15: Comparison of the Actual KVA Demand against the OUR/JPS's KVA 2022 Forecast

	Mode	Unit	2020	2021	OUR 2022	JPS 2022	Growth OUR 2022/21	Growth JPS 2022/21	%Variance (OUR vs JPS)
Rate 40	STD	KVA	2,255,708	2,280,305	2,353,354	2,281,108	3.2%	0.0%	-3.1%
	TOU	KVA	804,714	778,974	772,086	811,788	-0.9%	4.2%	5.1%
	Total	**KVA**	**3,060,422**	**3,059,279**	**3,125,440**	**3,092,896**	**2.2%**	**1.1%**	**-1.0%**
Rate 50	STD	KVA	665,661	647,515	669,716	657,344	3.4%	1.5%	-1.8%
	TOU	KVA	455,285	486,861	502,283	482,374	3.2%	-0.9%	-4.0%
	Total	**KVA**	**1,120,946**	**1,134,376**	**1,171,999**	**1,139,718**	**3.3%**	**0.5%**	**-2.8%**
Rate 70	STD	KVA	783,298	661,594	672,253	727,304	1.6%	9.9%	8.2%
	TOU	KVA	347,921	343,344	358,529	323,050	4.4%	-5.9%	-9.9%
	Total	**KVA**	**1,131,219**	**1,004,938**	**1,030,782**	**1,050,354**	**2.6%**	**4.5%**	**1.9%**
Grand Total			**5,312,587**	**5,198,593**	**5,328,221**	**5,282,968**	**2.5%**	**1.6%**	**-0.8%**

7.6.3 Customer Count Forecast 2022

7.6.3.1 The first step in computing the 2022 customer forecast, was to use of the monthly average of the customer numbers for 2020 and 2021. From this average, the calculated movement from 2020 to 2021 was applied in the formulation of the customer forecast for 2022.

7.6.3.2 Table 6.16 below, shows a comparison between OUR and JPS's customer count forecasts. There is a 1.03% variance between the two total number of customers; JPS is expecting a higher increase in customer than the OUR.

Table 6.16: Showing Customer Forecast for 2022

	Units	OUR's Forecast 2022	JPS' Forecast 2022	Variance
Rate 10	No.	615,558	621,150	0.91%
Rate 20	No.	69,477	70,952	2.12%
Rate 40	No.	1,898	1,926	1.48%
Rate 50	No.	148	151	2.03%
Rate 70	No.	24	24	0.00%
Rate 60	No.	505	505	0.00%
Total	**No.**	**687,610**	**694,708**	**1.03%**

7.6.4 OUR's Final Decision

7.6.4.1 The OUR retains the decision criteria used in the 2021 Annual Review determination for Energy Sales and KVA. The OUR will also apply this rule to the number of customers forecast as well. The rules are:

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

7.6.5 Energy Sales

7.6.5.1 Table 6.17 below, shows OUR's final decision for the 2022 tariff period. This decision was based on the **3%** variance rule described above. Therefore, JPS's forecast for all rate classes is accepted except for rate 50, where the average between JPS's and OUR's forecasts was used. Based on these criteria, the OUR expects total energy consumption to be approximately **3,072 GWH** for 2022. This figure represents a **3.1%** increase in energy sales compared to 2021.

Table 6.17: OUR's and JPS's initial 2022 Energy Sales Forecast along with OUR's final decision

Rate Class	2021 Actual Energy Sales (GWH)	OUR's Forecast 2022 (GWH)	JPS' Forecast 2022 (GWH)	Variance (JPS vs OUR)	OUR's Final Decision 2022 (GWH)	Percentage Change (2021 vs OUR's Final Decision)
Rate 10	1123.3	1,094.1	1,090.0	-0.37%	1090.0	-3.0%
Rate 20	545.9	588.2	591.0	0.48%	591.0	8.3%
Rate 40	742.6	774.0	792.0	2.33%	792.0	6.7%
Rate 50	236	264.5	255.0	-3.59%	259.8	10.1%
Rate 70	282	288.6	294.0	1.89%	294.0	4.3%
Rate 60	49.4	44.5	45.0	1.03%	45.0	-8.9%
Total	**2,979.2**	**3,053.9**	**3,067.0**	**0.43%**	**3071.8**	**3.1%**

7.6.6 Energy Demand (KVA)

7.6.6.1 The OUR's 2022 decision for KVA is shown in Table 6.18 below. The variance rule was applied to the Standard and TOU total for Rates 40, 50 and 70, not the total figure for the rate classes. The OUR is expecting an energy demand of **5,299 MVA** for 2022, representing a **1.9%** increase, compared to 2021. See Table 6.18 below for details.

Table 6.18: OUR's and JPS's Initial 2022 Energy Demand Forecast along with OUR's Final Decision

Rate Class	Mode	2021 (KVA)	OUR 2022 (KVA)	JPS 2022 (KVA)	%Variance (OUR vs JPS)	OUR's Decision 2022 (KVA)	Percentage Change (2021 vs OUR's Final Decision)
Rate 40	STD	2,280,305	2,353,354	2,281,108	-3.1%	2,317,231	1.6%
	TOU	778,974	772,086	811,788	5.1%	791,937	1.7%
	Total	**3,059,279**	**3,125,440**	**3,092,896**	**-1.0%**	**3,109,168**	**1.6%**
Rate 50	STD	647,515	669,716	657,344	-1.8%	657,344	1.5%
	TOU	486,861	502,283	482,374	-4.0%	492,328	1.1%
	Total	**1,134,376**	**1,171,999**	**1,139,718**	**-2.8%**	**1,149,672**	**1.3%**
Rate 70	STD	661,594	672,253	727,304	8.2%	699,779	5.8%
	TOU	343,344	358,529	323,050	-9.9%	340,789	-0.7%
	Total	**1,004,938**	**1,030,782**	**1,050,354**	**1.9%**	**1,040,568**	**3.5%**
Grand Total		**5,198,593**	**5,328,221**	**5,282,968**	**-0.8%**	**5,299,408**	**1.9%**

7.6.7 Number of Customers

7.6.7.1 Based on the decision criteria, the OUR has accepted JPS's 2022 customer numbers. The OUR is expecting 2022 customer numbers to grow by approximately **0.6%,** relative to 2021. See details in Table 6.19 below.

Table 6.19: OUR's and JPS's Initial 2022 Customer Number Forecast along with OUR's Final Decision

Rate Class	2021 Actual Customer Numbers	OUR's Forecast 2022	JPS' Forecast 2022	Variance	OUR's Final Decision 2022 (GWH)	Percentage Change (2021 vs OUR's Final Decision)
Rate 10	618,726	615,558	621,150	0.91%	621,150	0.4%
Rate 20	69,251	69,477	70,952	2.12%	70,952	2.5%
Rate 40	1,890	1,898	1,926	1.48%	1,926	1.9%
Rate 50	149	148	151	2.03%	151	1.3%
Rate 70	24	24	24	0.00%	24	0.0%
Rate 60	482	505	505	0.00%	505	4.8%
Total	**690,522**	**687,610**	**694,708**	**1.03%**	**694,708**	**0.6%**

Determination 6

a) The Office has approved the 2022 Sales/Demand Forecasts, based on a synthesis of JPS's and the OUR's forecasts. In light of this the forecast applicable to the derivation of the rates in this Annual Review and the volumetric targets for 2022, shall be those set out in the tables referenced below:
   - Energy Sales Forecast: Table 6.17
   - Energy Demand Forecast: Table 6.18
   - Customer Number Forecast: Table 6.19

b) For the 2023 Annual Review, JPS shall be required to submit a 2023 Sales/Demand Forecast which should include energy sales, energy demand (KVA) and the customer number, by rate classes.

7.6.8 Rate 10 and Rate 20 TOU Rates

7.6.8.1 Included in JPS's 2019-2024 Rate Review Application, was a proposal for the introduction of a time-of-use (TOU) rate option for residential (RT10) customers. The design proposed was based upon the concept of a ratcheted demand charge and an energy charge that would vary with kWh consumption. The OUR in its response, took the view that it was "a positive step toward greater cost reflectivity" and approved the establishment of RT10 TOU rates. Additionally, the OUR approved TOU rates for the RT20 customer category. The approval of these two new customer categories, are set out in the JPS 2019-2024 Rate Review Determination Notice.

7.6.8.2 JPS, by way of a letter, dated 2021 February 8, expressed concerns that the TOU design approved by the OUR, contained weaknesses that would put the company at risk, primarily in relation to revenue recovery. The OUR in its response, agreed that there was a risk of revenue losses and adjusted the rates and approved a new set of TOU rates, in JPS's 2021 Annual Review Determination Notice.

7.6.8.3 In 2022 April presentation to the Office's Technical Committee, JPS objected to the revised TOU rates, arguing that:

- The rates were flawed in terms of price signaling and do reflect the marginal cost of service;
- The design would not result in any significant variable O&M costs savings from customers shifting consumption from the on-peak period to the off-peak period.

- The structure of the rates would allow customers to derive financial benefit, without behavioural change (particularly, the RT20 category).
- The design was based on On-peak rates that are excessively high and not reflective of the system cost nor demand characteristics of the classes.

7.6.8.4 The OUR has, therefore, place a hold on the implementation of TOU rates and is in the process of reviewing the issues raised by JPS, with a view of publishing its position on TOU rates before the end of 2022.

8 H-Factor and Fuel Cost Adjustment Mechanism

8.1 Introduction

Background

8.1.1 In accordance with Schedule 3 of the Licence 2016 (applicable to the Fuel Rate Adjustment aspect of JPS's price control regime), at each Annual Review, during a 5-year revenue cap period, the Office is required to determine the H-Factor, as necessary, to reflect the applicable Heat Rate versus the pre-established yearly targets established in the 5-year Rate Review. 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.

8.2 Regulatory Principles for Setting Heat Rate Targets

8.2.1 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 the electricity generation related fuel costs to customers. As stipulated by the Licence 2016, the targets are set by the Office normally at the 5-year Rate Review Process. 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 5-year Rate Review Process.

8.2.2 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 take into account, legitimate system constraints, provided that, JPS is taking reasonable action to mitigate these constraints.
4) The targets should normally be set at the 5-year Rate Review Process 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.

8.3 Regulatory Objectives and Approach

8.3.1 Although the OUR had conducted a comprehensive Heat Rate evaluation/analysis during the 2019-2024 Rate Review Process, there has been some recognizable system developments since the effective date of the 2021 Annual Review Determination Notice. These developments have signalled the need for further evaluation of the generation system orientation and operations, and the initial Heat Rate performance forecasts developed for the 2022-2023 rate adjustment period. The main system developments during the stated period include:

- The commissioning of the JPS/CB 10MW Combined Heat and Power (CHP) DG facility in 2021 December, the operation of which is expected to impact JPS's thermal plants Heat Rate, going forward.
- Implementation of T&D projects during the review period that would have resulted in some changes to the system configuration, which has implications for the generation dispatch process.

8.3.2 Given these developments, the OUR conducted a Heat Rate evaluation covering the 2022-2023 review period to determine whether the pre-established 2022-2023 Heat Rate target remains representative and reasonable to ensure the efficient pass-through of JPS's electricity generation related fuel costs to ratepayers. The scope of this Heat Rate evaluation is outlined below.

8.4 Scope of 2022-2023 Heat Rate Review

8.4.1 The scope of OUR's 2022-20233 Heat Rate evaluation for this 2022 Annual Review, encompasses, among other things, the following activities:

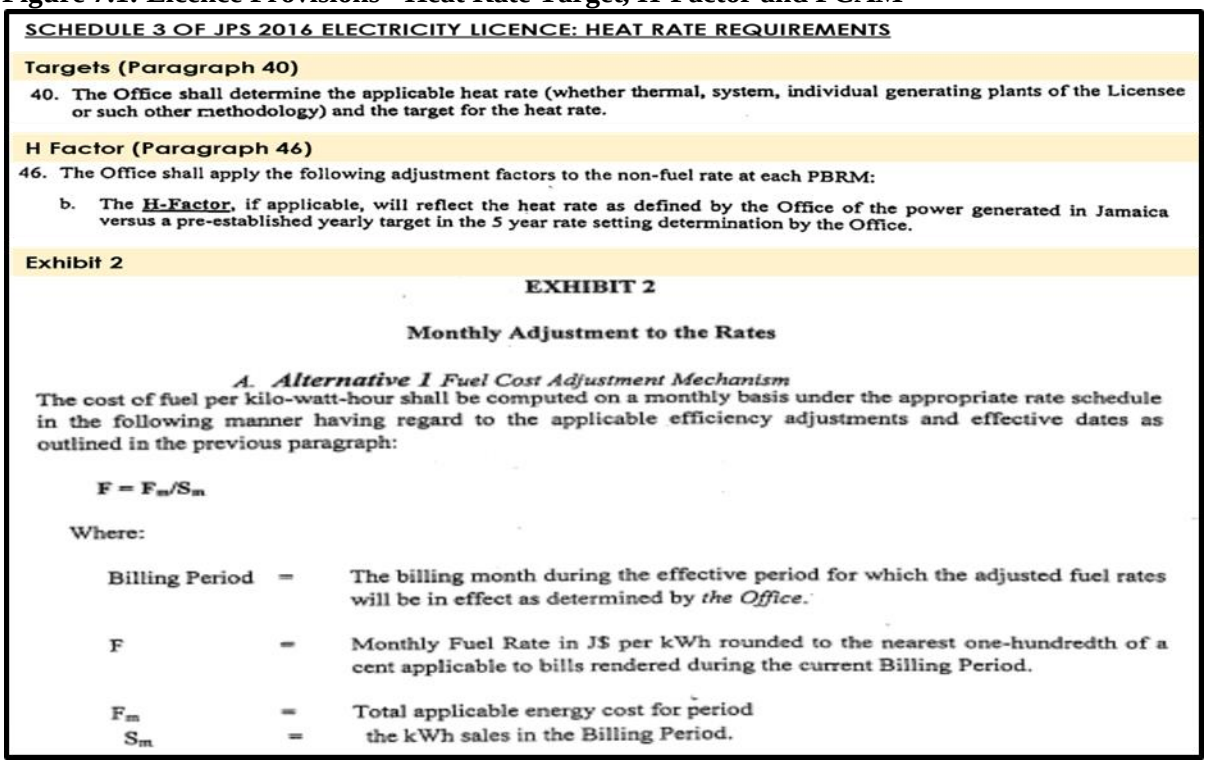
- Technical evaluation of JPS's 2022-2023 Heat Rate proposals, (including all supporting schedules and data submitted by JPS up to 2022 June 03), using the relevant OUR models;
- Develop Heat Rate forecast for 2022-2023, using OUR's Heat Rate model.
- Scenario analysis to assess the effects of the operational dynamics and output variations of the available generating plants (considering transmission system operating constraints) on JPS's Heat Rate performance, during the review period.
- Review of the 2022-2023 Heat Rate target approved in the 2019-2024 Rate Review Determination Notice, and reset the target if deemed necessary: and
- Review and determine Heat Rate methodology, H-Factor and FCAM for the 2022-2023 review period.

8.5 Licence Requirements Applicable to Heat Rate And Fcam

8.5.1 For reference, the provisions of the Licence 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 relevant Licence 2016 provisions 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.

8.6 Approved Heat Rate Target

8.6.1 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.

8.7 Pre-established 2021-2022 Heat Rate Target

8.7.1 The Office, in the 2019 – 2024 Rate Review Determination Notice, approved the Heat Rate targets to be applied in the FCAM each month over the 2019-2024 review period, as described in Table 7.1 below.

Table 7.1: Office Pre-established Heat Rate Targets for JPS

OFFICE APPROVED 2022-2023 HEAT RATE TARGETS FOR JPS: 2019-2024 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**	To be used in FCAM for each applicable month in review period
2023	2023-2024	JPS Thermal Plants	**9,470**	

8.7.2 As shown, the pre-established 2022-2023 target for JPS is **9,495 kJ/kWh**. Subject to any revision by the Office, this target is to be applied in the defined FCAM over the 2022-2023 review period.

8.7.3 On the matter of the reasonableness of the 2021-2024 annual Heat Rate targets, contrary to JPS claims, the Office in the 2019-2024 Rate Review Determination Notice stated that these targets are "reasonable and prudent" and were set in keeping with the requirements of the Licence 2016 and established regulatory precedents. The Office also asserted that the relevant annual target will be reviewed at the respective Annual Reviews during the 2019-2024 Rate Review period to account for material EE improvements and factors outside the control of JPS.

8.8 Fuel Cost Adjustment and Recovery Mechanism

Approved FCAM for 2019-2024 Review Period

8.8.1 In keeping with the provisions of paragraph 40 of Schedule 3 of the Licence 2016 and established regulatory precedents, 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 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 2020-2024 regulatory period shall be the formulae defined in Figure 7.2 below.

Figure 7.2: Office Approved FCAM for the 2019-2024 Review Period

$$\textit{Allowed Fuel Cost} = \textit{IPPs Fuel Cost} + \left[\textit{JPS Fuel Cost} \times \textit{H-Factor [Thermal]} \right]$$

[OUR Approved FCAM: (2020 - 2024)]

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

8.8.2 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 to 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.

8.9 Factors contributing to System Fuel Cost

8.9.1 In JPS utility operations, 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. The fuel costs are largely dependent on the following factors:

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

8.9.2 These linkages, infer that system fuel cost in each month is likely to change whenever one or more of the above factors are altered. This means that any resulting variations in monthly fuel cost will be reflected in the adjusted monthly fuel rates.

8.10 Overview of Generation System Performance

System Developments

8.10.1 Since 2016, the electricity sector has made significant strides towards achieving a more sustainable, secure and cost effective supply energy mix, with recent major developments including the commissioning of the following:

- Eight Rivers Energy Company Limited's (EREC's) 37MW Solar PV Generation facility at Paradise Park, Westmoreland, in 2019 June.
- JPS 24.5MW/16.6MWh Hybrid Energy Storage System (HESS), in 2019 December.
- South Jamaica Power Company (SJPC) 194MW NG/ADO fired CCGT plant, in 2019 December.
- NFE-JAMALCO 94MW NG/ADO Combined Heat & Power (CHP) plant, in 2020 February; and

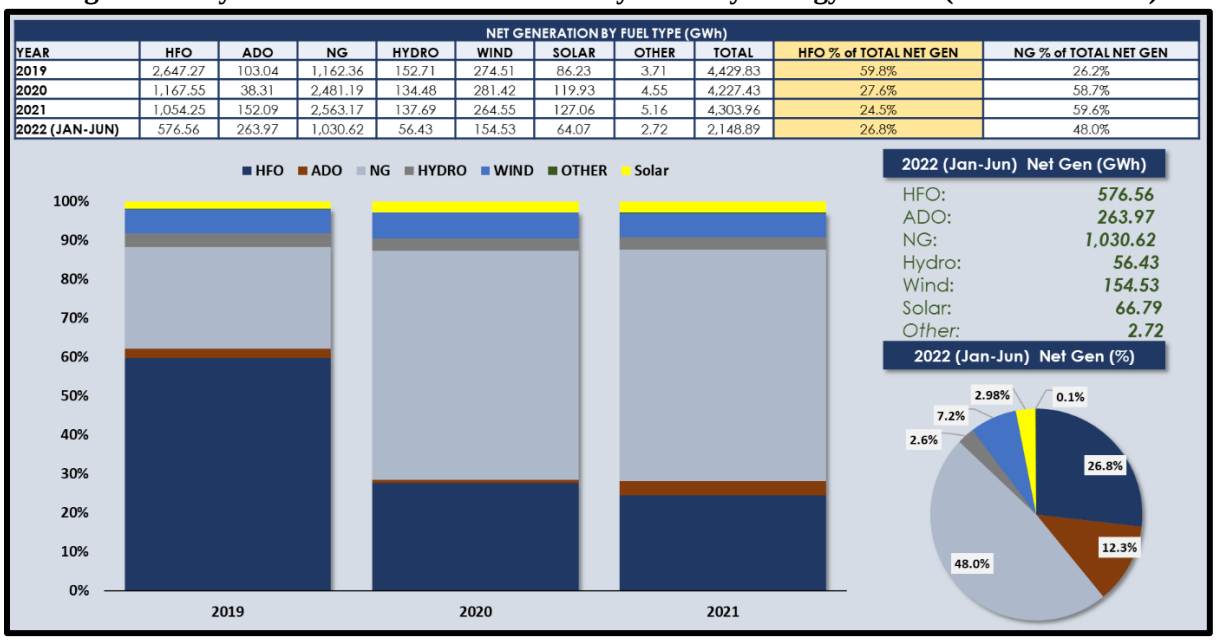
- JPS/CB 10MW CHP DG plant at Hill Run in St, Catherine, and declaration of Commercial Operations Date (COD), on 2021 December 17.

8.10.2 Notwithstanding these advancements, 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 system demand, and to contribute to system reliability and stability at least cost to ratepayers. After the generation capacity requirements are identified, the Generation Procurement Entity (GPE), subject to the provisions of the Electricity Act, 2015 is charged with the responsibility for procuring the new generation capacity for the system. The pivotal role of the OUR in these processes, is to ensure that such activities take into account the lowest possible economic cost for ratepayers.

8.11 Energy Supply Mix and Net Generation

8.11.1 Based on the existing energy matrix, the primary energy sources used for the production of electricity 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-Jun), is represented is in Figure 7.3 below.

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



NET GENERATION BY FUEL TYPE (GWh)

YEAR	HFO	ADO	NG	HYDRO	WIND	SOLAR	OTHER	TOTAL	HFO % of TOTAL NET GEN	NG % of TOTAL NET GEN
2019	2,647.27	103.04	1,162.36	152.71	274.51	86.23	3.71	4,429.83	59.8%	26.2%
2020	1,167.55	38.31	2,481.19	134.48	281.42	119.93	4.55	4,227.43	27.6%	58.7%
2021	1,054.25	152.09	2,563.17	137.69	264.55	127.06	5.16	4,303.96	24.5%	59.6%
2022 (JAN-JUN)	576.56	263.97	1,030.62	56.43	154.53	64.07	2.72	2,148.89	26.8%	48.0%

8.11.2 For 2021, the relative contributions to system net generation were: 59.55% from NG, 24.49% from Heavy Fuel Oil (HFO), 3.53% from ADO, with RE sources supplying 12.41%, while other sources accounted for a minute portion of just 0.01%.

8.12 RE Generation

8.12.1 The annual generation (GWh) from RE sources, reported over the period 2019 - 2022 (Jan-June) is shown in Table 7.2 below. As indicated, RE generation supplied to the grid in 2021 (534.15 GWh) was down by 5.9 GWh, relative to the 2020 level (540.01 GWh). For 2022, the RE generation supplied to the grid up to the end of June was 277.73 GWh or 12.92% of total net generation.

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

GENERATION FROM RE SOURCES (2019-2022 MAY)					
Components	**2019**	**2020**	**2021**	**2022 Jan-Jun**	**Remarks**
RE Generation GWh)	516.82	540.01	534.15	277.73	
System Net Generation	4,429.83	4,227.43	4,303.96	2,148.89	
RE % of Net Generation	**11.67%**	**12.77%**	**12.41%**	12.92%	
NEP RE Target (%)	-	**15.00%**	-		2020 RE Target not yet achieved.

8.12.2 While the RE contribution to net generation contribution is invaluable, given the environmental effects, it should be noted that all the interconnected RE generation facilities supply net energy output (NEO) to the grid, on an "as-available" basis, due to the inherent intermittency of the RE resource. However, this dynamic creates the need for energy balancing requirements that is mostly supplemented by firm capacity dispatchable thermal

plants, which has ramifications for their overall operating efficiency and Heat Rate performance. This situation is taken into account in the Heat Rate evaluation process.

8.12.3 In summary, the generation data shows that the 2020 RE target of 15% established in the NEP is yet to be achieved.

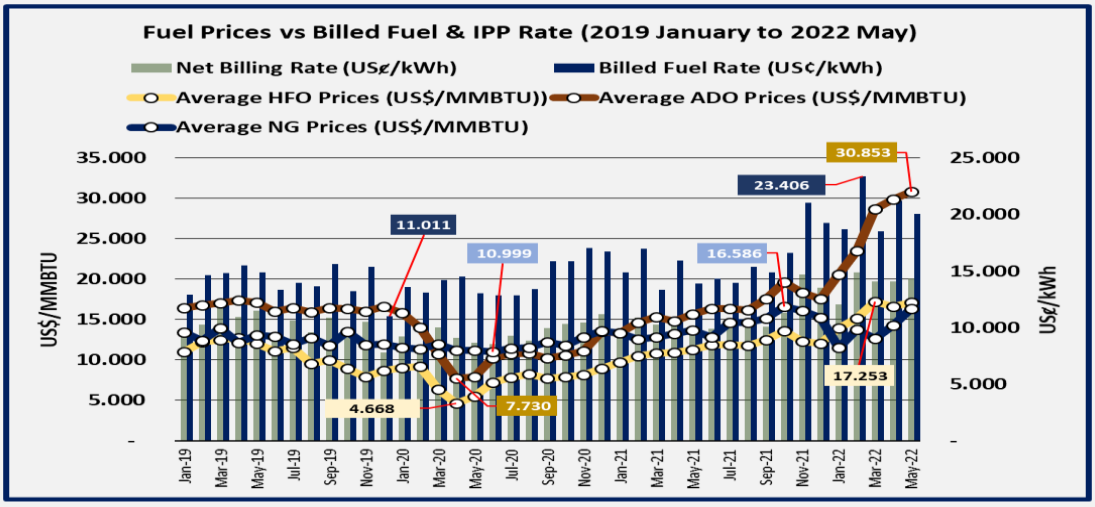
8.13 Fuel Supply and Price Dynamics

8.13.1 Although 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 is less exposure to exogenous factors, however, there are still embedded vulnerabilities as all fuel requirements for electricity production are imported. To the extent that imported NG, now accounts for almost 60% of the electricity generation matrix, which induces other elements of risk. For the petroleum-based 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 a bit more stable NG prices to JPS and IPPs. Notwithstanding, it should be recognized that based on factors such as unpredictable market conditions and 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 review period, is represented in Figure 7.4 below.

8.13.2 As shown in Figure 7.4 below, average fuel prices have fluctuated significantly during the 2019 January - 2022 May timeframe, with the highest recorded average monthly price for each fuel type indicated. Over the period, the average price of HFO supplied to JPS's generating plants, fluctuated heavily within the range of US$4.67 to US$17.25/MMBTU, which was reflected in the monthly system fuel cost and Fuel Rates for the applicable months. Similarly, ADO prices also varied widely between a low of US$7.73/MMTU and a high of US$30.85/MMBTU. In contrast, plant gate prices for NG, was steady residing in the US$11 to 16.6/MMBTU range during the period.

Figure 7.4: Average Price of Fuels used for Electricity Generation (2019 - 2022 May)

Year	Avg. HFO Prices		Avg. ADO Prices		Avg. NG Prices	Avg. Fuel & IPP Charge	Avg. Billed Fuel Rate	Avg. Net Billing Rate
	US$/BBL	US$/MMBTU	US$/BBL	US$/MMBTU	US$/MMBTU	US¢/kWh	US¢/kWh	US¢/kWh
2019	67.19	10.69	96.35	16.54	12.66	15.1	14.09	10.28
2020	47.65	7.58	64.87	11.14	11.82	17.09	14.43	9.5
2021	72.99	11.61	95.09	16.33	14.25		15.89	10.96
2022 (Jan-May)	100.79	16.03	155.64	26.72	13.74		20.39	13.91



8.13.3 Based on the relationship between input fuel prices and fuel rates, the effects of fuel price variations are usually manifested in the monthly fuel charges, calculated by JPS for billing purposes.

8.14 System Fuel Cost

8.14.1 As compiled from monthly JPS Fuel Reports, the total annual fuel costs incurred from the use of HFO, ADO and NG for grid electricity generation since the start of the 2019-2024 review period, are as represented in Table 7.3 below.

Table 7.3: System Fuel Cost by Fuel Type (2019 - 2022 June)

SYSTEM FUEL COST BY FUEL TYPE 2019 – 2022 JUNE					
Year	HFO (J$M)	ADO (J$M)	NG (J$M)	Total (J$M)	NG Cost % of Total
2019	40,937	3,659	16,353	60,949	26.8%
2020	13,931	1,183	41,822	56,936	73.5%
2021	18,237	3,467	49,963	71,667	69.7%
2022 (Jan-Jun)	13,531	5,910	27,231	46,672	58.3%

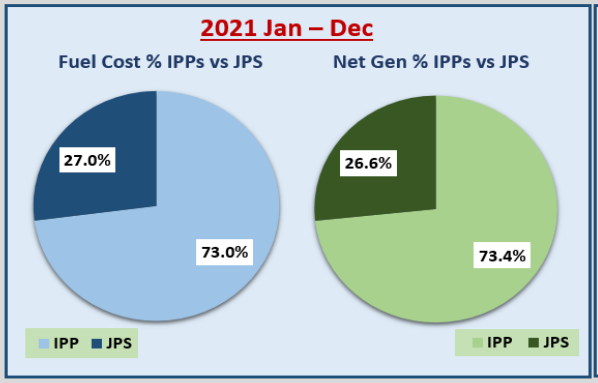
8.14.2 The data indicates that for 2021, total annual NG cost accounted for almost 70.0% of the system total fuel cost. This outcome was largely expected because of the relatively low "Merit Order" costs and forecasted high utilization of the SJPC (190MW), NFE-JAMALCO (94MW), and JPS Bogue CCGT generation plants, which predominantly runs on NG (primary fuel type).

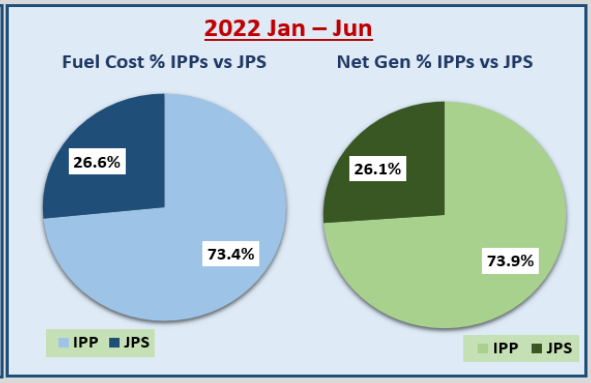
8.15 JPS & IPPs Contributions to System Generation and Total Fuel Cost

8.15.1 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 approximately 73% and likely to be higher by the end of 2022. This is mainly due to the large displacement of fuel oil based electricity generation by new large-scale generation facilities operating on NG. In terms of actual costs, the 2021 net generation ratio translates to annual fuel costs of approximately J$52.289B and JS$19.379B, attributable to IPPs and JPS, respectively.

Figure 7.5: Contribution of JPS and IPP Generation to Total Fuel Cost

YEAR	FUEL COST					NET GENERATION				
	TOTAL (J$M)	IPP (J$M)	JPS (J$M)	IPP %	JPS %	TOTAL (MWH)	IPP (MWH)	JPS (MWH)	IPP %	JPS %
2019	60,949	21,541	39,408	35.3%	64.7%	4,429,831	1,990,338	2,439,493	44.9%	55.1%
2020	56,936	37,828	19,108	66.4%	33.6%	4,227,429	2,831,903	1,395,526	67.0%	33.0%
2021	71,667	52,289	19,379	73.0%	27.0%	4,303,957	3,156,981	1,146,976	73.4%	26.6%
2022 (Jan-Jun)	46,672	34,264	12,408	73.4%	26.6%	2,148,893	1,587,366	561,527	73.9%	26.1%





8.15.2 With respect to system annual net generation, for 2021, the contributions from IPPs facilities and JPS plants, were almost equivalent in proportions to that of the fuel costs, at approximately 73.4% and 26.6%, respectively. This indication infers that the coverage of the system load is dominated by IPP plants.

8.16 Fuel Rate

8.16.1 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 system. 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 shows the relative movement in the monthly fuel prices and billed fuel rate, over the period 2019 January – 2022 May. As shown, the monthly Fuel

Rate significantly varied from month to month during the 41-month period, with a profile that largely tracks the movement in global fuel prices (US$/MMBTU). According to 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 electricity sales volumes recorded for each applicable month. As indicated in the chart, the highest and lowest Fuel Rate applied over the period were 23.406 US¢/kWh (2022 February) and 11.011 US¢/kWh (2019 December), respectively. To put things into perspective, the fuel charge currently represents approximately 50% of the average residential customer's electricity bill.

8.17 Net Billing Rate

8.17.1 Like the monthly fuel rate, the Net Billing Rate which 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), also exhibited 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.

8.18 JPS 2021-2022 Heat Rate Performance

JPS Monthly Heat Rate Performance (2021–2022 Review Period)

8.18.1 As previously indicated, the Heat Rate target for the 2021-2022 review period, was set at 9,667 kJ/kWh. Using the monthly Heat Rates (JPS actual) reported since the effective date of the 2021 Annual Review Determination Notice (2021 September 1 up to 2022 June), the OUR compared the monthly average value against the approved target, as shown in Table 7.4 below.

Table 7.4: Summary of JPS Monthly Heat Rate Performance (2021–2022 Review Period)

JPS AVERAGE MONTLY HEAT RATE VERSUS TARGETS (2021 JAN-2022 JUNE)						
Review Type	**Period**	**JPS Proposed Heat Rate Target (kJ/kWh)**	**Approved Heat Rate Target (kJ/kWh)**	**Average Actual Heat Rate (kJ/kWh)**	**Average Difference (Target – Actual) (kJ/kWh)**	**Benefit /Penalty**
2019-2024 RATE REVIEW	2021 Jan – 2021 Aug	9,976	9,675	9,440	235	Benefit to JPS
2021 ANNUAL REVIEW	2021 Sep – 2022 Jun	9,927	9,667	9,442	225	Benefit to JPS

8.18.2 As indicated, JPS's average monthly Heat Rate (actual) for the period 2021 January – August, was 9,440 kJ/kWh, which represents an over-achievement of the target (9,675 kJ/kWh) by a margin of 235 kJ/kWh on average, in favour of JPS. A similar result occurred for the period 2021 September – 2022 June, where JPS's average monthly Heat Rate

(actual) was 9,442 kJ/kWh; which also represents an over-achievement of the target of (9,667 kJ/kWh) by a margin of 225 kJ/kWh on average.

8.19 JPS Monthly Heat Rate Performance versus Target (2021 January – 2022 June)

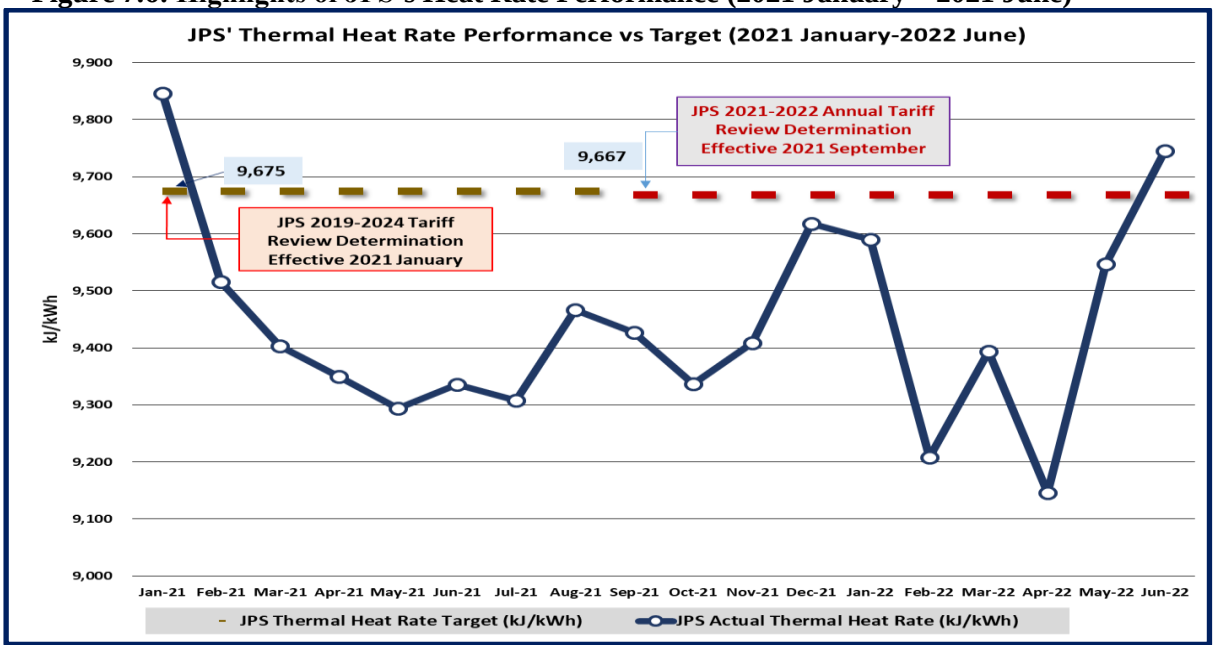
8.19.1 For more precise resolution, the OUR compared the historical monthly Heat Rates (actual) reported by JPS, since the 2019-2024 Rate Review Determination Notice came into effect, versus the applicable targets, as shown in Table 7.5 below.

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**
2020-2021Target							9,675	9,675	9,675	9,675	9,675	9,675	-
Change							-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**
2021-2022Target	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	367	209	241	330	258	49	77	459	274	521	121	-79	**236**

8.19.2 The data indicates that over the period, JPS achieved the respective Heat Rate targets for 16 of the 18 months under observation, with margins ranging between 49 kJ/kWh and 521 kJ/kWh. Further highlights of the JPS's Heat Rate performance during the subject period, is illustrated in Figure 7.6 below.

Figure 7.6: Highlights of JPS's Heat Rate Performance (2021 January – 2021 June)

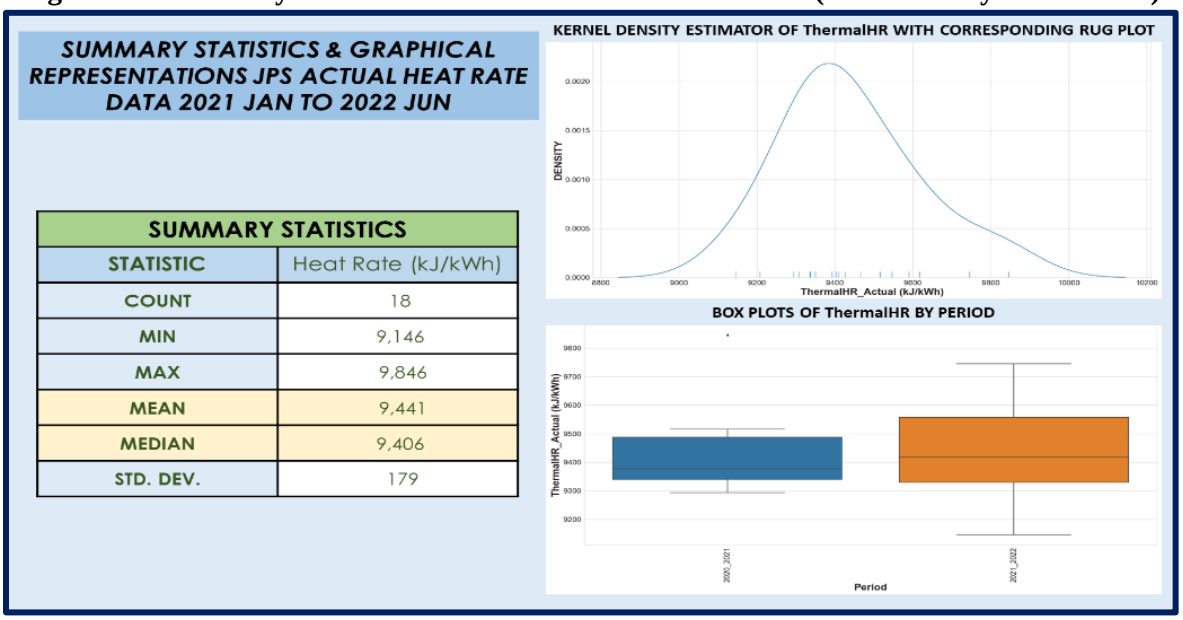


8.19.3 As shown in Figure 7.6 above, there were wide variations in the monthly Heat Rates over the 2021 January – 2022 June period.

8.20 Statistical Analysis – Historical Heat Rate Data (2021 January – 2022 June)

8.20.1 In reviewing JPS's 2021 January – 2022 June Heat Rate performance, the OUR also conducted statistical analysis on the submitted Heat Rate data, which yielded the summary statistics presented in Figure 7.7 below and also shows the distribution of the monthly Heat Rates reported for the period.

Figure 7.7: Summary Statistics - JPS's Heat Rate Performance (2021 January – 2022 June)



SUMMARY STATISTICS	
STATISTIC	Heat Rate (kJ/kWh)
COUNT	18
MIN	9,146
MAX	9,846
MEAN	9,441
MEDIAN	9,406
STD. DEV.	179

8.20.2 As indicated, the mean and median statistics for the 2021 January – 2022 June Heat Rate distribution, show close convergence, inferring that Heat Rate performance profile over the period is almost symmetrical and depicts a normal distribution of the Heat Rate data. The summary statistics indicate the mean Heat Rate value over the period is 9,441 kJ/kWh, with standard deviation (STD) of 179 kJ/kWh, which means that 95% of the monthly Heat Rates lie within 2 STDs of the mean value. This analysis provides clear validation that the Heat Rate targets set by the Office for JPS were reasonable and reside within statistical confidence limits.

8.21 Review Summary – JPS Historical Heat Rate Performance

8.21.1 The highlights from the OUR's review of the 2021 January – 2022 June Heat Rate performance are as follows:

1) The Heat Rate targets were reasonably achieved by JPS, except for the two (2) months highlighted yellow in Table 7.5 above.

2) The interconnection of the JPS/CB 10MW CHP DG facility to the grid and the start of commercial operations in 2021 December does not appear to be having any material impact on the Heat Rate performance of JPS's thermal generating plants in the system.

8.22 JPS' 2021 Annual Review Heat Rate Proposals

8.22.1 As stipulated in Criterion 14 and ANNEX 4 of the Final Criteria, JPS is required to submit its Heat Rate proposals, supported by the required schedules, models and generation system data, for regulatory evaluation and determination. In adherence to these requirements, JPS

in the 2022 submissions, presented its 2022-2023 Heat Rate proposals along with the associated models, inputs, assumptions, and forecasts. The details of the Heat Rate proposal and supporting schedules/data are outlined below.

8.23 JPS 2022-2023 Heat Rate Target Considerations

8.23.1 With respect to the 2022-2023 Heat Rate, in the submissions, JPS posited that in the setting of the Heat Rate target, consideration should be given to the following factors:

- Low energy demand due to COVID-19 pandemic.
- The state/age of JPS's generation plants, particularly the Rockfort units (RF1&2).
- The major overhaul of the Bogue CCGT Steam Turbine unit (ST14).
- The impact of IPPs performance; and
- The continuing effects of the COVID-19 pandemic on system operations.

8.23.2 The OUR has taken note of JPS's proposition for the consideration of these issues. However, it should be pointed out that all these factors were already taken into account in the OUR's Heat Rate evaluation and targets determination during the 2019-2024 Rate Review Process, and subsequently, at the 2021 Annual Review. Further, they are taken into consideration in the OUR's Heat Rate evaluation in this Annual Review.

8.23.3 Regarding the major overhaul of the Bogue CCGT Steam Turbine unit (ST14), this planned generation outage was factored in the 2021-2022 Heat Rate target, from which JPS has already benefited. Therefore, no further Heat Rate adjustment will be considered for this rescheduled major maintenance activity.

8.24 JPS 2022-2023 Heat Rate Forecast

8.24.1 The details of JPS's Heat Rate projections for the 2022-2023 review period, are provided in the sections below.

8.25 JPS Heat Rate Model

8.25.1 In its submissions, JPS indicated that continuing from the 2019-2024 Rate Review Process, it has utilized the PLEXOS simulation software to model its generation system operations and to develop its Heat Rate forecast for the 2022-2023 review period. As described by JPS, its Heat Rate modelling process features 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 for ADO, HFO and NG for 2019-2024; and
- The average Heat Rate of each generating unit/facility to be utilized during the review period.

8.26 JPS 2022-2023 Generating Plants NEO/CF Forecast

8.26.1 As described in JPS's 2022 submissions, the system 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 in its Heat Rate model to estimate the corresponding 2022-2023 Heat Rates. A summary of the 2022-2023 generation plants NEO/CF and Heat Rate projections developed by JPS, using these models, is provided in Table 7.6 below.

Table 7.6: JPS 2022-2023 Generation Plants NEO/CF and Heat Rate Forecasts

JPS FORECASTED PLANT NEO, CAPACITY FACTORS AND HEAT RATES								
OWNER	2022 JULY – 2023 JUNE DATA							
	2019-2024 Rate Review Application				2022 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	145.94	83.30%	9,077	20.00	125.62	71.51%	9,258
RF2	20.0	132.51	75.63%	9,077	20.00	140.93	80.22%	9,217
HBGT5	21.5	8.33	4.42%	15,038	21.50	3.26	1.73%	16,723
HBGT10	32.5	22.11	7.76%	13,236	32.50	12.89	4.52%	18,080
BOGT3	21.5	5.60	2.97%	15,399	21.50	0.03	0.02%	18,362
BOGT6	18.0	0.018	0.01%	17,845	18.00	0.00	0.00%	-
BOGT7	18.0	0.160	0.10%	18,231	18.00	0.48	0.30%	21,302
BOGT9	20.0	5.50	3.14%	13,541	20.00	1.41	0.80%	20,133
BOGT11	20.0	86.93	49.62%	11,990	20.00	22.63	12.88%	12,981
BOCCGT	120.0	876.80	83.41%	8,942	120.00	665.47	63.13%	9,376
JPS MUNRO	3.0	3.35	12.74%	-	3.0	3.35	12.71%	-
MGGTY6.3	7.2	44.09	69.91%	-	7.2	44.08	69.70%	-
JPS HYDRO	22.4	97.22	49.55%	-	22.4	97.20	49.54%	-
IPPs:								
JEP	124.5	146.08	13.39%	8,616	124.5	162.14	14.83%	8,620
JPPC	60.0	311.51	59.27%	8,153	60.0	220.26	41.79%	8,678
WKPP	65.5	232.27	40.48%	8,569	65.5	370.96	64.48%	8,570
SJPC	190.0	1,327.99	79.79%	8,834	194.0	1,351.97	79.34%	8,126
NFE	94.0	466.77	56.69%	10,964	94.0	766.88	92.88%	11,091
WIGTON I	20.0	55.67	31.78%	-	20.0	52.50	29.88%	-
WIGTON II	18.0	55.76	35.36%	-	18.0	52.78	33.38%	-
WIGTN III	24.0	53.86	25.62%	-	24.0	50.62	24.01%	-
BMRJW	34.0	111.94	37.58%	-	34.0	115.07	38.53%	-
CSL	20.0	42.29	24.14%	-	20.0	42.30	24.08%	-
EREC	37.0	63.44	19.57%	-	37.0	79.47	24.45%	-
JPS/CB CHP DG	10.0	83.22	95.00%	-	10.0	24.26	27.62%	9,150

8.26.2 As shown in Table 7.6 above, some of the parameters presented in the 2019-2024 Rate Review Application, particularly, the dispatch levels and plants' NEO, have been adjusted by a significant degree. However, no clear basis or rationale was offered by JPS to substantiate such noticeable alteration to the data.

8.26.3 With respect to the JPS/CB CHP DG plant, the data shows a significant difference between the original 2022-2023 NEO/CF forecast (83.22GWh and 95%, respectively) included in the 2019-2024 Rate Review Application and the revised NEO/CF forecast (24.26GWh and 27.62%, respectively) presented in the 2022 submissions. JPS did not provide any explanation for this apparent disparity. However, generation data for this DG facility included in the monthly Technical Reports and Fuel Rate Calculation submissions, suggests that the plant may be experiencing operational challenges. The data shows that since the commencement of commercial operations in 2021 December, the plant has failed to achieve the established performance guarantees. As an example, the average CF achieved from plant operation over the period 2021 December 17 to 2022 June 30 was 41.33%, which is significantly below the required utilization level of a CHP plant, to ensure the realization of the relatively high fuel conversion efficiencies, inherent in cogeneration plant operation. Given these plant output disparities and possible plant performance issues, JPS is required to provide an update to the Office on the operational status and functionality of the 10MW CHP DG facility since COD.

8.27 JPS Thermal Plants Heat Rate Projections (2022-2023)

8.27.1 In the 2022 submissions, JPS indicated that the Heat Rate performance of its thermal generating plants over the 2022-2023 review period, will depend on several factors that typically affect economic generation dispatch, including:

1) Growth in system demand.
2) Addition of more RE generation.
3) The addition of new generating units and the installed reserve margin.
4) Heat Rate improvements made to existing generating units.
5) Availability and reliability of JPS generators.
6) Availability and reliability of IPP generators.
7) Absolute and relative fuel prices for JPS and the IPPs and the impact on economic dispatch.
8) Spinning reserve policy; and
9) Network constraints and contingencies.

8.28 JPS Key Considerations for Revision of Heat Rate Target

8.28.1 Regarding the review of the 2022-2023 Heat Rate target, JPS stated that the OUR should consider the following factors:

a) The most recent operating key performance indicators (Heat Rate, CF, EFOR, EAF) of JPS key baseload units.
b) The direct and indirect effects of the COVID-19 pandemic on the load demand.
c) The 45 days planned outage of JPS's Bogue ST14 unit.
d) The 28 days planned Hot Gas Path Inspection (HGPI) in on Bogue GT12.
e) The Rockfort units Heat Rate deterioration and low sulfur fuel impact; and

f) A reasonable buffer, to alleviate the impact that higher than planned forced outages on the IPP units, have on JPS's heat rate performance due to the running of less efficient units (peaking units) to maintain system reliability and minimize load shedding.

8.28.2 The arguments proffered by JPS, imply that the factors listed are likely to influence the Heat Rate performance outcome, during the 2022-2023 period. However, the company is significantly constrained in mitigating their effects, some of which are outside of its control. On that premise, JPS has proposed that the 2022-2023 Heat Rate forecast and pre-established target, be revised to account for these factors outside of its control.

8.29 JPS's Revised 2022-2023 Heat Rate Forecast

8.29.1 Regarding the 2022-2023 Heat Rates, JPS posited that the assumptions and factors described above, were incorporated in its Heat Rate model to update the original 2022-2023 forecast previously submitted in its 2021-2024 Rate Review Application. The JPS revised 2022-2023 Heat Rate forecast, is presented in Table 7.7 below.

Table 7.7: JPS Thermal Plants Monthly Heat Rate Projections for 2022-2023

2022-2023 FORECAST (ORIGINAL & REVISED): JPS THERMAL PLANTS MONTHLY HEAT RATES (KJ/KWH)													
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**
ORIGINAL (2019 - 2024 RATE REVIEW)	9,304	9,332	9,351	9,344	9,326	9,343	9,332	9,496	9,324	9,412	9,319	9,305	**9,349**
REVISED (2022 ANNUAL REVIEW)	9,426	9,368	9,349	11,923	10,272	9,354	9,320	9,498	9,356	9,347	9,406	9,647	**9,689**
CHANGE (KJ/KWH)	122	36	-2	2,579	946	11	-12	2	32	-65	87	342	**340**

OUR Observations and Comments

- As indicated, the Heat Rate estimated for each month in the revised 2022-2023 forecast (2022 Annual Review), has increased relative to those in the "original forecast" (2019-2024 Rate Review Application).
- The 12-month average Heat Rate for the revised forecast is 9,689 kJ/kWh, which reflects an average change of 340 kJ/kWh, above that of the original forecast (9,349 kJ/kWh). However, the basis of the increases reflected in the JPS revised 2022-2023 Heat Rate projections, was not substantiated by the company.
- The forecasted Heat Rates for 2022 October & November are relatively high, which according to JPS, is because of the rescheduled major overhaul of its Bogue ST14 unit. However, as previously mentioned, this planned generation outage was factored in the 2021-2022 Heat Rate target, from which JPS has already benefited. Therefore, no further Heat Rate adjustment will be allowed for this rescheduled major maintenance activity, on the basis that such consideration would be tantamount to double counting and not in line with the "prudent and reasonable standard.

8.29.2 According to JPS, when the pre-established 2022-2023 Heat Rate target (9,495 kJ/kWh) is applied to its revised 2022-2023 Heat Rate forecast, the result would reflect a deficit of 194 kJ/kWh on average, and this would cause the company to under recover on its fuel bill for the period. On that basis, JPS proposed that the 2022-2023 target of 9,495 kJ/kWh, approved in the 2019-2024 Rate Review Determination Notice, be adjusted upwards.

8.30 JPS's Revised 2022-2023 Heat Rate Target Proposal

8.30.1 In its submissions, JPS submitted that in keeping with the principle of the FCAM, it is proposing that, the pre-established 2022-2023 Heat Rate target for JPS thermal plants (9,495 kJ/kWh), be revised to 9,791 kJ/kWh (refer to Table 7.8 below), to account for the impact of the influential factors described.

Table 7.8: JPS Revised 2022-2023 Heat Rate Target Proposal

JPS PROPOSED HEAT RATE TARGET FOR 2022-2023 (REVISED)					
HEAT RATE METHODOLOGY	**Tariff Period**	**JPS Proposed Target (2022-2023) – [KJ/KWH]**		**Difference (kJ/kWh)**	**Remarks**
		2019-2024 Rate Review	2022 Annual Review		
JPS Thermal Plants	2022 – 2023	**9,495**	**9,791**	**246**	

8.30.2 JPS noted that the revised target, includes a small buffer to account for potential forced outages and operational challenges that may occur but have not been included in the forecast.

8.31 Our's Review of JPS's 2022-2023 Heat Rate Proposals

Scope of 2022-2023 Heat Rate Review

8.31.1 To arrive at its determinations on JPS's revised 2022-2023 Heat Rate forecast and target proposals, the OUR pursuant to the legal and regulatory framework carried out a comprehensive technical evaluation of the proposals.

8.32 OUR's 2022-2023 Heat Rate Evaluation

8.32.1 To appropriately assess JPS's revised 2022-2023 Heat Rate proposals (including all supporting schedules, data and assumptions submitted by JPS up to 2022 June 03), the OUR conducted its independent Heat Rate evaluation. The OUR used its own system analysis/dispatch models and Heat Rate Model, which took into consideration all the relevant Heat Rate inputs/assumptions utilized during the 2019-2024 Rate Review Process, with all available updated data/parameters incorporated.

8.33 Specific Inputs/Assumptions for Heat Rate Evaluation

8.33.1 The specific inputs/assumptions utilized in the OUR's 2022-2023 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.

8.34 System Load Data (2022-2023)

8.34.1 In its submissions, 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 is shown in Table 7.9 below.

Table 7.9: JPS System Net Generation and Peak Demand Forecast (2022-2023)

JPS SYSTEM NET GENERATION AND PEAK DEMAND FORECAST (2022 – 2023)					
Submission	**Review Period**	**Net Gen (GWh)**	**Peak Demand (MW)**	**Load Factor (%)**	**Remarks**
2019-2024 Rate Review	2022-2023	4,412.6	646.8	77.88	JPS Projection
2022 Annual Review	2022-2023	4,406.6	635.1	79.21	JPS Projection

8.35 Committed Generation Projects to be Commissioned

8.35.1 In its submissions, JPS indicated that the JPS/CB 10MW CHP DG project was scheduled to be commissioned in 2021. As previously mentioned, the plant was commissioned, and COD declared on 2021 December 17. The facility plant was modelled and incorporated in the OUR's 2022-2023 system analysis and Heat Rate evaluation. No new plants were scheduled for commissioning during the review period.

8.36 Heat Rate Test Data

8.36.1 The 2021-2022 Heat Rate Test data submitted by JPS, was used in the OUR's Heat Rate evaluation. It is important to note that the Heat Rate Tests are critical for validating the current efficiency level of a generating unit relative to established limits and are also necessary for recalibration of the Heat Rate models. The full-load Heat Rates for JPS thermal plants use in the evaluation are represented in Table 7.10 below.

8.37 Variable O&M Cost

8.37.1 In accordance with the Final Criteria, JPS provided the 2021 variable operations and maintenance (VOM) costs of its thermal generating units, which were reportedly computed from actual O&M expenditures. For the IPPs, the VOM costs were obtained from their respective PPAs/current Variable Payments. The VOM cost assumptions used in the OUR's Heat Rate evaluation, are provided in Table 7.10 below.

Table 7.10: Thermal Generating Units Technical and Cost Data used in OUR's Heat Rate Evaluation

GENERATING UNITS TECHNICAL AND COST DATA					
OWNER	UNIT	FUEL TYPE	MCR (MW)	FULL LOAD HEAT RATE (kJ/kWh)	VOM (US$/MWH)
JPS	RF1	HFO	20.00	8,885	1.848
	RF2	HFO	20.00	8,983	1.848
	GT5	ADO	21.50	15,101	0.448
	GT10	ADO	32.50	14,310	0.179
	GT3	ADO	21.50	15,438	0.448
	GT6	ADO	18.00	16,209	0.382
	GT7	ADO	18.00	16,158	0.382
	GT9	ADO	20.00	15,784	0.382
	GT11	NG	20.00	11,443	0.382
	BOCCGT	NG	120.00	8,940	1.125
IPPs	JPPC	HFO	60.00	8,010	14.414
	JEP	HFO	124.36	8,616	23.139
	WKPP	HFO	65.50	8,569	16.612
	SJPC	NG/ADO	194.00	9,062	0.30
	NFE	NG/ADO	94.00	11,087	0.10
	HILL RUN	NG	10.00	8,271	-

8.38 Fuel Price Forecast

8.38.1 The fuel prices used in the OUR's 2022-2023 Heat Rate evaluation, are provided in Table 7.11 below.

Table 7.11: Fuel Price Forecast used in the OUR's 2022-2023 Heat Rate Evaluation

JPS FUEL PRICE FORECAST (2022-2023)									
PLANT	FUEL	2019-2024 RATE REVIEW APPLICATION				2022 ANNUAL REVIEW FILING			
		2022		2023		2022		2023	
		US$/ BBL	US$/ MMBTU	US$/ BBL	US$/ MMBTU	US$/ BBL	US$/ MMBTU	US$/ BBL	US$/ MMBTU
JPS RF	HFO	64.27	9.80	61.50	9.92	103.99	16.54	83.27	13.24
JPS HB	ADO	85.20	13.79	81.09	13.96	160.43	27.54	91.35	24.74
JPS BO	ADO	91.31	14.82	87.20	15.01	181.96	28.12	149.25	26.95
JPS BO	NG	-	9.97	-	9.97	-	12.08	-	11.11
IPPs (JPPC, JEP, WKPP)	HFO	60.25	9.96	60.78	10.31	107.21	17.05	85.62	13.62
SJPC CCGT	NG	-	7.97	-	7.97	-	10.23	-	9.26
NFE (CHP)	NG	-	7.97	-	7.97	-	10.23	-	9.26

8.38.2 JPS provided no specific references for the forecasted fuel prices. Presumably, the NG price projections were developed based on Henry Hub (HH) NG Futures forecast, in conjunction with the respective NFE/JPS GSAs. Similarly, for HFO and ADO, the price forecasts were presumably referenced to US Gulf Coast (Platts) futures settlement and the respective JPS/Petrojam FSAs. Additionally, the 2022 Annual Review price projections (2022-2023) for the respective fuels appear to be much higher than those presented in the

2019-2024 Rate Review Application, which is understandable given recent developments in the international fuel markets.

8.39 Verification Check - JPS Heat Rate Data

8.39.1 To ensure that its system analysis models, and Heat Rate model are properly calibrated, the OUR simulated the generation system operating performance (including generation dispatch) for the period 2021 June – 2022 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 close convergence with the simulated outputs and the actual system performance outcomes. After this validation check, the OUR proceeded with its Heat Rate evaluation, the results of which were used to generate the OUR's revised 2022-2023 Heat Rate forecast.

8.40 OUR'S HEAT RATE EVALUATION RESULTS

8.40.1 The OUR's Heat Rate evaluation generated different categories of results, including annual Heat Rate projections for JPS thermal plants, system Heat Rates, plant dispatch levels (CF), and net generation, for the 2022-2023 review period. The results are summarized below.

8.41 OUR's 2022-2023 Generation Dispatch Projections

8.41.1 The results of the generation system assessment indicate the level of utilization (CF) of each available generating unit scheduled for operation during the 2022-2023 review 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 is largely influenced by dispatch levels. Therefore, the dispatch levels of JPS's thermal generating plants are considered to be a critical determinant of JPS's monthly average Heat Rates (projected and actual), required for the H-Factor. Despite some alterations to the original inputs/assumptions, the revised 2022-2023 NEO/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/CF projections set out under Chapter 13 of the 2019-2024 Rate Review Determination Notice. These parameters were used to derive the 2022-2023 average Heat Rate for the JPS thermal plants.

8.42 OUR's 2022-2023 Heat Rate Projections for JPS Thermal Plants

8.42.1 With the available Heat Rate data and the forecasts of the generation system performance parameters presented above, the OUR used its Heat Rate Model to estimate the 2022-2023 average Heat Rate, for JPS's thermal generating plants. The results, including a comparison with JPS's proposed 2022-2023 average Heat Rate (revised), are presented in Table 7.12 below.

Table 7.12: OUR/JPS 2022-2023 Heat Rate Projections (JPS Thermal Plants)

OUR/JPS 2022-2023 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	2022 Annual Review	Variance	**2019-2024 Rate Review**	**2022 Annual Review**	**Variance**
2022-2023	JPS Thermal Plants	9,349	9,689	340	**9,144**	**9,176**	**32**

8.43 Indications from OUR's 2022-2023 Heat Rate Evaluation

1) The evaluation results indicate that the OUR's forecasted 2022-2023 average Heat Rate for JPS (9,176 kJ/kWh), turns out to be slightly higher than the corresponding value presented in the 2019-2024 Rate Review Determination Notice (9,144 kJ/kWh). This appears to be largely due to relatively higher average operating Heat Rates of the JPS thermal plants across the board. Nonetheless, the OUR is of the view that this slight change in forecast does not warrant an adjustment to the target, as sufficient buffer was already included.

2) The projected average Heat Rate performance of JPS's thermal plants during the 2022-2023 review 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 (peak load units) are expected to operate at very low average capacity factors (CF < 3%), with minuscule contributions 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) for the 2022-2023 review period indicates 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 under potential contingency conditions.

4) JPS's revised Heat Rates for 2022 October & November (11,923 kJ/kWh and 10,272 kJ/kWh respectively) presented in the 2022 Annual Review Filing, which purportedly considered the potential effects of the rescheduled planned outage (major overhaul) of the Bogue ST14 unit, were evaluated. The OUR found that they were not in alignment with system operating scenarios that reflect "optimal/economic generation dispatch," as per the requirements of the legal and regulatory framework. It should be noted that the OUR previously highlighted similar findings in the 2019-2024 Rate Review

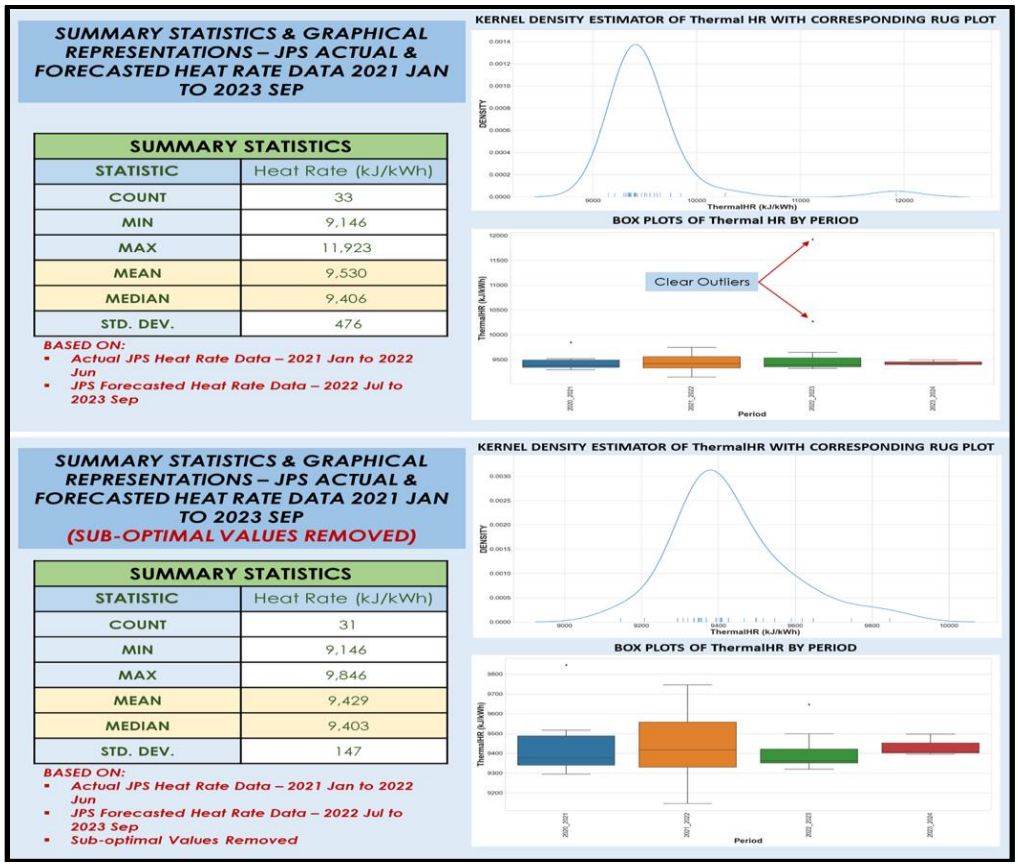
Determination Notice and later in the 2021 Annual Review Determination Notice in relation to JPS's 2022 February & March Heat Rates (10,516 kJ/kWh and 12,056 kJ/kWh respectively), which according to JPS reflected the effects of the originally planned major overhaul of the Bogue ST14 unit. For each of these constrained generation operation scenarios (major maintenance), the results from the OUR's system analysis models, indicated that the average Heat Rates for the relevant months spanning the scheduled major overhaul of the ST14 unit, were excessive and not reflective of economic generation dispatch operations.

5) Further, the OUR found that the Bogue GT12 and ST14 units are scheduled for HGPI and major overhaul respectively, and the unavailability of the generating unit during the outage periods, will likely have some impact on JPS's average Heat Rate performance for the 2022-2023 review period. Even though there may be some potential short-term negative Heat Rate impact, this would be offset by the improved efficiency of the composite Bogue CCGT plant, after the return to service of the constituent GT12 and ST14 units, following the completion of the respective major maintenance activities described. In addition, the 2022-2023 generation dispatch data provided by JPS suggests that the company's forecasted Heat Rates for 2022 October & November may have been overestimated. This infers that the company's claims of significant Heat Rate exposure for the months of 2022 October and November, creating the need for target adjustment, is not warranted.

8.44 Statistical Analysis – JPS Heat Rate Data

8.44.1 To test the reasonableness of JPS's proposed 2022-2023 Heat Rate target (9,791 kJ/kWh), the OUR used the available Heat Rate data (historical and projected) to perform statistical analyses, which generated the summary statistics, presented in Figure 7.9 below.

Figure 7.9: Summary Statistics - JPS Heat Rates (2021 January – 2023 September)



8.45 **Key Observations and Deduction**

1) The result for each defined scenario indicate that the center of the Heat Rate distribution (the median) is approximately the same at 9,403 kJ/KWh, which is expected because the median is a robust statistic and not susceptible to the effects of extreme observations.

2) The statistics generated for the scenario with the sub-optimal Heat Rate values (2022 October & November) excluded from the dataset, show that the mean Heat Rate value converges toward the medium value. This result also indicates that the mean value (9,429 kJ/kWh) is lower than the pre-established 2022-2023 Heat Rate target of 9,495 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 (Scenario without suboptimal values: 9,403 - 9,429 kJ/kWh) or (Scenario with suboptimal values: 9,406 - 9,530 kJ/kWh), would be statistically representative. JPS's revised 2022-2023 Heat Rate target proposal of 9,791 kJ/kWh, is outside of this range, and as such, should not be allowed.

8.46 Scenario Analysis

8.46.1 To further validate the robustness of the 2022-2023 Heat Rate target approved in the 2019-Rate Review 2024 Determination Notice, the OUR performed sensitivity/scenario analysis around the target, using JPS/OUR revised 2021-2022 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 2022-2023 target is still representative and reasonable for H-Factor adjustment during the subject review period. The results of this sensitivity analysis indicate that the 2022-2023 Heat Rate target of 9,495 kJ/kWh, is sufficiently robust, representative, and reasonable for application during the 2022-2023 review period. This means that, contrary to JPS's proposal, no adjustment to this target is warranted.

8.47 OUR'S 2022-2023 HEAT RATE TARGET FOR JPS

8.47.1 Based on the results of OUR's Heat Rate evaluation/analysis, it was determined that the approved 2022-2023 Heat Rate target for JPS in the 2019-2024 Rate Review Determination Notice (9,495 kJ/kWh), will be maintained. Accordingly, this target shall be applied to the H-Factor for efficiency adjustment in the approved FCAM each billing month during the 2022-2023 review period, as indicated in Table 7.13 below.

Table 7.13: Office Approved 2022-2023 Heat Rate Target for JPS

APPROVED HEAT RATE TARGET FOR JPS (2022-2023 REVIEW PERIOD)						
RATE ADJUSTMENT PERIOD	HEAT RATE MODALITY	JPS PROPOSED TARGET (2022-2023) – [KJ/KWH]		OUR APPROVED TARGET (2022-2023) – [KJ/KWH]		2022 Annual Review Target Variance
		2019-2024 Rate Review	2022 Annual Review	2019-2024 DET NOTICE	2022 ANNUAL REVIEW	
2022-2023	JPS Thermal Plants	9,545	9,791	9,495	9,495	296

8.47.2 In its submissions, JPS argued that the approved 2022-2023 Heat Rate target of 9,495 kJ/kWh should be reset to reflect the impact of the current COVID-19 pandemic on system load demand, the age and efficiency of JPS's thermal generating fleet and variability of renewable energy (RE) generation. Paradoxically, while JPS is advocating for a target reset on these grounds, which it claims will impact the generation dispatch, during the 2022-2023 review period, its own generation dispatch forecast for that period, was not found to be in line with the merit order/economic generation dispatch requirements in the Electricity Act, 2015, the Licence 2016 and Electricity Sector Codes. In addition, the forecast was not consistent with the optimal mix of generation assets assumed to be available for operation during the subject review period.

8.48 Target Achievement and Enabling Factors

8.48.1 Despite JPS's arguments challenging the pre-established 2022-2023 Heat Rate target (9,495 kJ/kWh), based on known system conditions, the generation plants operating capabilities and the 2022-2023 Heat Rate assumptions and performance forecast, it is expected that on average, the company will achieve the approved Heat Rate target during the rate adjustment period. Specifically, some of the enabling factors that should contribute to target achievement, among other things, include the following:

1) The major overhaul of the RF2 unit in 2022 March and resulting improvement in overall operational efficiency.
2) Recent efficiency improvements on other existing JPS generating units.
3) Major maintenance of other JPS generating units during the 2021-2022 review period, with expected efficiency improvements, that should be sustained during the 2022-2023 period.
4) Expected benefits from other ongoing and planned efficiency improvement programmes.
5) Effective management of the generation dispatch process and system operating constraints.
6) 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.
7) 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.
8) The commissioning and start of commercial operations of the JPS/CB 10MW CHP DG facility in 2021 December, which is expected to improve generation efficiency by limiting the utilization of inefficient/high marginal cost GT units during peak and some partial peak periods.
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 incorporation of exceptional IPPs' forced outages in the OUR's Heat Rate Models used for establishing the relevant Heat Rate targets.

8.49 JPS 2022-2023 Heat Rate Projections versus OUR Target

8.49.1 A fundamental feature inherent in the H-Factor design, is that the Heat Rate target represents an annual average threshold but is applied on a monthly basis. 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 under-achievement of the target in

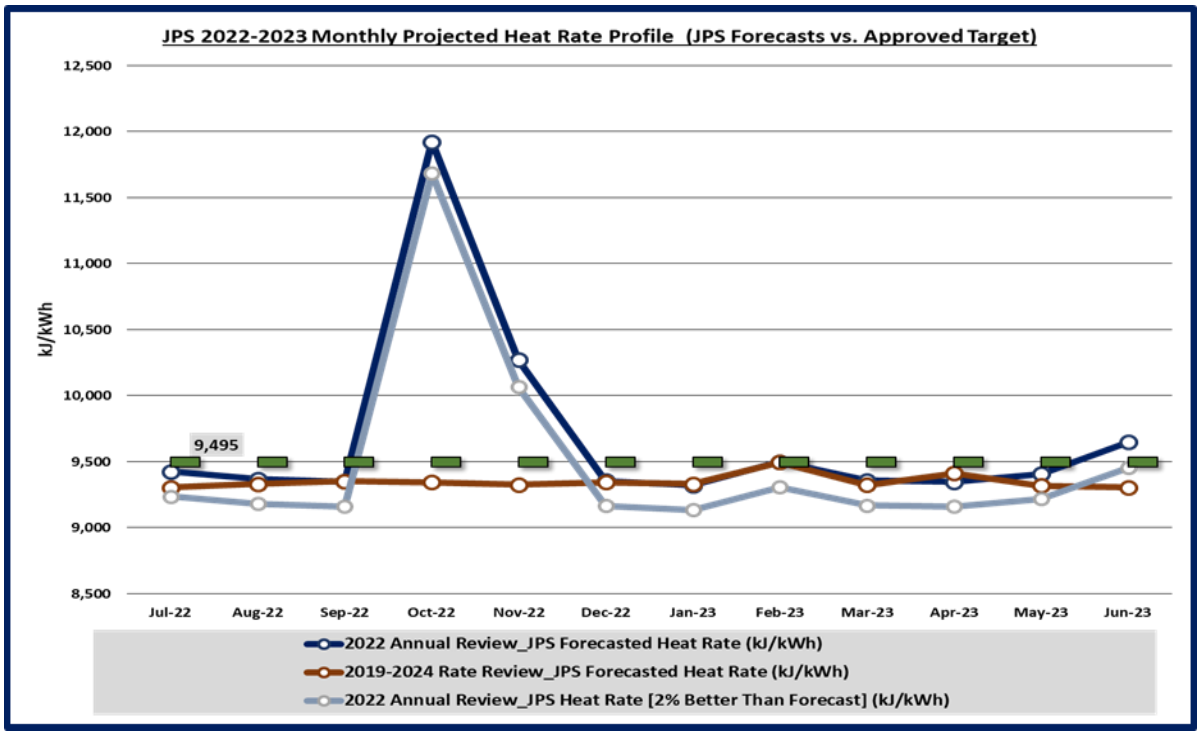
one or two months, may not necessarily lead to penalties to the company on aggregate at the end of the rate adjustment period. This construct is demonstrated in Table 7.14 below, based on a comparison of JPS's 2022-2023 monthly Heat Rate projections, against the applicable target.

Table 7.14: JPS 2022-2023 Monthly Heat Rate Projections versus Approved Target

JPS' 2022-2023 HEAT RATE PROJECTIONS VERSUS OFFICE APPROVED TARGET						
REVIEW PERIOD [2022-2023]	JPS HEAT RATE FORECAST (2022-2023) – [KJ/KWH]		OUR APRROVED TARGET (2022-2023) – [KJ/KWH]	2022-2023 VARIANCE (TARGET – FORECAST)- [KJ/KWH]		REMARKS
	2019-2024 Rate Review	2022 Annual Review	2019-2024 Rate Review & 2022 Annual Review	2019-2024 Rate Review	2022 Annual Review	
2022 JUL	9,304	9,426	9,495	191	69	
2022 AUG	9,332	9,368	9,495	163	127	
2022 SEP	9,351	9,349	9,495	144	146	
2022 OCT	9,344	11,923	9,495	151	-2,248	Suboptimal
2022 NOV	9,326	10,272	9,495	169	-777	Suboptimal
2022 DEC	9,343	9,354	9,495	152	141	
2023 JAN	9,332	9,320	9,495	163	175	
2023 FEB	9,496	9,498	9,495	-1	-3	
2023	9,324	9,356	9,495	171	139	
2023 APR	9,412	9,347	9,495	83	148	
2023	9,319	9,406	9,495	176	89	
2023 JUN	9,305	9,647	9,495	190	-152	
AVERAGE	**9,349**	**9,689**	**9,495**	**146**	**-194**	

8.49.2 For emphasis, the projected Heat Rate performance profile is further illustrated in Figure 7.9 below.

Figure 7.9: JPS 2022-2023 Monthly Heat Rate Profile (JPS Forecast versus Approved Target)



8.49.3 As indicated in Table 7.14 and Figure 7.9 above, with the original JPS 2022-2023 Heat Rate forecast (which is more likely to be realized based on historical performance), JPS would achieve the target for every month of the review period. In the case of the revised JPS forecast, with the exception of the high Heat Rate values estimated for 2022 October & November (suboptimal dispatch), on average, the company is expected to reasonably achieve the target for the review period. Further, the H-Factor construct described above, dictates that JPS must adhere to economic/optimal generation dispatch operations, during the period, to consistently meet the established target, and to recover the associated total fuel cost without penalties. Given all these considerations, the Office maintains that the approved 2022-2023 Heat Rate target of 9,495 kJ/kWh is deemed reasonable and achievable, and consistent with the legal and regulatory framework, and shall be applicable to the defined H-Factor over the 2022-2023 rate adjustment period.

8.50 2022-2023 H-Factor Methodology and Fcam

8.50.1 As outlined in the 2019-2024 Rate Review Determination Notice, the approved Heat Rate target in conjunction with JPS's thermal plant Heat Rate (actual), shall constitute the monthly H-Factor during the 2019-2024 review period. In accordance with the provisions of the Licence 2016, the H-Factor as defined shall be applicable to the approved FCAM over the 2022-2023 rate adjustment period.

8.51 Fuel Cost Adjustment Mechanism (FCAM) for 2022-2023 Review Period

8.51.1 As stipulated by the requirements of Exhibit 2, Schedule 3 of the Licence 2016, the monthly fuel cost of JPS thermal generating plants to be passed on to 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***" of Exhibit 2, Schedule 3 of the Licence 2016.

8.51.2 Therefore, in keeping with the requirements of the Licence 2016, the Office has determined that JPS shall continue to apply the FCAM approved in the 2019-2024 Rate Review Determination Notice, during the 2022-2023 review period. The approved FCAM is mathematically defined by the formulae represented in Figure 7.2 above.

8.52 Our Heat Rate Review - Issues and Positions

8.52.1 While there have been recognizable improvements in the overall efficiency of the generation system over time, several issues have emerged during the 2019-2024 Rate Review Process, some of which have lingered and have amplified the OUR's concerns at this 2022 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.

8.53 Generation Dispatch Issues

8.53.1 On the matter of generation dispatch, the OUR's system analyses continue to detect problematic issues that question the acceptability of JPS's generation dispatch process, as well as outputs, and projections that appear to deviate from the requirements of the legal and regulatory framework governing economic generation dispatch in the power system, as described herein. Considering these concerns, the Office believes that it is imperative that the required "generation dispatch audit" as stated in the 2019-2024 Rate Review Determination Notice, should be executed within the 2022-2023 review period.

8.54 VOM Costs in Merit Order/Generation Dispatch Calculations

8.54.1 Based on the Heat Rate data provided by JPS, it would appear that the VOM costs for JPS owned generating units have been included in the total variable cost of those units for the generation used to develop the Merit Order that guides the generation dispatch operations. However, the veracity of the VOM cost data could not be immediately verified. This will require further review.

8.55 **Fuel Rate Calculation Issues**

Process and Methodological Issues

1) The Fuel Rate Report (PDF) and Calculation Model (MS Excel) submitted by JPS to the OUR monthly, in their current form suffers from several problems. Based on observations over time, the quality of the submissions has deteriorated, in terms of structure, clarity, transparency and quality control. In developing utility rates (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 of the 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 is not clearly established. 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. Omission of certain critical components in both the electronic and hardcopy reports are prevalent. For example, the Heat Rate data is sometimes excluded from the hardcopy of the Fuel Rate Reports as well as the electronic version, as was the case for 2022 February. Despite repeated request to JPS for the data, it was not submitted until 2022 May 18.

   e. Overall, the multiplicity of deficiencies identified with the 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.

8.55.1 With these observations, it cannot be overstated that JPS, subject to the requirements of the 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. Therefore, irrespective of the company's narrative, it must be recognized that the system fuel cost is

a major driver of retail electricity rates, which has serious implications for the Jamaican economy.

Data Clarity and Quality Issues

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 is 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.

2) The "Generation Sheet" of JPS's Heat Rate Reports submitted since 2021 January has reported "Station Service" energy received (37,000 – 45,000 kWh) by the HB B6 unit. It is important to note that 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 the plant. There should be no reference to the HB B6 unit in the Heat Rate and Fuel Rate Calculation Reports, and no HB B6 related cost should be imposed without justification and approval. On that basis, the fact that energy is being supplied for Station Service use needs to be explained by JPS. Further, the source of the electricity for Station Service supply needs to be specified, to ensure accurate energy accounting in the energy balance and System Losses Measurements.

3) The generation data in the Heat Rate Reports for the period 2021 September – 2022 April, shows that the JPS Bogue GTs 3, 6 & 7 are receiving more energy than is being supplied, resulting in negative net generation (- kWh) for these units. The basis for the almost constant negative net generation (- kWh) reported for these units during the period needs to be explained by JPS. 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 and System Losses Measurements.

4) The level of net generation and CF reported for the Bogue ST14 in 2022 February – March, at that time, indicate that the unit was not taken out of service for "major overhaul", as was scheduled for 2022 February–March (2022 Generation Maintenance Schedule). The postponement of this planned major maintenance activity could have implications for system efficiency and reliability going forward. Despite such potential exposure, JPS did not provide any information regarding the rescheduling of the major overhaul of the unit and related contingency considerations, until the 2022 Annual Review Filing.

5) 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

6) 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 the question as to the 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 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. It is important that these GSA documents be included in monthly Fuel Rate Calculation Reports.

7) The situation described in item (5) and (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.

8) 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' monthly fuel rate calculations/billing.

8.55.2 JPS is required to exercise reasonable diligence and address the issues outlined above.

Submission of Technical Reports

8.55.3 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. As it stands, these Technical Reports are invariably submitted late, and at times, are found to be deficient. This imposes constraints on the OUR's ability to effectively assess the performance of the generation system and the evaluation of the monthly fuel rate calculations. Moreover, based on the tardiness of JPS in furnishing the deliverables, the OUR has to be constantly requesting these documents and repeatedly reminding the company to submit same. With respect to the reporting requirements, the OUR has established a regulatory reporting framework, which is strengthened through the Rate Review process. However, despite these regulatory requirements, the compliance level for the submission of the monthly Technical Reports remains low. The extent of the problem is demonstrated in Table 7.15 below.

Table 7.15: JPS' Level of Compliance for Technical Reports Submission

JPS MONTHLY TECHNICAL REPORTS SUBMISSION DATES					
2021 REPORTS			2022 REPORTS		
Technical Report	**Date Required**	**Date Submitted**	**Technical Report**	**Date Required**	**Date Submitted**
2021 January	2021 February 10	2021 March 24	2022 January	2022 February 10	2022 June 16
2021 February	2021 March 10	2021 June 11	2022 February	2022 March 10	2022 June 16
2021 March	2021 April 12	2021 June 11	2022 March	2022 April 11	2022 June 16
2021 April	2021 May 10	2021 June 11	2022 April	2022 May 10	Outstanding
2021 May	2021 June 10	2021 July 06			
2021 June	2021 July 12	2021 August 03			
2021 July	2021 August 10	2021 November 12			
2021 August	2021 September 10	2021 November 12			
2021 September	2021 October 11	2021 November 12			
2021 October	2021 November 10	2022 January 13			
2021 November	2021 December 10	2022 January 13			
2021 December	2022 January 10	2022 January 25			

8.55.4 Like the Technical Reports, there are also compliance issues with the submission of Fuel Rate Calculation Reports. The full reports are rarely submitted within the required timeline, which creates serious constraints for the monthly fuel rate validation process. These reporting and compliance issues need to be addressed by JPS.

Application of Office approved Heat Rate Targets

8.55.5 The review revealed that JPS has interfered with the H-Factor adjustment during the 2021-2022 review period by not applying the Office approved Heat Rate target (9,667 kJ/kWh) as required after until five (5) months after the 2021 Annual Review Determination Notice came into effect, despite being notified by the OUR about this omission. The indications from the monthly Fuel Rate Calculation reports, is that JPS actually started to apply the target in the 2022 February Fuel Rate Calculation. Based on the cost items included, it would appear that JPS included a related "efficiency adjustment" equivalent to US$35,000 supposedly for reconciliation of the accumulated monthly "H-Factor" differential resulting from JPS' delayed application of the approved 2021-2022 Heat Rate target. However, JPS did not notify the OUR prior to applying this adjustment, and also, no specific details/calculations pertaining to this adjustment were included in the 2022 February Fuel Rate Calculation report. This is not in keeping with the requirements of the Licence 2016, the 2019-2024 Rate Review Determination Notice, the 2021 Annual Review Determination Notice, and prudent utility practice. To ensure clarity and transparency, JPS is required to provide the OUR with the relevant details and breakdown of this adjustment in the next Fuel Rate Calculation report, that becomes due after the effective date of this Determination Notice.

8.56 Heat Rate Target Setting

1) Based on the requirements of the Licence 2016, regulatory precedence, and for the reasons cited herein, the Office maintains its decision that the Heat Rate targets and H-Factor, shall continue to be based on JPS's thermal generating plants.
2) The Office also maintains that the determined Heat Rate target is reasonable and achievable and would encourage optimal generation dispatch operations during the 2022-2023 review period.
3) Additionally, the Office, in the setting the Heat Rate target, considers 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 impact of major forced outages; and
    c) The requirements of the legal and regulatory framework, established Heat Rate target principles, and good regulatory practice.

8.57 Review of Heat Rate Targets

8.57.1 On the matter of target adjustment, some of the issues highlighted by JPS in its submissions may not unreasonable. However, these factors were considered in the OUR's Heat Rate evaluation and determination of the 2022-2023 Heat Rate target, during the 2019-2024 Rate Review Process. Notably, due consideration is also given to them in the Annual Review deliberations. As established in the 2019-2024 Rate Review Determination Notice and based on regulatory precedence, going forward, the OUR will continue to review the Heat Rate targets at each Annual Review, and reset if necessary.

8.58 Office Determination: Heat Rate Target, H-Factor and Fcam

8.58.1 In making its determination on JPS's 2022-2023 Heat Rate target proposals, H-Factor and FCAM for the 2022-2023 rate adjustment period, the Office took into consideration, among other things, the following:

- The results of the OUR's 2022-2023 Heat Rate evaluation.
- The relevant provisions of the Licence 2016, and the legal and regulatory Framework; and
- The Heat Rate and "fuel cost recovery" determinations set out in the 2019-2024 Rate Review Determination Notice.

8.58.2 On that basis, the Office determines that the 2022-2023 Heat Rate target for JPS, that is to be applied during the 2022-2023 review period is **9,495 kJ/kWh.**

8.59 Office Determination Summary

8.59.1 The Office Heat Rate target, H-Factor and FCAM determinations, are summarized in DETERMINATION 7 below:

Determination 7

1) JPS's revised Heat Rate target proposal 9,791 kJ/kWh for the 2022-2023 rate adjustment period, was deemed to be unrepresentative and unreasonable, and would not encourage optimal economic generation dispatch during the subject period, and therefore was not allowed.
2) The 2022-2023 Heat Rate target of **9,495 kJ/kWh** set for JPS in the 2019-2024 Rate Review Determination Notice, shall be applicable for the 2022-2023 rate adjustment period.
3) The "Thermal" Heat Rate methodology applied to JPS' thermal generating plants shall continue to be in effect for the H-Factor and FCAM, during the 2022 -2023 review period.
4) The H-Factor adjustment to JPS monthly fuel cost during the 2022-2023 review period, shall commence with the month in which this Determination Notice becomes effective.
5) JPS shall provide an "update" to the Office on the operational status and functionality of its 10MW CHP DG facility since COD, within one (1) month of the effective date of this Determination Notice.
6) JPS shall comply with all the H-Factor and Fuel related requirements, including the associated regulatory reporting requirements, specified in this Determination Notice.

9 2021 System Losses Performance and Y-Factor Adjustment

9.1 Introduction

9.1.1 At each Annual Review, the Office is required to measure JPS's annual System Losses performance against the relevant targets set in the Rate Review Process. The review facilitates the calculation of the applicable "Y-Factor" in accordance with the provisions of Schedule 3 of the Licence 2016, applicable to the Annual Revenue Target (ART), which is incorporated in the defined price control regime. 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.

9.1.2 In essence, the existing Performance-Based Rate Making (PBRM) mechanism, as structured, links JPS's Non-Fuel Revenue to operational efficiency through the Y-Factor incentive scheme. The mechanics are such that, if System Losses performance is not consistent with economic efficiency, then there will be financial penalties or disallowance of revenues, which is an intrinsic feature of the Y-Factor.

9.2 Scope of 2021 System Losses Review

9.2.1 The OUR's System Losses review, encompasses among other things, the following activities:

- Assessment of JPS's 2022 Annual Review System Losses proposals and the 2021 System Losses performance measurements.
- Evaluation of JPS's 2021 System Loss reduction initiatives, including associated capital expenditure and impacts.
- Determination of the Responsibility Factor for the 2022, 2023, 2024 Y-Factor; and
- Calculation of the 2021 Y-Factor, required for the derivation of the "TULos2021" component of the 2021 Revenue Surcharge.

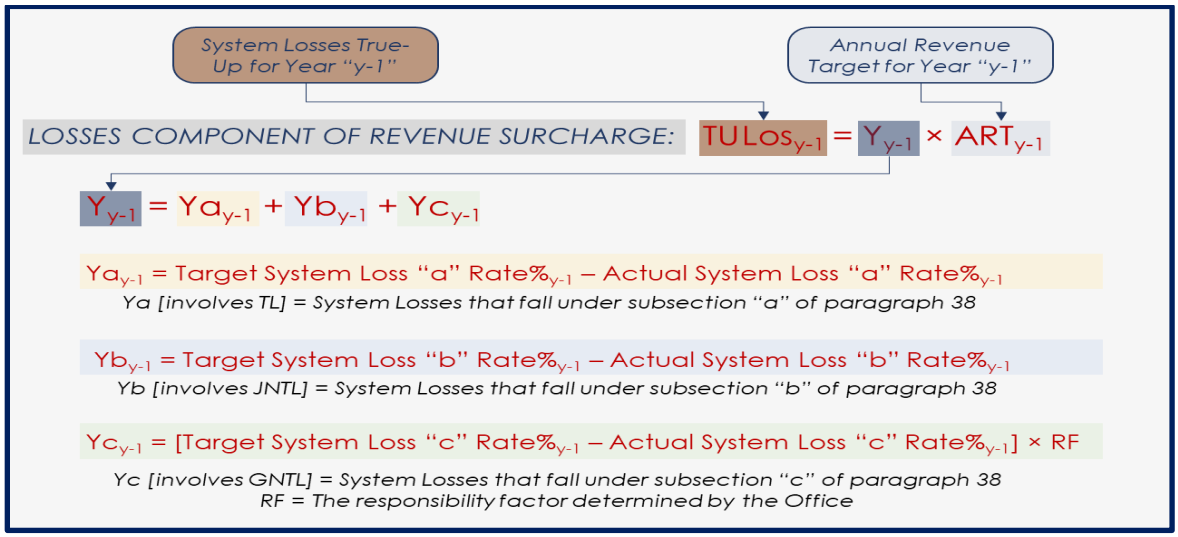
9.3 Licence Requirements Applicable to System Losses

9.3.1 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.

9.4 Y-Factor and True-Up Losses Adjustment Mechanism

9.4.1 As prescribed by the Exhibit 1, Schedule 3 of the Licence 2016, 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



Where:

- Ya involves Technical Losses ("TL");
- Yb involves Non-Technical Losses (NTL), totally within JPS' control ("designated JNTL");
- Yc entails NTL 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.

9.4.2 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.

9.5 Office Determined 2021 System Losses Targets

9.5.1 Pursuant to paragraph 3, Schedule 3 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 (3) defined loss categories: TL, JNTL and GNTL.

9.5.2 The approved 2019-2023 System Losses targets required for the calculation of the "Y-Factor", are as set out under Chapter 14 of the 2019 – 2024 Rate Review Determination Notice. The 2021 targets applicable for the 2022 Annual Review are presented in Table 8.1 below.

Table 8.1: Office Approved 2021 System Losses Targets

2021 SYSTEM LOSSES TARGETS SET IN 2019-2024 RATE REVIEW DETERNINATION NOTICE									
Performance Year	Rate Adjustment Period	JPS Proposed 2021 Targets (COVID-19 Impact)				Office Approved 2021 Targets (COVID-19 Impact)			
		TL	JNTL	GNTL	RF	TL	JNTL	GNTL	RF
2021	2022-2023 Annual Review	7.85%	7.54%	13.94%	10.0%	7.72%	4.58%	11.50%	20.0%

9.6 System Losses Categorization

9.6.1 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 sub-categories of TL and NTL, computed each month/year on a 12-month rolling average basis.

9.7 JPS's ELS Issues

9.7.1 In its submissions, JPS continued to aver that the ELS is flawed, and that the NTL modelled by the company are disconnected from reality. JPS opposed the use of the ELS that the company has developed for categorizing and reporting the measured System Losses and in effect for over 10 years, stating that it is "unusual" based on the technical challenges involved in creating an accurate report and the questionable benefits it would provide to the target setting process. With those claims, JPS insisted that its proposed "alternative mechanism" described in its 2019-2024 Rate Review Application, which uses the coverage of smart meters to characterize the level of NTL under its control, uses verifiable and mutually available variables to set targets, is a more suitable approach that should be adopted.

OUR' Position

9.7.2 The OUR's response to JPS's arguments against the suitability/applicability of the ELS for regulatory assessment of System Losses, is as follows:

1. It is important to underscore that in order for JPS to effectively manage and mitigate System Losses, it is critical that a proper framework/methodology is in place to appropriately define, measure and quantify these losses. Moreover, according to the provisions of the Licence 2016, this is a fundamental responsibility of the company. In that respect, during previous Rate Review cycles, the OUR has collaborated with JPS in establishing a reasonable framework to guide the process for defining, categorizing measuring/estimating, and reporting System Losses, which includes the ELS methodology. As currently structured, the ELS provides a full disaggregation of the total System Losses (TL & NTL), estimated for a given month (based on a 12-month

rolling average) into defined categories/components, according to the sources/modes of energy losses. Although not 100% precise (due mainly to TL/NTL approximations), with the balancing effect of the rolling 12-month average approach, and efforts to improve the data quality overtime, there is a high degree of confidence that the annual ELS data is within acceptable margins of error. As such, the ELS and associated energy losses components are considered to be reasonable and suitable to be used as the basis for regulatory assessment of JPS's System Losses performance and related determinations.

2. As stipulated in the Final Criteria (Annex 3), JPS is required to submit to the OUR, the relevant ELS which shall be structured in accordance with the requirements and conditions. The ELS submitted by JPS for each month up to 2021 December, has been found to be largely consistent with the defined framework in the Final Criteria. Further, the ELS reports that were submitted by JPS prior to the 2019-2024 Rate Review Application (same as the 2021 ELS), were defended by the company as being acceptable and reasonable. Therefore, the company's recent contention that the ELS is unsuitable for regulatory assessment of its System Losses, without substantiation and sound reasoning, is not constructive.

3. The ELS methodology is not an entrenched mechanism or principle of electric utility "rate making". It is simply a framework that provides valuable information on the nature and quantity of energy losses in the electricity system. Undoubtedly, it seeks to convey the "best available" losses information, which in essence, serves to reduce the "information asymmetry" in the regulatory process, involving the treatment of System Losses during Rate Reviews and Annual Review proceedings. Despite some limitations, the ELS is recognized as a valuable and useful loss reporting tool. Suffice it to say that:

    - At no time, have the OUR ever declared that the ELS provides a perfect quantification of the defined System Losses components. Furthermore, the OUR acknowledges that the global losses can be measured with a reasonable degree of accuracy, but a precise disaggregation into constituent elements is difficult given that certain loss components cannot be directly measured and have to be estimated using credible approximation methodologies. This is not unknown to JPS, as total NTL and some aspects of TL are estimated by the company using such approaches. The OUR does not accept JPS's characterization of the use of the ELS for System Losses assessment as "unusual".

    - Due to greater availability and accuracy of System Losses related data, resulting from increased deployment of advanced energy measurement technologies/information systems across the transmission and distribution (T&D) network, including advanced metering infrastructure (AMI) as well as stronger regulatory controls, the quality/reliability of the ELS reports have improved progressively over time, rendering the model more plausible for the relevant System Losses evaluation.

    - During the 2014-2019 Rate Review Process, it was established that the ELS developed for December of each calendar year preceding a Rate Review or

Annual Review, will form the foundational basis of the System Losses performance assessment and determination of the relevant targets going forward. Notwithstanding, this requirement does not preclude the consideration of other relevant factors in the regulatory treatment of System Losses. Needless to say, that the use of the ELS methodology follows years of established precedents that continued even after the implementation of the Licence 2016. More specifically, it was consistently applied at the 2016, 2017 and 2018 Annual Reviews to support the determination of the relevant System Losses targets and performance measurement, as applicable. The ELS was also applied at the 2019-2024 Rate Review and related 2021 Annual Review, consistent with the established regulatory requirements, principles, and precedents. In its respective submissions, JPS made a number of claims about the NTL allocation methodology and questioned the suitability of the ELS. The OUR has examined these claims and do not find them to be meritorious.

4. It is instructive to not that despite JPS's recent negative criticisms of the ELS, the model was actually utilized by the company to develop the 2019-2023 annual System Losses forecast included in its 2019-2024 Rate Review Application, and recently for the derivation of the 2021 Y-Factor in its 2022 Annual Review Filing.

5. It is also observed that while JPS has sought to selectively criticize the suitability of the ELS framework for System Losses performance measurement, to date, it has not put forward a superior alternative.

6. From the arguments presented, it would appear that JPS is conflating two issues; the ELS framework and the apportionment of NTL into JNTL and GNTL, which are two disparate and distinct elements. On the matter of the ELS, as described herein, the model is considered important and necessary, and there are continuing efforts to improve its efficacy and data quality. With respect to the issue of NTL distribution, the company's persistent claim that its proposed "alternative mechanism" (use of smart meter coverage to determine its level of control of NTL) is a more suitable approach that should be adopted, is unsubstantiated. As such, the Office maintains its decision of not approving the proposed mechanism.

7. To elaborate, this position reiterates the Office's conclusion on issue as delineated in the 2019-2024 Rate Review Determination Notice, where it was established that the OUR's assessment of the proposal found the model to be at an early conceptual/experimental stage and did not meet the standard for practical application. The specific deficiencies of the proposed mechanism as uncovered by the OUR include:

    - It is very abstract and lacked practicality with no clear connection to the relevant System Losses performance indicator/metrics.
    - It was viewed as a "work-in-progress" model, with unexplained variables and subjective parameters, which was not properly calibrated to facilitate robust NTL analysis.
    - The existing design was unproven/untested, which provided little or no confidence about the reliability and efficacy of the model. Thus, it was deemed

unsuitable for allocating NTL into JNTL and GNTL, which has significant cost implications.

- In addition to the issues involving the mechanics of the model, another major shortcoming is that it predominantly involves smart meter coverage, but this feature only applies to NTL in the "Billed Customers" category, which accounts for just a 37% share of total NTL, and would likely distort the results. The model does not appear to incorporate the other losses components in the NTL category, namely, NTL due to "Illegal Users" and "Internal Losses, which is a clear indication that it is not suitable for the purpose.

9.7.3 Based on these factors and considerations, and the general legal and regulatory framework, the Office rejected the proposed "alternative mechanism" and continues to maintain that decision.

9.8 JPS 2021 System Losses Performance

2021 Annual System Losses Measurement

9.8.1 In accordance with the established regulatory requirements, the overall System Losses for 2021 (January 1- December 31), was estimated by JPS and disaggregated into the various losses categories as represented in the 2021 December ELS shown in Figure 8.2 below.

Figure 8.2: 2021 System Losses Estimates (2021 December ELS)

JPS ENERGY LOSS SPECTRUM — December 2021

(All figures in MWh unless otherwise stated)

Transmission Network	2.21%
Primary Distribution Network	1.50%
Distribution Transformers	1.30%
Secondary Distribution Network	2.90%
Technical Losses	7.91%
Technical Losses	7.91%
Non-Technical Losses	20.38%
System Losses	28.29%

Category		Average Monthly Cust./Cons.	Billed Sales	Energy Loss	
				Loss	Total %*
Billed Customers	Wholesale Tariff (R70)	24	281,809	-	-
	Streetlight/Stoplight (R60)	482	49,431	-	-
	Large C&I (R50)	148	343,079	2,893	0.07%
	Large C&I (R40)	1,890	742,629	15,812	0.37%
	Medium C&I (rate 20)	6,744	338,629	15,616	0.36%
	Small C&I (rate 20)	62,431	207,286	8,955	0.21%
	Residential (rate 10)	610,598	1,123,328	280,081	6.51%
SUBTOTAL BILLED CUSTOMERS		682,317	3,086,191	323,357	7.51%
Other Non-Technical	Illegal Users (Non-Customers)	180,000	-	520,059	12.08%
	Internal Losses	-	-	33,866	0.79%
SUBTOTAL NON-TECHNICAL		862,317	3,086,191	877,282	20.38%
Technical Losses		-	-	340,485	7.91%
GRAND TOTALS		862,317	3,086,191	1,217,766	28.29%

*Net generation of 4,303,957

9.8.2 As indicated in figure 8.71, the 2021 total System Losses as at 2021 December was estimated at 28.29% of annual net generation, representing a marginal increase of 0.26% or 32.98 GWh relative to the 2020 level (28.03%). Of this 2021 total (28.29%), TL and

NTL, accounted for 7.91% and 20.38% of net generation, respectively, with the overall increase of 0.26% realised for the year being mostly driven by NTL caused by "Illegal Users", according to the ELS.

9.8.3 According to JPS, this outcome was mainly due to the adverse effects of the COVID-19 pandemic, which negatively impacted its operations in 2021.

9.8.4 Notably, the estimated 2021 TL and the relevant NTL constituents were measured against the applicable targets to determine the 2021 Y-Factor required for the TULos2021 computation.

9.9 2021 Energy Balance

9.9.1 For 2021, JPS reported a total system net generation of 4,303.96 GWh, with electricity sales ("billed energy") and System Losses accounting for 71.71% (3,086.19 GWh) and 28.29% (1,217.77 GWh), respectively, as reflected in the 2021 energy balance provided in Table 8.2 below.

Table 8.2: System Energy Balance (2020 vs 2021)

COMPONENT	2020 ENERGY BALANCE		2021 ENERGY BALANCE		CHANGE
	Energy Distribution (GWh)	% of Net Generation	Energy Distribution (GWh)	% of Net Generation	% Change (GWh)
Technical Losses (TL)	334.31	7.91%	340.49	7.91%	6.18
Non-Technical Losses (NTL)	850.48	20.12%	877.28	20.38%	26.80
TOTAL SYSTEM LOSSES	**1,184.79**	**28.03%**	**1,217.77**	**28.29%**	**32.98**
BILLED ENERGY SALES	**3,042.64**	**71.97%**	**3,086.19**	**71.71%**	**43.55**
TOTAL (NET GENERATION)	**4,227.43**	**100.00%**	**4,303.96**	**100.00%**	**76.53**

9.9.2 As shown in Table 8.71, the 2021 system net generation (4,303.96 GWh) increased slightly by 1.8% (76.53GWh) relative to the 2020 level (4,227.43 GWh), which according to the data, was attributable to small increases in both electricity sales and System Losses. Similarly, electricity sales (billed energy), which represent aggregate consumption of legitimate customers, grew slightly by 1.4% (43.55 GWh) in 2021, from 3,042.64 GWh in 2020 to 3,086.19 GWh at the end of 2021.

9.9.3 These results also indicate that the level of increase in NTL in 2021 is equivalent to 62% of the electricity sales growth realized for the year, which has demand growth and cost implications.

9.10 2021 Monthly System Losses Breakdown

9.10.1 As represented in the 2021 January - December ELS submitted by JPS, the full breakdown of the monthly global System Losses into the various categories as well as the trajectory of these losses, over the reporting period is shown in Table 8.3 below.

Table 8.3: JPS 2021 Monthly System Losses Performance (2021 January - December ELS)

JPS' 2021 ENERGY LOSS SPECTRUM: MONTHLY BREAKDOWN														
TYPES	**LOSS CATE-GORY**	**2020 DEC**	**2021 JAN**	**2021 FEB**	**2021 MAR**	**2021 APR**	**2021 MAY**	**2021 JUN**	**2021 JUL**	**2021 AUG**	**2021 SEP**	**2021 OCT**	**2021 NOV**	**2021 DEC**
TL	Transmission	2.21%	2.22%	2.21%	2.20%	2.20%	2.20%	2.20%	2.22%	2.24%	2.25%	2.25%	2.21%	2.21%
	Primary Distribution	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
	Distribution Transformers	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%
	Secondary Distribution	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 TL	**7.91%**	**7.92%**	**7.91%**	**7.90%**	**7.90%**	**7.90%**	**7.90%**	**7.92%**	**7.94%**	**7.95%**	**7.95%**	**7.91%**	**7.91%**
NTL	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	0.06%	0.06%	0.06%	0.06%	0.06%	0.06%	0.06%	0.06%	0.06%	0.06%	0.07%	0.07%	0.06%
	Rate 40	0.37%	0.38%	0.38%	0.38%	0.38%	0.38%	0.37%	0.37%	0.37%	0.37%	0.37%	0.37%	0.37%
	RT20 (Med)	0.47%	0.37%	0.37%	0.37%	0.37%	0.37%	0.37%	0.37%	0.37%	0.36%	0.36%	0.36%	0.36%
	RT20 (Small)	0.21%	0.21%	0.21%	0.21%	0.21%	0.21%	0.21%	0.21%	0.21%	0.21%	0.21%	0.21%	0.21%
	RT10	6.57%	6.60%	6.66%	6.67%	6.66%	6.63%	6.61%	6.61%	6.62	6.60%	6.57%	6.53%	6.51%
	Sub-Total	**7.59%**	**7.63%**	**7.68%**	**7.68%**	**7.67%**	**7.65%**	**7.63%**	**7.62%**	**7.64%**	**7.61%**	**7.57%**	**7.53%**	**7.51%**
	JPS Internal	0.65%	0.70%	0.52%	0.52%	0.56%	0.54%	0.44%	0.48%	0.48%	0.79%	1.01%	0.85%	0.79%
	Illegal Users	11.87%	12.05%	12.28%	12.28%	12.41%	12.35%	12.32%	12.28%	12.28%	12.21%	12.16%	12.13%	12.08%
	Total NTL	**20.12%**	**20.38%**	**20.47%**	**20.53%**	**20.65%**	**20.53%**	**20.39%**	**20.38%**	**20.38%**	**20.61%**	**20.74%**	**20.51%**	**20.38%**
Total		**28.03%**	**28.30%**	**28.38%**	**28.43%**	**28.55%**	**28.44%**	**28.29%**	**28.30%**	**28.34%**	**28.57%**	**28.69%**	**28.42%**	**28.29%**
LOSS (GWh)		**1,184.8**	**1,156.4**	**1,165.5**	**1,186.4**	**1,193.7**	**1,195.2**	**1,193.1**	**1,193.1**	**1,195.2**	**1,210.1**	**1,221.8**	**1,218.1**	**1,217.8**
NET GEN (GWh)		**4,227.4**	**4,206.3**	**4,175.7**	**4,173.5**	**4,181.8**	**4,202.9**	**4,216.7**	**4,225.2**	**4,217.0**	**4,236.1**	**4,258.8**	**4,285.6**	**4,304.0**

9.10.2 The data presented in Table 8.72 above indicates that:

1) Both TL and NTL are concentrated in the distribution network, and account for almost 90% of the total System Losses. The data also shows that NTL continues to be driven by "Illegal Users", the Rate 10 customer category and inefficiencies in JPS' internal processes.

2) Total TL estimated at the end of 2021 December was 7.91% of annual net generation, at par with the 2020 December level, even though there was increased energy flows in the T&D network during the year. However, the data shows that TL in GWh increased 1.85% in 2021, while net generation increased by 1.81%, which would be the reason for no change in TL derived on a percentage of net generation basis.

3) Total NTL estimated at the end of 2021 December was 20.38% of annual net generation, 0.26% higher than the 2020 December level of 20.12%. This, according to JPS is due to the effects of the COVID-19 pandemic on its utility operations in 2021.

4) NTL due to large C&I (Rate 40&50) and Medium C&I (Rate 20) customers continue to be relatively high based on industry standards, despite the suite of advanced metering capabilities and information systems, including "check meters", available for monitoring these accounts.

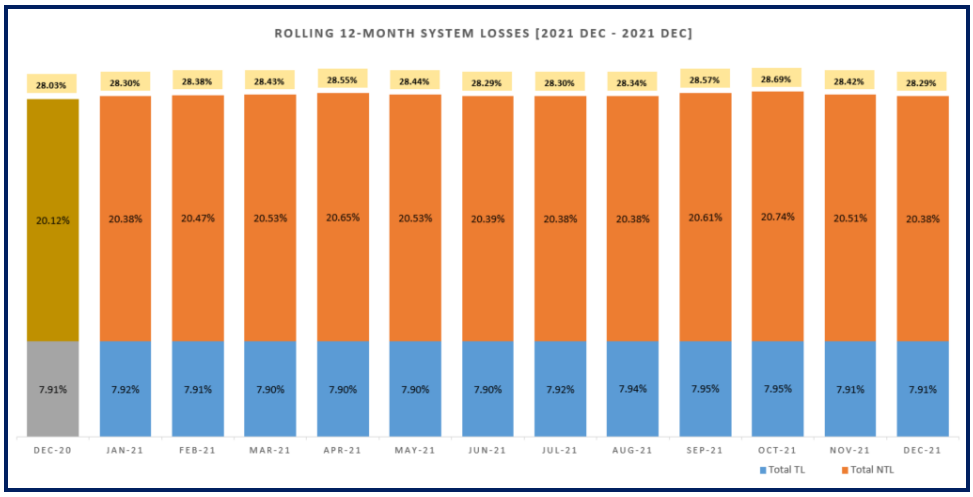
5) NTL attributable to Rate 10 customers as at the end of 2021 December was 6.51% of annual net generation, down by just 0.06% relative to the 2020 December level (6.57%), despite JPS's mass deployment of advanced metering infrastructure (AMI) and other targeted loss reduction initiatives in 2021 to reduce energy losses in this customer class. With over 450,000 AMI meters now installed in the network, this insignificant impact brings into question the effectiveness of the overall smart meter programme.

6) NTL caused by "Illegal Users" (non-customers) increased by 0.21% of net generation from 11.87% in 2020 December to 12.08% (or 59% of total NTL) as at the end of 2021 December. Over the years, this component has been the dominant driver of NTL, which according to JPS, is being sustained by an estimated 180,000 "Illegal Users" across the country. The annual System Losses data indicates that since the 2014-2019 Rate Review this number of Illegal Users has been held constant by JPS, but the quantity of energy that they have reportedly abstracted and consumed annually has increased considerably. For example, between 2019 and 2021, the energy consumed increased by approximately 15% from 452.61 GWh in 2019 to 520.06 GWh in 2021. JPS claimed that this level of increase in electricity consumption by the "Illegal Users" was influenced by the COVID-19 pandemic conditions during 2020 and 2021. However, that argument may be counter-intuitive, given that the historical System Losses data indicates some level of saturation in this category and that the reported increase in consumption (kWh) may not be possible without a significant increase in the number of "Illegal Users".

7) While total System losses expressed on a percentage basis (% of net generation) increased by 0.26% from 28.03% in 2020 to 28.29% as at the end of 2021, the actual 2021 energy losses measured in GWh increased by a wider margin of 2.78%. The System Losses trend during 2021 is illustrated in Figure 8.72 below.

8) The system annual net generation (the base used to convert actual System Losses measured in GWh to percentage), increased from 4,227.4 GWh in 2020 to 4,304.0 GWh in 2021, due to marginal increases in both billed sales and System Losses, showing signs of recovery from the effects of the COVID-19 pandemic. This increase in the 2021 net generation would have served to moderate the effect of the 32.98 GWh increase in overall System Losses in 2021, thus, resulting in just a small increase of 0.26% of net generation.

Figure 8.3: JPS Monthly System Losses Trend (2020 December - 2021 December)



9.11 JPS 2021 System Losses Reduction Projects Status

JPS 2021 Loss Reduction Projection – Scope and Impact

9.11.1 In the 2019-2024 Rate Review Determination Notice, the Office approved a total CAPEX of US$19.57M to finance the implementation of JPS's 2021 loss reduction projects in its 5-year capital investment plan. JPS has indicated the status of these projects as summarized in Table 8.4 below.

Table 8.4: JPS 2021 Loss Reduction Projects – Scope and Impact

STATUS OF JPS 2021 LOSS REDUCTION PROJECTS							
Loss Category	**Projects**	**OUR Approved CAPEX (US$'000)**	**Planned Scope**	**Actual Scope**	**Planned Impact**	**Actual Impact**	**Remarks**
TECHNNICAL LOSSES (TL)	Voltage Standardization Programme (VSP)	3,196	-	-	-	-	JPS reports that 2 feeders were upgraded in 2021 but scope/impact not provided
NON-TECHNNICAL LOSSES (NTL)	Smart Meters	14,588	45,000	47,631	21 GWh	17.3 GWh	Adjusted Scope: 60,000 to 45,000 meters.
	Audits & Investigations	-	87,500	75,026			
	Upgrading Metering Infrastructure	192	NONE	NONE	NONE	NONE	Fund approved but no activity.
	RAMI Projects	4,788	7,000	2,494	17.6 GWh	1.6 GWh	
	Social Initiatives, Community Renewal & Strike Force		11,750	3,198	6.9 GWh	4.8 GWh	
TOTAL NTL		**19,568**					
TOTAL IMPACT					**45.5 GWh**	**23.7 GWh**	

9.11.2 According to JPS, the smart meter and RAMI initiatives launched in 2021, were heavily impacted by the global supply chain issues, which led to a shortage of meters and communication devices needed to implement these initiatives, and caused delays, which resulted in lower than expected loss reduction. However, this meter shortage issue was not

communicated to the OUR, and was not reflected in the Meter Testing, Administrative and Operational Protocol (MTAOP) activities during 2021.

9.12 OUR's Review of JPS's System Losses Reduction Programme Development

9.12.1 The OUR's review of the status of JPS's 2021 loss reduction projects identified some very pertinent issues and concerns. These are outlined in Table 8.5 below.

Table 8.5: JPS System Losses Reduction Projects Implementation Problems

JPS SYSTEM LOSSES REDUCTIONS PROJECTS IMPLEMENTATION ISSUES
2021 TECHNICAL LOSSES REDUCTION PROJECTS
1. Voltage Standardization Programme (VSP)
In power system operations, a Voltage Standardization Programme VSP) is 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. 2020 VSP Initiatives Under section 5.2.1 (page 73) of the 2022 submissions, JPS stated that at the end of 2020, two feeders from the Upper White River (UWR) substation (UWR 110 & 210 in the parish of St. Mary) were upgraded from 12 kV to 24 kV, as part of the approved 2020 VSP initiatives, for which technical losses reduction was realized in 2021, and that the resulting impact is reported in the full primary distribution assessment accompanying the submissions. The assessment report was reviewed but the specific impact of these completed initiatives was not obvious. 2021 VSP Initiatives In section 5.1 (page 65) of the submissions, JPS indicated that the 2022 VSP was approved by the OUR for US$3.2M to facilitate the conversion of one (1) distribution feeder emanating the Blackstonedge Substation and two (2) distribution feeders emanating the Highgate Substation. JPS claimed that it spent US$2.9M in 2021 and completed the upgrade of the three (3) feeders from 12 kV to 24kV. As reported, 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 indicated that the remaining 56km of re-insulation will be completed in 2022 and will cost an additional US$0.3M. For clarity, the Office approved CAPEX for JPS's 2022 VSP was not US$3.2M as stated by the company. Instead, this appears to represent the amount approved for the 2021 VSP initiatives. According to the 2019-2024 Rate Review Application, JPS 2021 VSP initiatives encompassed the upgrade of the three (3) named distribution feeders, scheduled to be completed in 2021, with expected TL reduction of 635.35 MWh. In the 2019-2024 Rate Review Determination Notice, the Office approved a total CAPEX of US$3.196M projects to fund the implementation these projects, and so, the reported capital expenditure suggests that these VSP initiative were executed within budget. Notwithstanding, JPS reported that the projects have been completed in 2021, but the precise completion dates were not provided, and also, the associated TL reduction impact has not been quantified. These issues need to be addressed by JPS.
2. 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. However, up to the date of the Annual Review submissions, there has been no indication of any TL reduction realized from the operation of the DG facility since commissioning. JPS needs to measure the associated TL reduction and report this to the OUR.
2020 NON-TECHNICAL LOSSES REDUCTION PROJECTS
3. Smart Meter Project
In the 2019-2024 Rate Review Determination Notice, the Office approved US$14.588M (no IDC) to fund the installation of 110,000 smart meters (JPS 2019-2023 Investment Plan) in 2021, with loss reduction impact of 14.034 GWh. However, according to JPS, the approved capital amount equates to 81,000 meters. However, in the 2022 submissions, JPS indicated

that it planned to install 60,000 meters in 2021 but the target was reduced to compensate for previously exceeding the allocation in 2020 (70,000 installed at cost of US$13.3M). JPS claimed that because the OUR had only approved US$8.7M for expenditure in 2020,it meant JPS had to pre-spend US$4.6M on the smart meter programme from 2020, and in order to be made itself whole, JPS had to reduce the 2021 expenditure on smart meters to US$8.9M, This facilitated the installation of 47,631 smart meters. JPS also indicated that due to the effects of COVID-19 pandemic on global supply chain, it experienced shipment delays of several months for the meters. This the company claimed, severely affected the deployment of smart meters in 2021, with the bulk of the deployment occurring towards the end of the year. As such, the expected loss reduction benefits were not realised in 2021 due to the delayed installations.

In the OUR's view, the alterations to the Office approved 2019-2024 Smart Meter Programme are significant, and JPS should have consulted with the Office before making such adjustments to schedule. On the matter of the 2021 loss reduction benefits, while JPS reported that the smart meter impact was not realized in 2021 for the stated reasons, in Table 5-4 of its submissions, a combined impact for smart meters and "audits & investigations" was stated. This needs to be clarified by JPS.

4. Audit and Investigations

For 2021, JPS reported that it completed 75,026 investigations (65,699 on residential and small commercial accounts) that discovered 8,258 irregularities and recovered approximately 17 GWh of lost energy (planned impact - 21 GWh). According to JPS, the COVID-19, the pandemic continued to interfere with operations during the year and decreased the availability of crews to perform these investigations.

While JPS has reported 75,026 audits/investigations for 2021, the data in the "JPS Losses Orders – 2021", submitted as part of the 2022 Annual Review submissions, indicates that a total of 105,107 investigations were conducted. This level of inconsistency raises questions about the reliability and credibility of data/results being reported, and there, requires explanation from JPS.

5. Residential Automated Metering Infrastructure (RAMI) Projects

In the 2019-2024 Rate Review Determination Notice, the Office approved US$4.788 (no IDC) to fund the installation of 5,000 RAMI meter installations (JPS 2019-2023 Investment Plan) in 2021, with loss reduction impact of 4.282 GWh. However, according to JPS, it planned to undertake ten (10) projects in 2021 of which nine required pole line construction due to a lack of infrastructure, but due to the global supply chain issues, only six (6) of these planned projects were completed in 2021, and the four remaining projects are delayed until 2022. JPS further indicated that these issues also caused the six projects to be completed later than was initially scheduled, and as a result, the estimated energy loss reduction benefits were not realised in 2021. The results of the completed projects indicate that there were 2,025 conversions to RAMI, with 469 new customers added, which according to JPS, will yield approximately one (1) GWh of energy loss reduction per month.

However, despite the reported challenges, the OUR is of the view that the reported RAMI project results are not encouraging. Further, given the planned project scope and capital expended, the results suggest that the programme up to this point is not cost effective, and may need to be reassessed and recalibrated.

6. Community Renewal Initiatives

As presented by JPS, the Community Renewal is a social intervention programme that is focused on addressing socioeconomic issues that drive NTL at the community level, and its main goal is to convert illegal users to legitimate customers, and wherever possible, tries to reduce the consumption of illegal users. In its submissions (page 76), the company indicated that it had set a target to convert 8,000 illegal users to legitimate customers in 2021, with an estimated energy loss reduction impact of 6.9 GWh. However, Table 5-7 in the said submissions indicate that planned for user regularization 11,750 and not 8,000. This inconsistency needs to be clarified by JPS. With respect to the programme results for 2021, it was indicated in the submissions that only 3,198 illegal users were regularized, but the corresponding energy loss reduction impact was not discernible because it was lumped together with that associated with Strike Force activities. Going forward, the respective impacts need to be separated to facilitate proper assessment. According to JPS, the programme is workable but is being hampered by house-wiring issues, which needs to remedied. Notwithstanding, based on evidence presented and previous failures of similar initiatives, the OUR is of the view that JPS may need to reassess these measures to ensure that they are cost effective and are fulfilling the intended objectives.

7. Strike Force Activities

In its submissions, JPS indicated that movement restrictions, curfews, unavailability of police personnel, and other issues triggered by the COVID-19 pandemic caused the Strike Force to operate at partial capacity in 2021. The company reported that the Strike Force activities resulted in 1,618 users being regularized (target - 2,250), 232,529 illegal throw-ups removed compared (target - 250,000), and 81 arrests made for theft of electricity in 2021. Under the circumstances, these 2021 interventions reflect a strong effort that cannot be overlooked. Nevertheless, the results in terms of energy loss reduction are found to be miniscule. While every unit of energy recovered and/or loss prevented counts, the current loss reduction rate is not high enough to cause any dent in total annual NTL, which are progressing on an upward trajectory.

OUR's Comments – JPS's 2020-2021 Loss Reduction Initiatives

9.12.2 The OUR's review of the 2020-2021 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 fruitless 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.

9.12.3 Given these findings and considering that some of the 2021 projects have been carried forward to 2022 and that most of the approved 2022 projects are scheduled to be completed in 2022, the OUR believes that it is prudent for JPS to reassess and revise its project implementation strategy. This is with the aim of returning the 2019-2024 System Losses reduction programme to a sustainable path, to ensure that the established programme objectives can be achieved within the defined timeframe, despite the potential future challenges and constraints.

9.13 JPS's 2022 Loss Reduction Projects

9.13.1 In its submissions, JPS indicated that in 2022 it plans to implement the loss reduction projects described in Table 8.6 below.

Table 8.6: JPS's Loss Reduction Projects Planned for 2022

JPS' 2022 LOSS REDUCTION PROJECTS				
Loss Category	**Projects**	**OUR Approved CAPEX (US$'000)**	**Estimated Loss Reduction Impact**	**Remarks**
TECHNICAL LOSSES (TL)	VSP	4,165	2.595 GWh	The New Michelton Halt 210 and 310 feeders in St, Catherine to be upgraded from 12 kV to 24kV. The expected TL reduction (2.595 GWh) is to be realized starting in 2023.
	Capacitor Bank Project (Corporate Area)	-	0.603 GWh	Project involves the installation and commissioning of 40 MVAR of medium-voltage substation capacitor banks in the Corporate Area. The target TL reduction of 603 MWh is to be realized starting in 2023. The project is channelled through JPS 2022 May Extraordinary Rate Review Application
	TOTAL TL		**3.198 GWh**	
NON-TECHNICAL LOSSES (NTL)	RAMI	3,001	18.000 GWh	• Three projects originally planned for completion in 2021 are rescheduled for completion in 2022. • Three new projects planned for 2022 are to be completed by the end of the year. • The estimated loss reduction is about 758 MWh/month.
	Smart Meter	12,511		• 65,000 revenue meters to be installed in Westmoreland and St. Ann. • 4,000 transformer meters to be installed in other area to facilitate energy balance measurements.
	Audit and Investigations	-	17.000 GWh	• Audits/Investigations in 2022, will be mainly driven by transformer energy balance (TEB) initiative. • 30,000 customers are currently captured under the TEB. • JPS plans to increase the coverage to 100,000, primarily residential customers, by the end of 2022. • About 75,000 audits are be executed in 2022, with associated loss reduction and recoveries of 17 GWh.
	Community Renewal and Strike Force	-	6.720 GWh	• In 2022, JPS plans to operationalize the 2021 social intervention pilots that showed signs of success. • The overall aim is to regularize 6,200 customers with expected total energy loss reduction of 6.720 GWh.
	TOTAL NTL		**53.000 GWh**	

OUR's Comments – JPS 2022 Loss Reduction Projects

a) The 2021 RAMI projects carried forward to 2022 were not specifically identified, to allow for proper evaluation of the 2021 loss reduction impact.
b) The energy loss reduction impact expected from the 2022 smart meter installations was not specifically stated, which constrained the OUR's assessment of the project. This needs to be rectified by JPS in order to facilitate regulatory assessment after project completion.

9.14 JPS's CONCERNS - 2019-2024 SYSTEM LOSSES DETERMINATIONS

JPS Claims of Unreasonable Targets

9.14.1 JPS continues to argue that the targets prescribed by the Office do not reflect realistic conditions and the historical context of system losses in Jamaica and therefore, run contrary to the principles espoused by paragraph 37, Schedule 3 of the Licence 2016, which mandates that targets should be reasonable and achievable. JPS claimed that the targets prescribed by the Office are some of the most aggressive seen internationally, considering

resources and the lack of the national response seen elsewhere. To support its position, the company also made reference to a 2015 USAID sponsored workshop, citing examples of jurisdictions with rather generous System Losses targets as a basis to bolster its arguments.

OUR's Response

9.14.2 On the question of the reasonableness of the Office's determined 2019-2024 System Losses targets, the OUR and JPS differ fundamentally, as outlined in Chapter 14 of the 2019-2024 Rate Review Determination Notice. While these questions have been previously addressed in other proceedings, they have again re-surfaced at this Annual Review. As such, the OUR's further response is elaborated below:

1) Within the scope of the existing "price control mechanism", the "reasonable and achievable" condition in relation System Losses targets, as prescribed in Schedule 3 (paragraph 37) of the Licence 2016, cannot be interpreted in isolation because it is integrally linked to the overall Rate Review Process. As such, it must be guided by the overarching rate-making principles of prudent and efficient utility costs and "fair and reasonable" rates. In adhering to these fundamental principles of regulation, the "reasonable and achievable" condition must be objectively and rationally applied to the requirements of Schedule 3 (paragraphs 37 and 38) of the Licence 2016.

2) Regarding the reference to "historical context", it should be noted that this does not provide a sound basis for comparison because the circumstances during the previous performance periods were fundamentally different from the present situation (lack of structure/harmonization in the loss reduction efforts, mid-stream changes to the "price control mechanism", and lower penetration of advanced metering technology, etc.).

3) The claims made by JPS, seem to suggest that the Office should have shifted JPS's responsibility for JNTL to ratepayers, which would be imprudent and unreasonable. In principle, the 2019-2024 targets are set to hold JPS accountable for System Losses fully within its control as required by the Licence 2016. A typical example is JPS' "Internal Losses", which are under the direct and total control of JPS and should not be passed on to ratepayers. This also brings into focus the issue of fair and reasonable allocation of the System Losses burden, which has been a major factor in the regulatory treatment of System Losses and the Office's efforts to balance the interests of both JPS and the ratepayers. Within the bounds of rationality, it is understandable that reasonableness and achievability are important conditions to gauge System Losses performance. The OUR is obliged to go further an ask probing questions such as - reasonable to whom? Achievable at what cost? The answers to these questions were critical to the regulatory treatment of JPS's System Losses.

4) Moreover, all the approved CAPEX for JPS's loss reduction projects, and all relevant OPEX related to System Losses, as well as over 90% of the actual cost of the losses (based on the Y-Factor) are incorporated in the rates set by the Office, which are borne by ratepayers. Therefore, the assertions that the approved 2019-2024 targets are aggressive and unreasonable are not well founded.

5) Based on the "Y-Factor" formula (Exhibit 1, Schedule 3 of the Licence 2016), the effective share of GNTL imposed on the ratepayers, accounts for over 95% of total GNTL. Therefore, in respect of the JNTL target, which seems to be source of JPS's discontentment, a much higher target, would result in almost 100% NTL being allocated ratepayers, which would be unreasonable and unjustified, and not consistent with the provisions of Schedule 3 of the Licence 2016.

6) Under the current PBRM mechanism, it is the fundamental responsibility of JPS to minimize System Losses related costs to ratepayers, not to impose additional costs through excessive targets, which is not in the interest of the consumers. If JPS disputes this condition, then its arguments about unreasonable targets and the need for higher targets collapses.

7) The reference to the USAID sponsored workshop is selective and the benchmarks cited are limited and now aged. Moreover, recent System Losses benchmark data shows utilities in South America and other regions that have dedicated loss reduction plans, have realized over 50% reduction.

8) In summary, the approved 2019-2024 System Losses were determined based on reasonableness and prudence. They seek to assign consequence to imprudence and to induce accountability in relation to System Losses performance, particularly in relation to JNTL.

9.15 JPS Claims of Retroactive Targets

9.15.1 In the submissions, JPS asserted that the 2019 and 2020 System Losses targets set by the Office during the 2019-2024 Rate Review Process are "retroactive targets" and violates the requirements of the Licence 2016. The OUR disagrees with these claims based on the reasons outlined in the 2021 Annual Review Determination Notice. Therefore, as established in the 2019-2024 Rate Review Determination Notice, the OUR maintains its decision on the approved 2019 and 2020 System Losses targets.

9.16 JPS's 2022 Annual Review System Loses Proposals

9.16.1 JPS's 2021 System Losses performance measurements applicable to this 2022 PBRM, as well as proposals for the 2023 Annual Review adjustment, as presented in its submissions are delineated in the sections below.

9.17 JPS's Proposed 2021 System Losses Components and Y-Factor for $TULos_{2021}$

9.17.1 As indicated in its submissions, JPS used the 2021 System Losses components (actual performance) and the approved 2021 targets (DETERMINATION #21 of the 2019-2024 Rate Review Determination Notice) to derive the 2021 Y-Factor, necessary to determine the related TULos2021. These parameters (Ya, Yb, Yc and RF) were applied by JPS to compute the 2021 Y-Factor is provided in Table 8.7 below.

Table 8.7: JPS's 2021 System Losses Performance Parameters used to derive 2021 Y-Factor

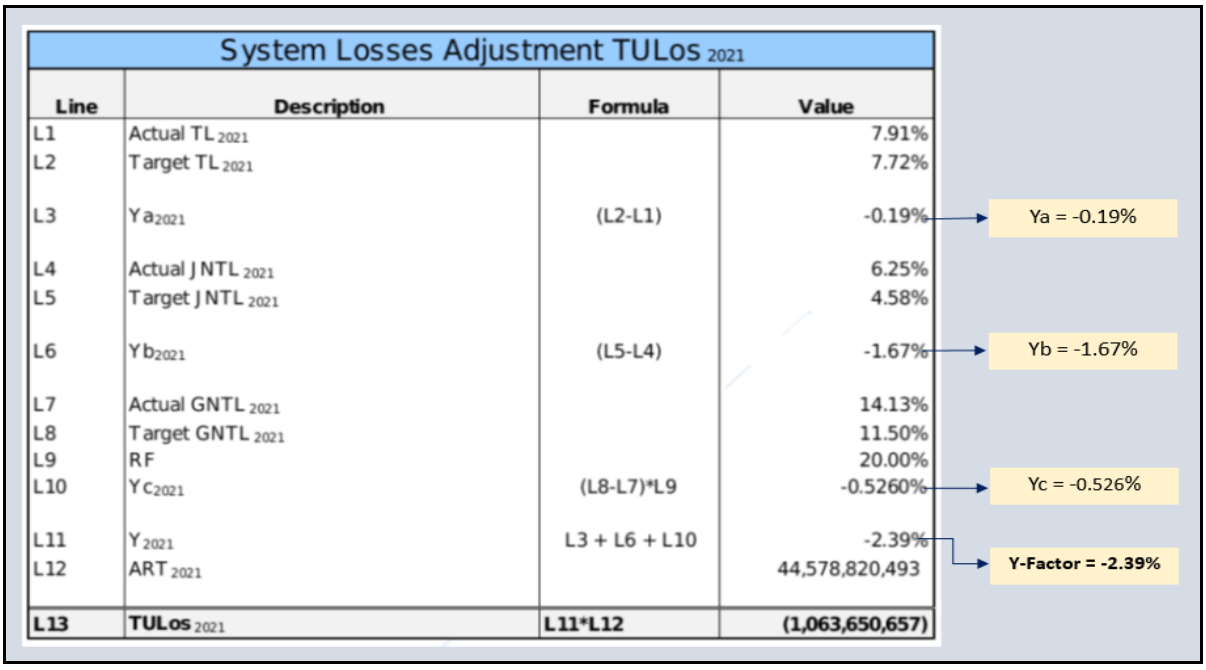
JPS 2021 SYSTEM LOSSES PARMETERS AND Y-FACTOR COMPUTATION						
DESCRIPTION	**TL**	**JNTL**	**GNTL**	**TOTAL**	**RF**	**REMARKS**
JPS 2021 SYSTEM LOSSES	7.91%	6.25%	14.13%	28.29%	-	Based on 2021 December ELS
OUR 2021 TARGETS	7.72%	4.58%	11.50%	-	20.00%	2019-2024 DETERMINATION NOTICE

9.17.2 Regarding these Y-Factor determinants, JPS submitted that based on the allocations outlined in Table 14.26 of the Final Determination and the absence of a stay by the Tribunal under Condition 32 paragraph 1 (iii) of the Licence 2016, these targets remain as the approved targets from the OUR unless JPS is successful in its pending appeal of the OUR's decision. However, it should be pointed out that "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, the question is whether JPS has conceded on its challenge to the TL targets.

9.18 JPS 2021 Y-Factor and related "TULos$_{2021}$" Computations

9.18.1 As indicated in its submissions, JPS used the 2021 System Losses components shown in Table 8.7 above (actual TL, JNTL and GNTL values versus the corresponding targets), to compute the 2021 Y-Factor and related "TULos2021". These computations which are demonstrated in Figure 8.4 below, generated a 2021 Y-Factor of **-2.39%** and a TULos2021 of **-J$1.063B**, representing a financial penalty to be absorbed by JPS.

Figure 8.4: JPS 2021 Y-Factor and related "TULos2021" Computations



System Losses Adjustment TULos 2021

Line	Description	Formula	Value	
L1	Actual TL 2021		7.91%	
L2	Target TL 2021		7.72%	
L3	Ya 2021	(L2-L1)	-0.19%	Ya = -0.19%
L4	Actual JNTL 2021		6.25%	
L5	Target JNTL 2021		4.58%	
L6	Yb 2021	(L5-L4)	-1.67%	Yb = -1.67%
L7	Actual GNTL 2021		14.13%	
L8	Target GNTL 2021		11.50%	
L9	RF		20.00%	
L10	Yc 2021	(L8-L7)*L9	-0.5260%	Yc = -0.526%
L11	Y 2021	L3 + L6 + L10	-2.39%	Y-Factor = -2.39%
L12	ART 2021		44,578,820,493	
L13	**TULos 2021**	**L11*L12**	**(1,063,650,657)**	

9.18.2 In reference to the 2021 Y-Factor and adjustment, JPS noted that while it has included a System Losses penalty in the 2022 ART, required to determine the non-fuel rates at this 2022 Annual Review, it believes that the System Losses targets, which were set at the height of the COVID-19 pandemic, are not reasonable and achievable. Therefore, they are inconsistent with the requirements of paragraph 37 of Schedule 3 of the Licence 2016. The OUR rejects this claim on the premise that during the 2019-2024 Rate Review Process, the Office considered the effects of the COVID-19 pandemic in the setting of the annual System Losses targets for 2020 to 2023. The fact is, in 2020 September, JPS in response to the OUR's draft 2019-2024 Rate Review Determination Notice, proposed a revised 2020-2023 System Losses forecast and corresponding targets (COVID-19 effects incorporated), for the Office's consideration. This proposal was evaluated by the OUR and the effects of the COVID-19 pandemic were factored in the relevant System Losses targets for 2020-2023. The Office's reasoning and decision on the proposal is set out under Chapter 14 of the 2019-2024 Rate Review Determination Notice.

9.19 JPS's Proposal for Adjustment to OUR's Approved 2022 Targets

9.19.1 As indicated in JPS's System Losses outlook for 2022, the planned 2022 System Losses reduction initiatives are expected to reduce TL by 3.2 GWh and NTL by 53 GWh, which should be realized in 2023. Taking into account this outcome, the company is forecasting a total annual net generation and electricity sales of 4,387 GWh and 3,180 GWh, respectively, for 2022, which would result in total annual System Losses of 1,207 GWh or 27.50% of net generation. On that basis, JPS is proposing that the 2022 System Losses targets approved in the 2019-2024 Rate Review Determination Notice should be revised to reflect the targets presented in Table 8.8 below.

Table 8.8: Revised 2022 System Losses Targets Proposed by JPS

REVISED 2022 SYSTEM LOSSES TARGETS PROPOSED BY JPS (2022 ANNUAL REVIEW FILING)	
System Loss Component	**Target**
Technical losses (TL)	7.90%
Non-Technical Losses fully within the control of JPS (JNTL)	6.89%
Non-Technical Losses not fully within the control of JPS (GNTL)	12.71%
Total	**27.50%**
RF	**10.00%**

9.19.2 JPS also submitted that it is maintaining its proposed 10% responsibility factor (RF) for the same reasons outlined in the 2019-2024 Rate Review Application. Additionally, the company noted that 90% of illegal users cannot be regularised without proper house wiring and certification, which is firmly not the responsibility of the utility.

9.20 **OUR's Position – JPS Proposal to adjust 2022 Targets**

1) The Office rejects JPS's proposal to adjust the 2022 System Losses targets approved in the 2019-2024 Rate Review Determination Notice to those in Table 8.102 above, on the basis that no sound justification was provided by JPS to substantiate the proposal.

2) The 2022 System Losses performance scenario had already been fully and appropriately assessed during the 2019-2024 Rate Review Process and the relevant targets determined, taking into consideration, the requirements of the Licence2016, the approved capital expenditure for the 2022 loss reduction projects, ongoing loss reduction measures (account audit, meter investigations etc.), projected penetration of Smart Meter project (AMI meters), and scope for recovering revenues associated with some modes of NTL.

3) The Office approved 2021 targets is deemed 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.

4) Accordingly, the Office's position is that the approved 2022 System Losses targets in the 2019-2024 Determination Notice (TL = 7.72%, JNTL = 4.58%, and GNTL = 11.50%), will stand.

5) With respect to RF, the OUR's position is outlined in detail in subsequent sections. Notwithstanding, the claim by JPS that 90% of illegal users cannot be regularized without proper house wiring and certification, seems to suggest that the company is equating "90% of Illegal Users" to 90% of GNTL, which is not the case.

9.21 **OUR's Evaluation of JPS's 2021 Y-Factor Proposal**

OUR's Preliminary Review

9.21.1 The OUR's initial review of JPS' 2021 System Losses measurements and 2021 Y-Factor proposal in its submissions, identified information gaps which created the need for additional System Losses data, necessary to facilitate a thorough assessment of the 2021 System Losses performance. The additional information was requested from JPS via letter dated 2022 May 26, and includes the following items:

1) The PDF version of the 2021 December Energy Loss Spectrum (ELS) included in the "Appendix G" of its submissions is not fully legible. A clear and readable version should be resubmitted.

2) The ELS for the months 2021 January – November, as required by Regulatory Reporting Framework have not been submitted by JPS. These monthly ELS are necessary to support the evaluation of JPS's 2021 System Losses performance in this 2022 Annual Review, and therefore, should be submitted to the OUR.

3) A breakdown of the total number of Advanced Meters (AMI), including Transformer/Total Meters, and "Check Meters" that have been installed in the electricity

network from the start of the smart meter programme up to 2022 May, broken out by Customer Class and by Parish/Service Area.

4) As required by DETERMINATION #21(5) of the 2019-2024 Rate Review Determination Notice, JPS shall submit a "detailed report" on the advanced meter programme up to 2020 June to the Office, addressing the scope, cost, benefits, and impact on NTL, within six (6) months of the effective date of this Determination Notice. However, this report was not submitted. To address this omission, the OUR under DETERMINATION 14(3) of the 2021 Annual Review Determination Notice, further determined that JPS shall submit an updated "detailed report" to the Office, covering the "smart meter programme" implementation activities up to 2021 June, with the contents stipulated in Chapter 14 (paragraph 14.184) of the 2019-2024 Determination Notice, within three (3) months of the effective date of this Determination Notice. This report was due 2021 December 1, but to date, the OUR's records indicate that it has not been submitted by JPS. A 2-slide PPT presentation entitled "Smart Meter Deployment" is included in "Appendix G" of the 2022 Annual Review Filing, however, on review, this document was found to be inadequate and does not include the contents specified in the DETERMINATION 14(3) of the of the 2021 Annual Review Determination Notice. It is important to note that this smart meter programme status report is necessary to support the OUR's evaluation of and determination on JPS' 2021 Non-Technical Losses (NTL) performance at this 2022 Annual Review. Accordingly, JPS is required to submit this detailed report to the OUR with additional contents, covering programme details up to 2022 May.

5) As required by DETERMINATION #21(4) of the 2019-2024 Rate Review Determination Notice, the company shall complete a full assessment of the primary distribution network Technical Losses (TL), including the total number of feeders and total number of distribution transformers, within one (1) year of the effective date of this Determination Notice, and a copy of the assessment report shall be submitted to the OUR. This TL assessment report was due 2021 December 24, but to date, the OUR's records indicate that it has not been submitted by JPS. It must be emphasized that the requested report is necessary to support the OUR's evaluation of and determination on JPS' 2021 TL losses performance at this 2022 Annual Review. Accordingly, JPS is required to submit this report to the OUR.

6) A detailed update on other Loss Reduction initiatives and approved projects currently in progress, including, commencement date, projected completion date, capital expenditure and corresponding loss reduction impact.

7) A breakdown of the 2021 System Losses for the following components in the T&D network:
   a. Each transmission line
   b. Each HV substation
   c. Each Distribution Feeder
   d. Each Distribution Transformer

8) Documentary evidence of the energy measurements/meter readings used to determine the Technical Losses within the boundaries of the Transmission System as defined in the Electricity Sector Codes.

Responsibility Factor (RF)

9) DETERMINATION #21(3b) of the 2019-2024 Rate Review Determination Notice, provides as follows:

"…At the 2022-2023 Annual Review, the RF will be reviewed and adjusted as necessary based on the progress of the initiatives to address GNTL."

9.21.2 Given this determination, JPS is required to provide all relevant information pertaining to GNTL since the effective date of the 20219-2024 Rate Review Determination Notice, to support the review of RF at this juncture. 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 – 2022 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 remaining years in the 2019-2024 Rate Review period.

9.21.3 All the requested data was submitted by JPS up to 2022 June 10, which were reviewed by the OUR and was found to largely satisfy the information requirements. Subsequently, the OUR carried out a full technical evaluation of JPS's 2022 Annual Review System Losses proposals and the 2021 System Losses performance measurements and 2021 Y-Factor, including all the relevant supporting schedules and data. This evaluation/analysis was necessary to facilitate the calculation of the 2021 Y-Factor required for the derivation of the "TULos2021" component of the 2021 Revenue Surcharge.

9.22 OUR's 2021 System Losses Performance Analysis

9.22.1 During the 2019-2024 Rate Review process, JPS in its response (dated 2020 September 8) to the 2019-2023 System Losses targets set out in the OUR's draft Rate Review Determination Notice (submitted to JPS in 2020 July), proposed "revised targets". JPS argued that a revision of the original System Losses projections included in its 2019 - 2024 Rate Review Application was necessary to account for the impact of COVID-19, which was unforeseen prior to the submission of the said application.

9.22.2 The revised System Losses forecast/target proposal was subsequently evaluated by the OUR, taking into account the COVID-19 effects on system operating parameters, particularly, system net generation, electricity sales and average system losses. The results of this evaluation indicated that the prevailing COVID-19 conditions, were likely to result in some adverse consequences, on System Losses within the 2020-2021 timeframe.

9.22.3 Based on the COVID-19 related 2021 System Losses projections, JPS proposed a revised total System Losses target for 2021 of 27.47% (100% of forecast). Based on the assumptions, the OUR also forecasted the overall 2021 System Losses to be approximately 27.50% of net generation. As it turned out, the actual System Losses recorded for 2021, as reflected in the 2021 ELS is 28.29% of net generation. Based on the OUR's review of the relevant system performance data, the reported 2021 System Losses level of 28.29% was validated as representative. A comparison of the referenced 2021 System Losses forecasts versus the actual 2021 System Losses performance are presented in Table 8.9 below.

Table 8.9: 2021 System Losses Forecasts versus Actual Performance

2020 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 (2021 ELS)**	**Variance (JPS COVID19 Forecast vs Actual)**	**Variance (OUR COVID19 Forecast vs Actual)**
TL	7.92%	7.90%	7.90%	7.91%	-0.01%	-0.01%
NTL	17.61%	19.57%	19.60%	20.38%	-0.81%	-0.78%
- JNTL	5.86%	6.63%	6.50%	-		
- GNTL	11.75%	12.94%	13.10%	-		
TOTAL LOSSES	**25.53%**	**27.47%**	**27.50%**	**28.29%**	**-0.82%**	**-0.79%**

9.22.4 The data shows that the 2021 System Losses forecasts (27.50%) were underestimated by a small margin of 0.80% of net generation, which falls within acceptable statistical margins of error and confidence limits.

9.23 Allocation of 2021 NTL to JNTL and GNTL

9.23.1 Utilizing the NTL allocation model described in the Final Criteria and the 2019-2024 Rate Review Determination Notice, and taking into account, JPS's 2019 - 2021 NTL Source Data as well as previous NTL causation factors, the OUR estimated the 2021 JNTL and GNTL allocations to be 6.29% and 14.09%, respectively. These are reflected in the 2021 NTL distribution provided in Table 8.10 below.

Table 8.10: OUR 2021 NTL Distribution – (JNTL and GNTL)

2021 NTL DISTRIBUTION - JNTL & GNTL						
Description	**Total NTL**	**JPS NTL Allocation**		**OUR NTL Allocation**		**Remarks**
		JNTL	GNTL	JNTL	GNTL	
2021 NTL (Actual)	20.38%	6.25%	14.13%	**6.29%**	**14.09%**	• Basis for JPS NTL allocation not stated. • OUR NTL Distribution based on JPS 2019 - 2021 Source data and previous NTL Datasets.
2021 NTL Proportions	100.00%	30.67%	69.33%	30.84%	69.16%	

9.23.2 A salient observation from this NTL breakdown is that the OUR's 2021 JNTL and GNTL allocations are quite like those derived by JPS, with relatively small variances for the respective components. Despite arguments to the contrary, this degree of convergence

invalidates the claims that the OUR's NTL distribution methodology is unsuitable and the resulting JNTL and GNTL allocations are unreasonable. Furthermore, it must be underscored that the OUR's NTL distribution methodology is predicated on a practical and robust approach and has been reasonably and consistently applied, to ensure fair allocation of the System Losses burden between ratepayers and the utility.

9.23.3 Notwithstanding the proximity of the 2021 NTL distributions, the OUR's determined 2021 JNTL and GNTL values were used to calculate the 2021 Y-Factor, as described in the sections below.

9.24 Review of the Responsibility Factor (RF)

Responsibility Factor Definition and Targets

9.24.1 To compute the annual Y-Factor, Exhibit 1, Schedule 3 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 responsibility factor (RF). That is, Yc = [(GNTL.target – GNTL.actual)] x RF.

9.24.2 As defined by the Licence 2016, RF is the responsibility factor determined by the Office, which is a percentage between 0% and 100%. This RF 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.

9.24.3 In its submissions, JPS applied the 2021 RF of 20% approved in the 2019-2024 Rate Review Determination Notice to compute the 2021 Y-Factor, in conformance with the Office's determination. Despite the compliance, the company has expressed its disagreement with the approved 2021 RF and has asserted that it maintains the position that the RF should be set at 10% for the reasons outlined in the 2019-2024 Rate Review Application.

9.24.4 However, based on the OUR's review of JPS's RF 2019-2024 proposal, the Office in the 2019-2024 Rate Review Determination Notice, determined as follows:

a) The RF shall remain at 20% for the 2020-2021 and 2021-2022 Annual Review
b) At the 2022-2023 Annual Review, the RF will be reviewed and adjusted as necessary based on the progress of the initiatives to address GNTL.

9.25 GNTL Reduction Strategies

9.25.1 In keeping with this determination, the OUR in this 2022 Annual Review proceeding, conducted a review of RF, in order to:

- examine the strategies/initiatives being implemented by the utility and GOJ to address NTL.
- ascertain the level of progress being made in reducing GNTL; and
- estimate the portion of GNTL that is within JPS control.

9.25.2 To facilitate this RF review, the OUR via the referenced 2022 May 26 letter to JPS, requested relevant information pertaining to GNTL since the start of the effective date of the 2019-2024 Rate Review Determination, as outlined in the additional information requirements above.

9.25.3 In response, JPS indicated that it is intimately involved with promoting legitimate and responsible use of electricity, but given the scope of the current problem, it has proposed several initiatives with significant GOJ involvement including:

1) Revised building and event permits that require some proof of legitimate supply
2) Dedicated courts to expedite cases involving electricity theft and other utilities.
3) Training Police to fight electricity theft independent of the utility.
4) Adjustments to legislation to provide the utility with more effective punitive tools.
5) Increasing the criminal penalties for electricity theft.
6) Expanded house-wiring subsidies for households that cannot afford the prerequisites for legitimate supply.

9.25.4 From JPS's account, the only one that has seen any positive movement is the house-wiring programme, wherein the GOJ, through its agency JSIF has wired and certified less than 300 houses between January 2021 and May 2022, with loss reduction impact of less than 50 MWh. According to JPS, the GOJ plans to wire about 1,500 houses annually, but over 200,000 households are estimated to have an illegal supply with no utility contract. JPS also revealed that it has collaborated with the GOJ to target high-theft areas where the affordability of house wiring is a significant impediment to legitimising users.

9.25.5 JPS emphasized that given the limited traction on its proposed initiatives, and lower than expected performance of some social initiatives in 2021, the company is contemplating and have already proposed an expanded house-wiring programme to be undertaken by JPS and funded by offsetting the system loss penalties. However, the OUR must give caution that there are many unknowns surroundings this proposition and will therefore require closer examination.

9.25.6 Other developments on this worth noting include:

<u>National Electricity Loss Reduction Plan</u>

This project is funded by the Inter-American Development Bank (IDB) and is designated the National Electricity Loss Reduction Plan (NELRP). It is expected to focus on the technical, commercial, economic, and legal & regulatory aspects of the unsustainable System Losses situation engulfing the sector and involves key stakeholders. The plan is

scheduled to be completed in 2022 and should provide a roadmap and recommendations on appropriate strategies and solutions to reduce System Losses, going forward.

Loss Reduction Working Group

According to JPS, the United States Agency for International Development (USAID) is also hosting and funding a Working Group consisting of MSET, JPS, the Office, JSIF and other advisory agents. The goal is to prepare and implement a short-term, coordinated, sector-wide plan for electricity loss reduction, particularly focusing on community engagement through social programmes. House wiring was identified as a major barrier to loss reduction in vulnerable areas and the Working Group is currently focussed on expanding the house wiring support for vulnerable households in 2022.

9.26 OUR's Assessment of GNTL and Determination of RF

9.26.1 In reviewing RF at this 2022 Annual Review, the OUR carried out an assessment of GNTL, taking into account, the following:

- Historical NTL data, including their orientation, causes, and distribution.
- The GNTL initiatives proposed for the 2019-2024 Rate Review period
- Targeted GNTL reduction measures/initiatives implement by JPS/GOJ since the start of the 2019-2024 Rate Review period;
- The initiatives contemplated by the GOJ to address NTL going forward.

9.26.2 The OUR's assessment found that while a collaborative approach to address GNTL is being established between JPS and the GOJ, there is no indication or anticipation of any tangible impact in terms of a shift in responsibility for GNTL, to date, or over the 2022-2023 review period. Further, based on the progress of the GNTL reduction initiatives being pursued, it is not likely that there will be any material change in the existing RF threshold until about the year 2024 Rate Review.

9.26.3 It is recognized that efforts to combat NTL is very demanding and involve considerable challenges and intricacies. Against that backdrop, it is apparent that some of the described GNTL reduction strategies/interventions are narrow in scope and are also being impeded by process inertia. Consequently, their loss reduction impact has been infinitesimal, with virtually no effect on GNTL, which have increased markedly since the effective date of the 2019-2024 Rate Review Determination Notice.

9.26.4 Taking into consideration, among other things, the results/findings of the OUR's RF review, and the relevant provisions of the Licence 2016, the Office determines that:

The RF shall remain at 20% for application at the 2022-2023 Annual Review, 2023-2024 Annual Review, and the 2024 Rate Review.

9.27 OUR 2021 Y-Factor COMPUTATION

9.27.1 To determine the 2021 Y-Factor, the actual TL, JNTL, and GNTL values were measured against the corresponding 2021 TL, JNTL and GNTL targets, approved in the 2019-2024 Rate Review Determination Notice, in accordance with the Y-Factor mechanism defined under Exhibit 1, Schedule 3 of the Licence 2016. The required computations and the resulting 2021 Y-Factor is presented in Table 8.11 below.

Table 8.11: OUR Derivation of the 2021 Y-Factor

2021 Y-FACTOR FOR JPS 2022 PBRM							
2021 Losses Components	**Approved 2021 Targets**	**JPS 2021 Actual**	**OUR 2021 NTL Allocation**		**2021 Y-Factor Components**	**JPS 2021 Y-Factor**	**OUR 2021 Y-Factor**
2021 TL	7.72%	7.91%	-		Ya[2021] = (TL Target – TL Actual)	-0.19%	**-0.19%**
2021 JNTL	4.58%	6.25%	**6.29%**		Yb[2021] = (JNTL Target – JNTL Actual)	-1.67%	**-1.71%**
2021 GNTL	11.50%	14.13%	**14.09%**		Yc[2021] = (GNTL Target – GNTL Actual) x RF	-0.53%	**-0.52%**
2021 RF	20.00%	-	-				
					Y-Factor[2021 = (Ya 2021 + Yb2021 + Yc2021)	-2.39%	**-2.42%**

9.27.2 As shown, the Y-Factor resulting from the 2021 System Losses (TL, JNTL and GNTL) performance measurement is **-2.42%**. Based on the defined "ART" adjustment mechanism, this Y-Factor value will be used to derive the "TULos2021" component of the 2021 Revenue Surcharge.

9.27.3 The Y-Factor result indicates that of the total 2021 System Losses (28.29% of annual net generation), only 2.42% is referred to JPS, while the cost of the remaining 25.87% (share of 91.4%) is borne by the ratepayers. Yet still, the company complains about unreasonable targets.

9.28 OUR System losses review - ISSUES AND POSITIONS

9.28.1 The findings and issues resulting from the OUR's review of JPS's System Losses proposals and supporting data during this 2022-2023 Annual Review process, are delineated in the sections below.

9.29 JPS Transparency Concerns

9.29.1 In its submissions, JPS argued that the Licence 2016 establishes a system where the Office evaluates system loss performance, sets reasonable and achievable targets after which, JPS and the Government implement activities necessary to reduce system losses, and this system falls apart if there is no shared understanding among the participants. JPS advocated for the Office to provide detailed evidence, rational and justifications for its positions and targets, arguing that such clarity provides the opportunity for JPS to adjust its plans to

tackle specific issues in a manner consistent with the Office's view or to challenge and improve the Office's positions. Ultimately, it can only benefit the customer if roles are transparent, well-understood, and well matched to the appropriate entity.

OUR Comments

9.29.2 First, JPS's reasoning appears to imply that the Office's System Losses determinations lack transparency. The OUR refutes any such aspersion. The Office has sought to meticulously outline the process, the analysis and the reasoning and grounds for each decisions on System Losses. Hence the Office's decisions have been extensively explained in each Determination Notice. Further, it is the Office's view that these decisions have been clear, consistent, and appropriately justified, and in accordance with the legal & regulatory framework and good regulatory practice, even if JPS does not agree with them. With respect to the specific issues raised, the OUR's position is follows:

a) It is important to note that the fundamental purpose of regulation is to align private behaviour with the "public interest". When applied to System Losses, it means ensuring that the cost of System Losses is not disproportionately allocated to ratepayers, while at the same, incentivizing utility performance in reducing these losses.

b) Under the existing legal & regulatory framework, there are defined and distinct roles/responsibilities. The Office has the power to set System Losses targets and approve JPS's loss reduction programme, while JPS has the obligation to address System Losses. Therefore, the notion that the customer only benefits if roles are transparent, well-understood, and well matched to the appropriate entity, is not entirely correct. JPS is well aware that the only way the customers will benefit is when the losses are in fact reduced, which requires performance.

c) The notion of JPS advocating for clarity from the Office to enable it to adjust its plans to tackle System Losses seems to be an attempt by JPS to shift its own responsibilities to the regulator. JPS's utility obligations involve decisional responsibility, which and cannot be separated from decisional risk. The arguments suggest that while JPS' management makes the System Losses decisions; it should be insulated from the risks. This is not acceptable and would perpetuate inefficiency. Under the existing regulatory framework, the Office is constrained to interfere in the running of JPS' "Licensed Business". The Office does not prescribe JPS's choice, in relation to System Losses management, therefore, customers should not be forced to bear any adverse consequences of such choice. Because JPS believes that the Office did not provide sufficient evidence, rationale, and justifications for its positions and targets, this does not insulate the company from the risk of poor results associated with its implementation of System Losses plans.

d) The current price control regime requires the Office to determine the relevant System Losses targets and approve the loss reduction plan (CAPEX and impact) for the 5-year

Rate Review period. This should provide adequate signals and clarity to JPS on how to structure and implement its loss reduction strategy. This should be the main focus.

e) The OUR's regulatory process is concerned with utility performance and outputs and not about managing or micro-managing the utility operations. In the case of System Losses, JPS has the responsibility to identify the drivers of these losses, evaluate their impact, and develop/implement loss reduction plans. This should be the imperative.

f) A common theme that appears to be emerging from JPS's challenge to the Office's System Losses determinations, is the avoidance of responsibility. Given this observation, and within the context of the current electricity market design, it must be emphasized that JPS has a legal monopoly over electricity service in the country. Therefore, in the absence of regulatory standards and consequences for not meeting performance targets, the utility would lack the incentive to perform efficiently and cost-effectively as opposed to a utility subject to market completion. In electricity market operation, utilities subject to the free interplay of competitive forces have no alternative to efficiency. This is not the case with JPS in the prevailing regime. Regulation must therefore cause the utility to comply with its obligations to perform, and in doing so must satisfy certain key requirements: secure efficiency in the utilization of its resources; to operate with all reasonable economies; to incur the lowest feasible costs; and to capitalize on all available cost saving opportunities. These requirements must serve as a guide to JPS when executing its mandated responsibilities, including those related to System Losses, and whatever additional obligations the Office imposes lawfully. Against that background, the Office in the Rate Review processes, has determined System Losses targets for JPS, reasonable, in alignment with the requirements of the Licence 2016, and seek to ensure that performance and consequences are commensurate.

9.30 Compliance with 2019-2024 Determination Notice Requirements

9.30.1 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, as indicated above. However, the independent study of NTL due to "Illegal Users", is still outstanding. It should be noted that in the 2021 Annual Review Determination Notice, the Office had granted a no objection to JPS for consolidating this study with the NELRP, provided that the conditions specified in the 2019-2024 Rate Review Determination Notice are satisfied. So, the independent study of NTL due to "Illegal Users, is expected to be addressed in the NELRP final report, but this is not yet received by the OUR.

9.31 Modes and Sources of NTL

9.31.1 The OUR's review of JPS's 2019 - 2020 NTL investigation data, including details of account audits, meter inspections/investigations, and the detected sources/modes of NTL,

submitted as part of the 2022 Annual Review submissions, revealed that JPS conducted 74720 customer account investigations in 2019, 73,139 in 2020, and 105,107 in 2021. In analysing the reported data, the OUR found 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 NTL. The sources/modalities 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
j) Other sources.

9.31.2 Notably, these sources/modes of NTL identified by JPS, are found to be largely consistent with the OUR' NTL causation factors elaborated in the 2019-2024 Rate Review Determination Notice, which are considered the primary drivers of energy losses in the "Billed Customer" category of NTL.

9.31.3 From a statistical perspective, the total number of accounts investigated in each of the stated years constitutes an acceptable "sample size" necessary to infer from the respective total populations (annual total customer counts). That is, total customer counts of 665,534, 676,879, and 689,132, for 2019, 2020 and 2021respectively. The respective sample sizes relative to total population, at a minimum, suggest a statistical confidence level of 95% in the results, with confidence interval (margin of error) of 5%. Accordingly, it can be reasonably inferred that the level of irregularities detected in each sample (number of accounts investigated annually) would be similar across the total customer base. This extrapolation from the sample to the whole population, which is critical for the validation of NTL in the system, NTL distribution into JNTL and GNTL, and formulation of NTL curtailment and mitigation strategies.

9.31.4 From the OUR's observations /findings, the following deductions were made:

1) The NTL data shows that energy losses due to "Billed Customers" (Rates 50, 40, 20 & 10), largely result from normal supply/service connection faults, meter infrastructure configuration problems & defects, and detectable meter irregularities, which can be corrected and mitigated, and are totally within JPS's control.

2) Based on the identified sources/modes of NTL, a significant portion of the resulting energy losses attributable to "Billed Customers" are regarded as "recoverable".

Accordingly, JPS should account for these losses as "recoverable energy" since they have been identified and quantified and can be 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 NTL 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) JPS can also seek to recover loss revenues associated with these sources of NTL by means of adjustments in accordance with the relevant "Back Billing Policy" or other means available to the company for redress.

4) The NTL investigation data indicates that the total number of customer accounts audited/investigated by JPS annually exceeds the requirements of the Licence (Schedule 2, Overall Standards - EOS7a & EOS7b). The higher number of annual meter/account audits and investigation activities is acknowledged, and this trend should allow JPS to gather more valuable information, to enhance its energy loss detection, analytics, and mitigation strategy.

9.31.5 Considering these considerations, the OUR urges JPS to continue to implement the necessary measures and take appropriate actions to address these elements of NTL to the benefit of the company, the ratepayers, the sector and the country as a whole.

9.32 RAMI Operational Issues

9.32.1 The Residential Automated Metering Infrastructure (RAMI) system was introduced in the low-voltage network (secondary distribution level) by JPS back in 2009, as a feasible anti-theft solution, equipped with advanced metering capabilities/features, that can limit the availability of means for electricity theft.

9.32.2 The RAMI design is specifically configured such that connected customers' premises are completely isolated from the assigned revenue meter module. This is done by locating the RAMI modules in secure enclosures mounted on the distribution transformers or utility poles, thus, eliminating the need for exposed secondary distribution conductors to provide low-voltage electricity supply. This unique feature makes it more difficult for illegal users to steal electricity from JPS because the energy is already metered upon leaving the transformer/RAMI enclosure. Additionally, these RAMI meters have remote telemetry and administration features with similar benefits as smart meters. But in the case of RAMI, the customer must be provided with a "display unit" as a substitute for the revenue meter, to provide energy/consumption readings to the customer, to assure transparency and trust in the process.

9.32.3 In addition, the RAMI solutions as used across the industry, is an expensive solution, but have been proven to be very effective in significantly reducing NTL, particularly in areas

with a high level of illegal access and electricity theft. However, the OUR has found that JPS has been deploying these RAMI systems in other areas not saturated with electricity theft, including some middle-income communities. This raises the question as to whether JPS is appropriately deploying these systems to address NTL.

9.32.4 While the benefits of the RAMI solutions are recognized, it should also be noted that over time, the systems have greatly improved due to design modifications, enhanced by the integration of advanced metering technology. With the promising results in terms of energy loss reduction, the programme accelerated after the 2009-2014 Rate Review Process. This was occasioned by the funding support provided through the Electricity Efficiency Improvement Fund (EEIF) approved in the 2009-2014 Tariff Review Determination Notice. However, by 2014-2019 Tariff Review, there were mounting evidence of declining returns, and management of the strategy and cost effectiveness of the programme was called into question. This resulted in the eventual termination of the EEIF in 2016 Annual Tariff Adjustment Determination Notice.

9.32.5 Nevertheless, in the 2019-2024 Rate Review Application, JPS packaged several modified RAMI projects as part of its NTL reduction programme for the 2019-2024 review period, which were subsequently reviewed and approved by the Office in the 2019-2024 Rate Review Determination Notice, with the expectation they would address some aspects of GNTL. However, since 2021, there have been increasing complaints from customers supplied by RAMI installations in several communities across the country about a range of RAMI malfunctions, as well as the receipt of multiple "estimated bills", in some cases, over 20 consecutive estimated bills, in constant breach of the Guaranteed Standard (EGS7). In the OUR's view, this situation has evolved into an unfortunate dilemma, on the grounds that an innovative NTL initiative that was intended to deliver positive outcomes, has now become a punishing inconvenience for legitimate customers. From a regulatory perspective, this development is deemed untenable and must be remedied with urgency. In this regard, the OUR will be looking into JPS's entire RAMI programme, and as such will require the following items of information, to support its investigation:

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 have 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.

9.33 JPS Responsibility for some NTL Components

9.33.1 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 NTL 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

9.33.2 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 - 2021 ELS, these categories of NTL continue to exit at unacceptable levels, as shown in Table 8.12 below.

Table 8.12: NTL Fully Assigned to JPS

NTL COMPONENTS FULLY ASSIGNED TO JPS (2019 - 2021)					
Components	**Final Criteria (JPS Control)**	**2019 Dec ELS**	**2020 Dec ELS**	**2021 Dec ELS**	**Remarks**
Wholesale (Rate 70)	100%	0.00%	0.00%	0.00%	
Rate 60	100%	0.00%	0.00%	0.00%	SSP – intelligent/remote consumption recording.
Large C&I (Rate 50)	100%	0.07%	0.06%	0.07%	All accounts equipped with AMI and Check Meters.
Large C&I (Rate 40)	100%	0.36%	0.37%	0.37%	All accounts equipped with AMI and Check Meters.
Medium C&I (Rate 20)	100%	0.40%	0.37%	0.36%	
JPS Internal Losses	100%	0.71%	0.65%	0.79%	JPS' billing errors and internal process inefficiencies.

9.33.3 Despite arguments proffered by JPS defending these NTL components, the OUR maintains that given the advanced metering capabilities, enhanced information/communication systems and advanced data analytics 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 regulatory criteria, JPS should seek to reduce these losses to zero (0), as a matter of priority.

9.34 Office 2022 Annual Review System Losses Determinations

2021 Y-Factor Determination

9.34.1 In making its determination on JPS's 2021 Y-Factor adjustment, the Office took into consideration, among other things, the following:

- The results of the OUR's 2021 System Losses evaluation
- The relevant provisions of the Licence 2016
- The System Losses determinations set out in the 2019-2024 Rate Review Determination Notice

9.34.2 Accordingly, the Office determines that the 2021 Y-Factor applicable to the "TULos2020" for the 2022 ART adjustment is **-2.42%**.

9.35 Losses Determination Summary

9.35.1 The Office System Losses determinations at this 2022 Annual Review are summarized in Determination #8 below:

Determination 8

1) The RF shall remain at 20% for application at the 2022-2023 Annual Review, 2023-2024 Annual Review, and the 2024 Rate Review.

2) The 2021 Y-Factor applicable to the 2022 Annual Revenue Target adjustment is -2.42%.

3) JPS proposal for the revision of the Office determined 2022 System Losses targets in the 2019-2024 Rate Review Determination Notice, is Not Approved.

4) Within one (1) month of the effective date of this Determination Notice, JPS shall provide the requested information to facilitate the review of the RAMI programme.

5) JPS shall comply with all System Losses related requirements specified in this Determination Notice.

10 Quality of Service (Q-Factor Adjustment)

Background

10.1 Q-Factor Adjustment

10.1.1 As stipulated in paragraph 46(a), Schedule 3 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' "quality of service" performance for each year in the 5-year revenue cap period versus the annual targets set in the 5-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 ± Q ± Z.

10.1.2 In observance of these conditions at this 2022 Annual Review, the 2021 Q-Factor was determined based on the OUR's measurement of JPS's 2021 "quality of service" performance.

10.1.3 Quality of Service Dimensions

10.1.4 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

10.1.5 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.

10.2 Q-FACTOR REVIEW SCOPE

10.2.1 The OUR's evaluation of JPS's Q-Factor encompasses among other things, the following activities:

- Assessment of JPS's system reliability performance for 2021, 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 2021, with focus on JPS's reliability improvement strategies; and
- Derivation of the 2021 quality indices.
- Determination of the Q-Factor to be applied in the 2022 PBRM.

10.3 MEASUREMENT OF SYSTEM RELIABILITY

10.3.1 In electric utility operations, reliability of supply is critical 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. In measuring system reliability, performance metrics become useful as they provide a framework for quantifying quality of service performance. Additionally, reliability measurements/metrics are also essential for regulatory assessment/monitoring of the utility reliability performance. Generally, for electric utilities "quality of service" performance assessments, the reliability indices commonly used include:

- **System Average Interruption Frequency Index (SAIFI)** - indicates the frequency at which the average customer experiences a sustained interruption (duration > minutes) over a predefined period of time (usually a year).
- **System Average Interruption Duration Index (SAIDI)** - indicates the total duration of interruption for the average customer during a predefined period of time.
- **Customer Average Interruption Duration Index (CAIDI**) - represents the average time taken to restore service to the average customer per sustained interruption; and
- **Momentary Average Interruption Frequency Index (MAIFI)** – indicates the average frequency of momentary interruptions.

$$SAIFI = \frac{\Sigma\, Total\ Number\ of\ Customers\ Interrupted}{Total\ Number\ of\ Customers\ Served}$$

[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)]

10.3.2 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' quality of service performance.

10.4 LICENCE REQUIREMENTS FOR Q-FACTOR

10.4.1 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.

10.5 REGULATORY PRINCIPLES FOR IMPLEMENTATION OF Q-FACTOR

10.5.1 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:

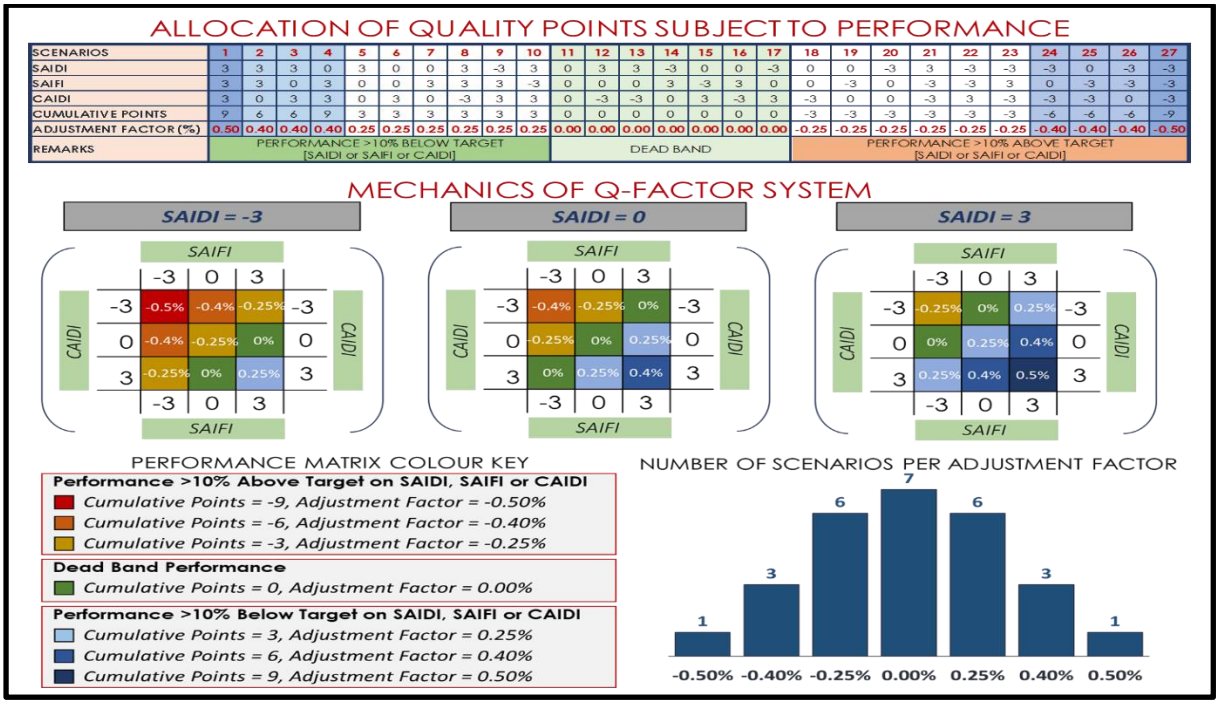
1) It should provide proper financial incentives to JPS to deliver an acceptable quality of service to customers.
2) The process must be transparent and supported by accurate data/information; and
3) It should take into account factors that are outside JPS's control.

10.5.2 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 the customers in the system should necessarily receive the same level of reliability, irrespective of their individual preferences. However, historical system reliability data indicates that this is not being achieved, as there are significant and sustained disparities in service reliability across the network.

10.6 Design of Q-Factor Scheme

10.6.1 As prescribed by the Licence 2016, the reliability indices, which constitutes the Q-Factor, are SAIFI, SAIDI, and CAIDI. Based on the design of the Q-Factor scheme, JPS's annual "quality of service" performance measurement in terms of these three (3) indices can either be: within ±10% of target (dead band) or outside this range, with quality point allocations of +3, 0, or -3 for each index, if they fall below the 10% of the target; within the dead band; or above 10% of the target, respectively. For all three indices, these criteria define a quality points system of 27 different combinations, generating total quality points scores from a minimum of -9 to a maximum of 9, with corresponding Q-Factor ranging between -0.5% and +0.5%, as shown in Figure 9. 1 below.

Figure 9.1: Q-Factor Points System and Adjustment Matrix



10.7 Office Determined Q-Factor Baseline and 2021 Targets

10.7.1 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 Reviews for each of the five (5) years and broken out year by year.

Pre-established 2021 Q-Factor Targets

10.7.2 During the 2019-2024 Rate Review Process, the Office determined the Q-Factor baseline and the related 2019-2023 targets (SAIFI, SAIDI and CAIDI), required for JPS's "quality of service" measurement and computation of the Q-Factor, to be applied in the PBRM at each Annual Review, over the 2019-2024 revenue cap period. The Q-Factor targets approved by the Office in the 2019 – 2024 Rate Review Determination Notice, are presented in Table 9.1 below.

Table 9.1: Office Approved 2019-2024 Q-Factor Baseline and 2021 Targets

APPROVED 2019-2024 Q-FACTOR BASELINE AND 2021 TARGETS (SAIFI, SAIDI & CAIDI)				
COMPONENTS	APPLICABLE PERIOD	SAIDI (minutes/customer)	SAIFI (interruptions/customer)	CAIDI (minutes/interruption)
BASELINE	**2019-2024 Rate Review**	**$SAIDI_{BASE}$ = 1,582**	**$SAIFI_{BASE}$ = 12.9**	**$CAIDI_{BASE}$ = 122.7**
2020 TARGETS	2021–2022 Annual Review	$SAIDI_{BASE} \times (1 - 0.05)$ = **1,502.9**	$SAIFI_{BASE} \times (1 - 0.04)$ = **12.4**	$CAIDI_{BASE} \times (1 - 0.01)$ = **121.5**
2021 TARGETS	2022–2023 Annual Review	$SAIDI_{BASE} \times (1 - 0.11)$ = **1,408.0**	$SAIFI_{BASE} \times (1 - 0.09)$ = **11.7**	$CAIDI_{BASE} \times (1 - 0.02)$ = **120.2**

10.8 JPS's SYSTEM 2021 RELIABILITY PERFORMANCE

10.8.1 JPS submitted that the 2021 "Annual Outage Dataset" (compiled from its Outage Management System "OMS"), formed the basis of its 2021 system reliability performance measurements used to compute the "2021 Q-Factor", applied in the proposed 2022 RC and ART adjustment. According to JPS, the 2021 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 is summarized in Table 9.2 below. The corresponding 2019 and 2020 indicators are also included for comparison.

Table 9.2: JPS 2021 System Reliability Performance Indicators

JPS SYSTEM RELIBILITY INDICATORS (2019-2021)								
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**
2021					10.5% < 2020 level	25.3% > 2020 level	40.4% > 2020 level	13.0% < 2020 level

10.9 2021 System Outage Data

10.9.1 For 2021, JPS reported that a total of 70,563 system outage events were recorded by its OMS. Of this total, 4,064 were reported as "planned outages", (scheduled to execute planned maintenance/works on the system infrastructure), while 66,499 were forced outage events, which resulted in unplanned supply interruptions to customers. The 2021 outage data also indicates that the recorded total forced outages (66,499) includes 61,828 "sustained" and 4,671 "momentary" outage events. Additionally, 57,333 forced outages were designated by JPS as "Reportable". This means that 13.8% of total forced outages (9,166 outages) were classified as "Non-Reportable", which far exceeds the established 5% threshold.

10.10 JPS 2021 SAIFI, SAIDI and CAIDI Levels

10.10.1 The annual trend in the quality indices calculated by JPS since the start of the 2019-2024 Rate Review period is summarized below:

- In 2021, the SAIFI measure decreased to 7.7 (interruptions/customer), representing a 10.5% improvement over the 2020 level.
- Conversely, SAIDI for 2021 increased to 1,862.7 (minutes/customer), reflecting a 25% deterioration in average interruption duration relative to the 2020 level.
- CAIDI, which is the derivative of SAIDI/SAIFI, declined precipitously in 2021 to 243.2 (minutes/interruption), worsening by over 40% relative to the 2020 level. From 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 2021 relative to 2020.

10.10.2 According to JPS, the deterioration in performance in SAIDI and CAIDI, is due to general adverse weather conditions, particularly in 2021 August, as well as the impact of tropical storms Elsa, Grace and Ida. JPS purports that these storms caused landslides, flooding and damaged utility poles, which severely inhibited its ability to respond promptly to power outages. Weather information disseminated by the Meteorological Service Division confirmed that tropical storms Grace and Ida passed through Jamaica on 2021 August 17 and 26, respectively, and caused some flooding and landslides. However, these were relatively weak storms that were experienced for only three separate days in the year, as such, JPS's claim that their associated effects were a major contributor to the increase in SAIDI and CAIDI in 2021, is questionable. Moreover, the 2021 Outage Dataset indicates that on 2022 August 17 when tropical storm Grace impacted Jamaica, the SAIDI recorded for the day was 460.7 minutes/customer, with outage causes related to storm conditions, typically "Lightning" and "Equipment Failure" (exposed network equipment/apparatus), accounting for an average duration of only 165 minutes/customer. With respect to the situation on 2022 July 4 and 2022 August 26 (tropical storms - Elsa and Ida), the recorded SAIDI for each of these event days, was 23.9 and 41.4 minutes/customers, respectively, which are not excessive and were not a major factor in the overall 2021 SAIDI derived by JPS. These indicators clearly refute JPS's argument that the increase in the 2021 SAIDI was mainly because of tropical storms in 2021.

10.10.3 It is acknowledged that the effects of the COVID-19 pandemic and the named tropical storms in 2021, would have likely imposed some constraints on JPS's utility operations, with some resulting negative impact on overall system reliability performance in 2021. However, the OUR is of the view that JPS's assumed impact of the named tropical storms is overstated. This is especially in the context of the "reasonable and prudent" standard attendant to the "quality of service" measurement framework and the defined scope/objectives of the approved reliability improvement programme. It is also recognized

that tropical storms conditions are likely to impact the island on a perennial basis. Indeed, there is anticipation of increased storm activity during the June - November period of each year. Against that background, it is not immediately discernible how these three (3) relatively weak tropical storms in 2021 could have inflicted such overwhelming consequences on system reliability, as purported by JPS. It also cannot be ignored that since 2016 the Office has approved significant capital expenditure for electricity network infrastructure reinforcements/enhancements on the basis that this would improve overall system resilience.

10.10.4 Given these factors, it has become a point of concern that JPS continues to make repeated claims of general weather events adversely impacting reliability performance (SAIDI & CAIDI).

10.10.5 Additionally, it is noted 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 and 2021, 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.

10.10.6 With respect to the 2021 SAIFI performance, the outage data shows that the indicated reduction in this index was not driven by improvements realized from JPS's reliability improvement projects implemented during 2021. Instead, the reported SAIFI gains appear to have been mainly influenced by appreciably higher OMS daily customer count for 2021 used to calculate the 2021 SAIFI, compared to the daily customer count for the previous year.

10.11 Momentary Interruptions and MAIFI

10.11.1 As established across the electricity industry, supply interruptions lasting five (5) minutes or less are categorized as "momentary". In power system operations, these 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.

10.11.2 In reference to JPS's quality of service performance measurement, it must be pointed out that while MAIFI is recognized as a key indicator, unlike SAIDI, SAIFI and CAIDI, 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, JPS is required to report momentary interruptions to facilitate ongoing system reliability assessments and regulatory monitoring. This is necessary to drive performance transparency and to ensure proper momentary interruption measurements, reporting, trending, and benchmarking.

10.11.3 With respect to the 2021 momentary supply interruptions as reflected in the MAIFI metric, Table 9.71 shows that on average, momentary interruptions per customer decreased by 13% to 12.0 (interruptions/customer) in 2021 compared to the 2020 level, reflecting some recovery from the poor performance realized in 2020.

10.11.4 According to JPS, despite the realized improvement in MAIFI in 2021, there was a rise in the index during the months June to August, which was primarily due to an increase in feeder cycling events associated with severe weather, occasioned by the three named tropical storms. JPS also asserted that although the largest cause contributor to MAIFI was described as "Unknown", the correlation lies with the majority of the MAIFI contribution happening in the months of June to August (38% contribution), corresponding to the usual adverse weather events associated with the hurricane season. The company further indicated that the ABB/Ventyx OMS was not designed to ascertain the drivers/causes of momentary outages, and by default, the causes of these outages were designated as "Unknown". This issue of unknown causes of momentary interruptions was previously raised by the OUR in the 2021 Annual Review Determination Notice, and is again, addressed later in this Determination Notice.

10.12 JPS Reliability Improvement Programme

10.12.1 2021 Reliability Projects – Capital, Scope and Impact

10.12.2 In the 2019-2024 Rate Review Determination Notice, the Office approved a total CAPEX of US$17.98M to finance the implementation of JPS 2021 reliability improvement projects included in its 5-year capital investment plan. The status of these projects, as presented is summarized in Table 9.3 below.

Table 9.3: JPS 2021 Reliability Improvement Projects – Status

STATUS OF JPS 2021 RELIABILITY IMPROVEMENT PROJECTS					
Projects	**Approved 2021 CAPEX (US$ M)**	**Actual Spend (US$ M)**	**Planned Scope**	**Actual Scope**	**Project Status Reported by JPS**
Voltage Standardization Programme (VSP)	3.196	3,400	Upgrade of three (3) feeders from 12kV to 24kV.	Upgrade of three (3) feeders from 12kV to 24kV.	• 3 feeders upgraded from 12kV to 24kV (Blackstonedge 110 and Highgate 110 & 210) in 2021. • Re-insulation of 322km of distribution line completed (85% of target). Remaining 15% to be completed in Q1 2022.
Grid Modernization Programme	2.299	2,100	• 300 TripSavers • 25 DA Switches • 4 Pole Reclosers & 100 FCIs	• 300 TripSavers • 25 DA Switches • 100 FCIs	Scope Completed.
Distribution Line Structural Integrity	4.564	5,300	• Replacement of 2,400 poles • Rehabilitation 4,424 poles • Replacement of ~11,600 pieces of equipment	Replaced 2,400 and Rehabilitated 5,987 poles. Replaced 12,546 pieces of equipment	Scope Completed.
Distribution Line Re-Conductoring and Relocation	2.124	1,900	Project Scope not stated in 2022 Annual Review Filing.	None stated	Programme 70% completed. Delayed due to material unavailability caused by COVID-19 related global logistical challenges. Programme scope deferred to 2022.
Transmission Line Structural Integrity	1.870	2,300	Project Scope not stated in 2022 Annual Review Filing	None stated	Scope Completed.
Substation Structural Integrity	1.722	1,900		None stated	Substation equipment (circuit breakers/reclosers), were not replaced in 2021 as scheduled because materials/equipment were damaged in a major Warehouse fire in Kingston. Project further affected by COVID-19 effects on global material availability and shipping logistics. Replacements were deferred to 2022.
Distribution Transformer Replacement and Upgrade Programme	2.203	-	Project Scope not stated in 2022 Annual Review Filing	None stated	Tredegar distribution transformer upgrade completed. Parnassus - 12% completed and Spur Tree - 12% completed. The projects were delayed due to shipping logistical issues, COVID-19 pandemic effects, and delay in NEPA Approval for the Parnassus project. Project completion extended to 2022 August.
TOTAL	**US$ 17.978**				

10.12.3 Regarding the overall status of the 2019-2024 capital investment programme to improve system reliability/resilience, JPS declared that despite the challenges encountered due to the various COVID-19 protocols, material shortages and shipping logistics delays, which in many cases curtailed planned work activities, the company has been tactical in implementing all but three (3) projects. According to JPS, these uncompleted projects were

deferred until 2022 due to impediments caused by the mentioned COVID-19 pandemic constraints and related supply chain challenges.

10.13 OUR's Review of JPS 2021 Reliability Programme Developments

10.13.1 The OUR's assessment of the JPS's 2021 reliability improvement project update, revealed a number of pertinent issues and concerns, particularly, a lack of clarity and specificity surrounding the scope, status, and impact of the planned projects. The identified issues are outlined in Table 9.4 below.

Table 9.4: JPS Reliability Improvement Projects Implementation Issues

JPS 2021 RELIABILITY IMPROVEMENT PROJECTS IMPLEMENTATION ISSUES
1. Voltage Standardization Programme (VSP)
As previously stated, a total CAPEX of US$3.196M was approved by the Office for 2021 to fund JPS's VSP initiatives planned for the year, with the aim of reducing System Losses and improving system reliability/service quality. As represented in JPS's 2019-2024 Rate Review Application/Investment Plan, the planned scope of the 2021 VSP initiatives encompass the upgrade of the Blackstonedge 110 and Highgate 110 & 210 feeders from 12kV to 24kV, with an estimated impact of 6.051 minutes of reduction in SAIDI. Regarding the status of these projects, in its submissions, JPS reported that it spent US$2.9M and completed the upgrade of the three (3) named feeders in 2021. However, as indicated elsewhere in this Determination Notice, the precise project completion dates were not provided, and the associated reliability impact was not quantified by JPS. The OUR notes that these omissions are constraining its assessments of the 2019-2024 reliability improve programme and wish to underscore that it is vital that JPS provide this information going forward.
2. Grid Modernization Programme
For 2021, a total CAPEX of US$2.299M was approved by the Office to finance JPS's Grid Modernization Programme (GMP) initiatives planned for the year, with the aim of yielding tangible improvements in SAIDI and the level of "Unserved Energy". As represented in its submissions, the planned scope of the 2021 "GMP" initiatives include the installation of 300 (24kV @ 100A) TripSaver Reclosers; 25 (DA Switches), 4 Pole-mounted Reclosers and 100 Fault Circuit Indicators(FCIs) across the distribution network, with expected impact of 17.5 MWh reduction in unserved energy and 24.6 minutes of reduction in SAIDI. Regarding the status of these GMP initiatives, JPS reported that in 2021, the company installed, 300 TripSaver Reclosers, 104 FCIs and 25 DA Switches, at a cost of US$1.8M. However, there was no update on the planned installation of the 4 Pole-mounted Reclosers. This needs to be furnished by JPS. With respect to the related reliability benefits, JPS indicated that for the period December 2022 and March 2022 JPS has measured 4.7 minutes of savings in SAIDI in the areas where the installations were done, and expects this to grow to 24.6 minutes by the end of 2022. However, this statement highlighting the project results appear to be incoherent and needs be reviewed and clarified by JPS. Further, it is not clear whether the reported reliability impact is fully attributable to 2021 GMP initiatives, given that since 2020 some reliability projects have been delayed for the reasons cited herein, causing some

degree of project overlap in 2021 and 2022. The necessary clarifications need to be provided by JPS.

3. Distribution Line Structural Integrity Project

In the 2019-2024 Rate Review Determination Notice, the Office approved the 2021 CAPEX of US$4.564M proposed by JPS for the implementation of its 2021 Distribution Line Structural Integrity projects, expected to improve system reliability and service quality. As indicated in the its submissions, the 2021 planned project scope encompasses: (a) Replacement of 2,400 degraded distribution poles, (b) Rehabilitation of 4,424 poles, and (c) Replacement of ~ 11,600 pieces of equipment (cross-arms, insulators, etc.). JPS reported that at the end of 2021, it replaced 3,474 degraded distribution poles, rehabilitated 5,987 poles, and replaced 12,546 pieces of equipment, at a cost of US$5.3M.

JPS asserted that actual project expenditure represents an over spend of US$0.76M or 17% of the approved 2021 CAPEX, and the company in 2022 intends to reduce the approved budget by the equivalent amount to ensure the overall envelope is not increased. According to JPS, the additional work to strengthen distribution structures in 2021 was required as patrols revealed significant structural integrity deficiencies. Additionally, JPS purports that the persistent bad weather in 2021, which resulted in flooding, lightning strikes and landslides across several parishes drove the need for emergency replacement of damaged distribution poles and other structures. While JPS efforts on this project are recognized, it should be noted that since project completion, no update on the associated reliability impact has been provided by the company, which is a constraint to the regulatory review process. This project information is necessary and needs to be provided by JPS, going forward.

Regarding JPS's proposition to reduce the approved 2022 CAPEX by the amount over spent in 2021 to account for the additional project scope in that year, the OUR cautions that any such adjustment must be transparent and reflect accurate reconciliation of the 2021 and 2022 project scope and capital expenditure, respectively.

4. Distribution Line Re-Conductoring and Relocation Project

For 2021, A total CAPEX of US$1.314M was approved by the Office to fund JPS's 2020 Distribution line Re-Conductoring and Relocation projects planned for the year. As represented in JPS' 2019-2024 Rate Review Application/Investment Plan, the 2021 planned project scope includes the: Reconstruction of 3 distribution feeders, Rehabilitation of 132 pole-mounted transformer circuits, Installation of 232km of 2/0AA MV Covered Conductors, and Rehabilitation of 5 distribution feeders. However, in its submissions, no planned project scope was stated. Nevertheless, JPS reported that the programme was 70% completed due to material unavailability caused by global logistical challenges brought on by the pandemic, and consequently, the programme scope was deferred to 2022. However, it is not clear as to whether the status update provided by JPS is in reference to the 2020 or 2021 projects. It is also notable that the scope of work being executed by JPS was not stated, therefore, there is no basis on which to evaluate the status of the project. JPS needs to address these issues.

JPS 2021 RELIABILITY IMPROVEMENT PROJECTS IMPLEMENTATION ISSUES
5. Transmission Line Structural Integrity Project
In the 2019-2024 Rate Review Determination Notice, the Office approved the 2021 CAPEX of US$1.87M proposed by JPS to fund the implementation of its 2021 Transmission Line Structural Integrity projects, expected to improve system reliability and service quality. As represented in JPS's 2019-2024 Rate Review Application/Investment Plan, the 2021 planned project scope includes: Lightning Mitigation and Grounding, Structural Integrity Pole & Hardware, Structural Integrity Pole Rehabilitation, Steel Pole & Steel Tower Rehabilitation, Fire Retardant Application, Fault Circuit Indicator Installation, Procurement of Hotline Tools and Equipment, and Procurement of Transmission Tools & Equipment. However, in its submissions, no project scope/impact was stated. Regarding the project status, in Table 2-8 (page 53) of the submissions, JPS stated that: "**Scope Completed"**, but no related details were provided. The Office considers the implementation of this capital investment project as being critical for enhancing the reliability/resilience of the system. It therefore urges JPS to address the obvious deficiency in its reporting on the scope, status and results of this project.
6. Substation Structural Integrity Project
In the 2019-2024 Rate Review Determination Notice, the Office approved the 2021 CAPEX of US$1,722 proposed by JPS to fund its planned 2021 Substation Structural Integrity projects, expected to improve system reliability and service quality. In the submissions, no planned project scope was stated. However, JPS reported that substation equipment such as circuit breakers and reclosers were not replaced in 2021 as scheduled because materials and equipment were damaged in a major Warehouse fire in Kingston. JPS also claimed that the project implementation was further affected by the effects of COVID-19 pandemic on global material availability and shipping logistics, thus, replacements were deferred to 2022. The OUR is aware of the referenced warehouse fire and the related effects. However, given the scope of project as defined in the JPS 2019-2024 Rate Review Application/Investment Plan, the OUR is of the view that a more detailed report on the status of this capital project is required from JPS. This report should also outline JPS's approach to the treatment of the cost of the damaged components that were procured for the project, considering that the warehouse facility and contents stored should been insured.
7. Distribution Transformer Replacement/Upgrade Project
In the 2021 Annual Review Filing, JPS indicated that the 2020 planned project scope involves the upgrade of the transformer at the Tredegar, Rose Hall and Parnassus substations. The project update provided in the said 2021 Filing, indicated that the scope of works at the Rose Hall substation were completed in 2020, while the works at the Tredegar substation were partially completed, and those planned for the Parnassus substation deferred to 2021. In the 2022 submissions, JPS reported that the Tredegar distribution transformer upgrade was completed in 2021, while the transformer upgrade works at the Parnassus Substation was 12% completed. Further, at the Spur Tree Substation, the installation of the additional distribution transformer, which was planned to start 2021 January, was reported to be also 12% completed. According to JPS, the projects were delayed due to shipping logistical issues, COVID-19 pandemic

JPS 2021 RELIABILITY IMPROVEMENT PROJECTS IMPLEMENTATION ISSUES
effects, and delay in receiving NEPA Approval for the Parnassus project, and as a consequence, the projects' completion dates were revised to 2022 August. As it relates to the 2021 Distribution Transformer Replacement/Upgrade projects, the Office in the 2019-2024 Rate Review Determination Notice approved JPS proposed 2021 CAPEX of US$2.203M to fund the planned 2021 initiatives, which involve the installation of an additional distribution transformer at the Duhaney and Spur Tree Substations, scheduled to start in 2021 January and completed in 2022 December. However, JPS capital projects update provided in the 2022 submissions, did not provide any information about the installation of the additional distribution transformer at the Duhaney Substation. In addition, the company did not indicate the precise project completion dates, also, the reliability impact associated with the completed projects was not stated. The OUR requests that JPS address this information gap.

OUR's Comments – JPS 2021 Reliability Projects

10.13.2 The OUR's review of the projects revealed numerous implementation issues, and for the projects that are already completed, the reported reliability improvements (SAIDI reductions), 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 improve programme by the end of the review period. As the evidence suggests, the realized gains are marginal, while at the same time, overall system reliability continues to worsen.

10.13.3 Given these findings, and considering that some of 2021 projects have been carried forward to 2022, and that most of the approved 2022 projects are scheduled to be completed in 2022, the OUR is of the view that it is prudent for JPS to reassess and revise its project implementation strategy with the aim of returning the 2019-2024 reliability improvement programme to a sustainable path; so as to ensure that the established programme objectives can be achieved within the defined timeframe, despite the potential future challenges and constraints.

10.14 JPS 2022 Reliability Projects

10.14.1 In its submissions, JPS indicated that the planned 2022 reliability improvement projects and associated capital investment, are as summarized in Table 9.5 below.

Table 9.5: JPS 2022 Reliability Improvement Projects

JPS 2022 RELIABILITY PROJECTS AND ASSOCIATED CAPITAL EXPENDITURE		
Projects	**OFFICE Approved 2021 Capital Expenditure (US$ M)**	**Remarks**
Voltage Standardization Programme	4.165	Planned scope/impact not defined.
Grid Modernization Programme	2.410	
Distribution Line Structural Integrity Programme	4.763	
Distribution Line Re-Conductoring and Relocation	2.037	
Transmission Line Structural Integrity Programme	1.858	
Substation Structural Integrity Programme	1.798	
TOTAL	**US$17.031 M**	

10.14.2 JPS posited that the over-arching objectives of its 2022 reliability programme are to, among other things:

- Reduce the frequency of outages through grid modernization.
- Reduce the average duration of forced outages through the improved OMS capabilities.
- Expand automated outage detection and reporting capabilities.

10.14.3 However, the specific scope of work and estimated reliability impact for each of these planned 2022 project have not been defined by JPS.

10.15 New Outage Management System

10.15.1 In the 2019-2024 Rate Review Determination Notice, the Office approved a total CAPEX of US$2.126M for the replacement of JPS's existing ABB/Ventyx OMS with a new fully integrated and advanced system, to be commissioned by the end of 2021. The old ABB/Ventyx OMS was commissioned in 2013 and reached the end of its useful life (fully depreciated) in early 2022.

10.15.2 Regarding the status of this replacement project, JPS by way of letter dated 2022 April 5, notified the OUR that a new "Electra 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 the 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.

10.15.3 Citing these developments, 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. The OUR's position on this matter is outlined in subsequent sections of this chapter.

Data Dictionary alignment with New OMS

10.15.4 JPS submitted that the "Data Calibration Dictionary" was initially developed based on JPS's recommendations and was approved by the OUR in order to have a standard in the classification of Non-Reportable outages due to the constraints experienced by JPS. Therefore, in being consistent, JPS is making a recommendation for "No Supply" but verified as "Power Quality" calls to be considered as a Non-Reportable. JPS is requesting an immediate implementation of the recommended updates to the Rule based Data Dictionary which will affect the criteria for Non-Reportable outages.

10.15.5 The OUR's position on these Data Dictionary issues is that there will be a need for an overall review of the OMS transition and determination on the related requirements/criteria, which will require additional information and further consultations with JPS. Therefore, these requested modifications to the Data Dictionary rules should also be included in the requested "testing & validation" report, which will be subjected to regulatory review.

10.16 Regulatory Review of JPS's 2021 Quality of Service Performance

10.16.1 OUR's Review of JPS 2021 Annual Outage Dataset

10.16.2 Subject to the Q-Factor requirements in the Final Criteria and the relevant conditions of the 2019-2024 Rate Review Determination Notice, the 2021 Annual Outage Dataset submitted in JPS's submissions formed the basis of the OUR's assessment of JPS' system reliability performance in 2021. As per criteria, this outage dataset was compiled and presented in Microsoft Excel format under the filename "*JPS 2021 OMS Dataset*". It comprises all the relevant outage data recorded in JPS's OMS for the period 2021 January – 2021 December 31 and includes the related JPS calculated 2021 quality indices (SAIFI, SAIDI and CAIDI). The dataset is structured with the following data categories:

1. Annex A - Raw Data (ANNEX A)
2. Annex B - Calibrated Data (ANNEX B)
3. Annex C - Summary Table (ANNEX C)
4. Annex D - 2016-2020 Trend (ANNEX D)
5. Annex E – Outage Drivers 2020 (ANNEX E)

10.16.3 To validate JPS's reported 2021 system reliability measurements/indicators, the OUR conducted an initial screening of the referenced outage dataset to identify errors, omissions, or misrepresentations in the underlying data and reliability calculations, as well as to determine the scope and scale of any adjustments made by JPS to the "Raw Data" prior to the calculation of the prescribed quality indices. Specifically, this screening exercise

entails, among other things, checks for outages with negative duration, checks for duplicate outage event records, events incorrectly classified as momentary or sustained. 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.

10.16.4 After completing the data screening exercise, the "Raw Data" (ANNEX A) and the "Calibrated Data" (ANNEX B), which contain the relevant details of the 2021 system outages and associated supply interruptions, were comprehensively evaluated, and analysed. This was done to appropriately categorize the different types of system outages, and to validate JPS' reliability calculations, proposed 2021 SAIFI, SAIDI and CAIDI values, and 2021 Q-Factor adjustment.

10.17 Description of the 2021 Annual Outage Dataset

10.17.1 As currently configured, the 2021 Annual Outage Dataset contains multiple data points. However, for simplicity, the encapsulated data is summarized as shown in Table 9.6 below.

Table 9.6: Summary Description of the 2021 Outage Dataset

2021 ANNUAL OUTAGE DATA SUMMARY										
ANNEX	**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-Reportable**
A	**70.559**	65,685	4,874	995	1,546	68,018	4,941	65,618	63,117	**7,442**
B	**70,563**	66,499	4,064	995	1,546	68,022	4,960	65,603	61,265	**9,298**
ANNEX	**RANGE OF CUSTOMERS AFFECTED DURING OUTAGE EVENTS**		**OUTAGE DURATIONS (Minutes)**				**RANGE OF CUSTOMER MINUTES LOST (CML)**			
	Minimum	**Maximum**	**Minimum**	**Maximum**			**Minimum**		**Maximum**	
A	1	67,477	0.02	175,477.37			0.02		153,652,883.10	
B	1	46,760	0.02	175,477.37			0.02		75,270,546.00	

10.18 JPS Adjustments to the 2021 Outage Dataset

10.18.1 The OUR's review of the 2021 Outage Dataset (ANNEX A & ANNEX B) found no material errors in the data records. However, it was revealed that JPS effected some level of calibration/adjustment to the dataset, resulting in the differences between the "Raw Data" and the Calibrated Data, and the total number of forced outages categorize as "Non-Reportable".

10.19 Adjustment/Calibration of Raw Outage Data by JPS

10.19.1 As with previous reliability performance measurements, JPS derived the 2021 quality indices (see Table 9.71) from the "Calibrated Data" (ANNEX B – 2021 Outage Dataset)

and not the raw OMS outage data (ANNEX A). This was 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.

10.19.2 As indicated by JPS, the 2021 Calibrated Data contain additional "primary" data elements 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. Based on the OUR's observations, a significant number of outage events were identified in the 2021 Calibrated Data with amended data points. These amendments primarily include changes to outage start and/or restoration times, as well as the number of customers affected, which in some cases, caused changes in other data elements, such as the outage classification (for example, a momentary interruption that transitioned to a sustained outage event). However, while these modifications were located in the dataset, they were clearly identifiable, and the specific reasons for the amendments were not stated. The OUR request that these issues be rectified by JPS for future such submissions.

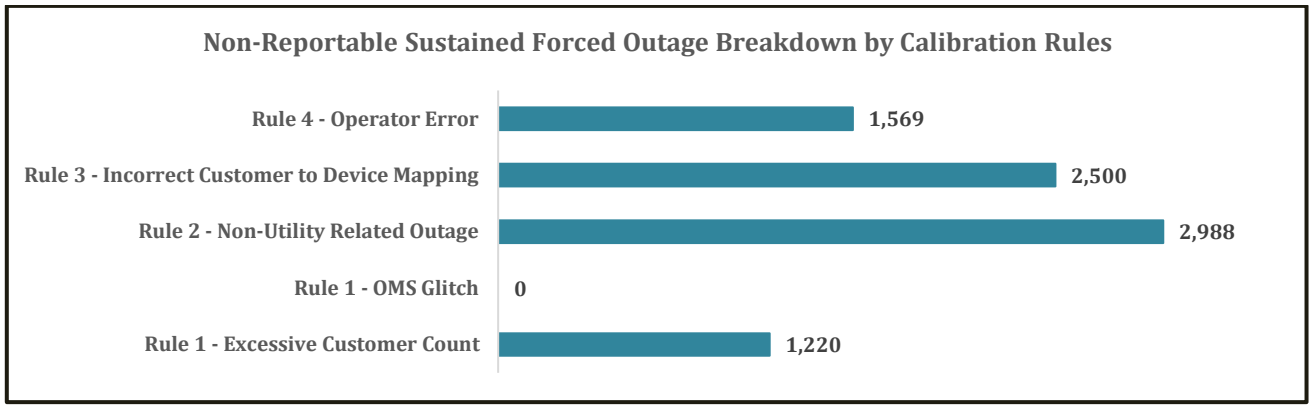
10.20 Review of JPS's Non-Reportable Outages

10.20.1 As indicated in Table 9.91 above, 9,298 (13.2%) out of the total number system outages (70,563) recorded for 2021, were classified by JPS as "Non-Reportable" outages, with 9,166 of these being forced outages. 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 of 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. In an effort to get JPS to remedy this problem, the Office in the 2019-2024 Rate Review Determination Notice, established a limit for Non-Reportable outages of **5%** of total recorded forced outages (sustained). Intuitively, 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. Given this criteria, the OUR carried out a thorough examination of the designated 2021 "Non-Reportable" forced outages, which validated that in fact 8,304 sustained forced outages were classified as "Non-Reportable", representing

13.4% of the total 2021 sustained forced outages. As the data shows, this proportion has breached the stipulated 5% limit by a margin of 170%.

10.20.2 As observed, a total of 8,277 sustained/forced outages (IPP outages exclude) were classified by JPS as "Non-Reportable" when the referenced "Data Dictionary" rules were applied to certain abnormal outage conditions. Due to this classification, these outages were excluded from the JPS 2021 reliability measurements. The breakdown of the Non-Reportable by calibration rules is shown in Figure 9.2 below.

Figure 9.2: Breakdown of Non-Reportable Sustained Forced Outage by Calibration Rules



10.20.3 As illustrated in Figure 9.91 above, "Non-Utility Related Outage" was the most influential driver of the 2021 Non-Reportable sustained/forced outages. The data indicates that this modality was responsible for the exclusion of 2,988 or 4.8% (almost the 5% Non-Reportable limit) of the total 2021 sustained/forced outages (61,828), through the application of calibration Rule 2. As outlined in Rule-based Data Dictionary, at times, JPS may not be able to immediately resolve these "Non-Utility Related Outages", due to circumstances such as customers' premises being found locked and outage cannot be verified, premises not found, defective customer equipment, and service disconnection. However, with the implementation of the grid modernization programme, large-scale deployment of the AMI systems and the full integration of the new OSI OMS/Geographic Information System ("GIS")/Customer Information System ("CIS") platforms, and other information systems, it is expected that for the remaining portion of the 2019-2024 review period. Hence, JPS will have more advanced capabilities to effectively respond to these outage conditions.

10.20.4 Additionally, the data shows that "Incorrect Customer to Device Mapping" and "Operator Error" were the cause of 1,593 and 2,503 sustained/forced outages, respectively, being classified as Non-Reportable. The OUR considers these number of outage data calibrations

to be excessive and unreasonable, given the level of regulatory interventions and scope of the capital investment programme to improve system reliability and the functionality of the support systems/processes. Further, the application of Rule 1 to classify 1,220 sustained/forced outages (46% above the 2020 number) as "Non-Reportable", due to "Excessive Customer Count" is questionable on the basis that the requirements for Rule 1 according to the "Rules-based Data Dictionary" do not provide for the classification of an outage as "Non-Reportable". As such, this will require explanation from JPS.

OUR's Summary Comments

10.20.5 Based on the findings of the OUR's assessment, it was concluded that the extra 2021 sustained/forced outages (5,212), which were characterized as "Non-Reportable" by JPS and were excluded from the 2021 reliability measurements, was not in keeping with the 5% criteria established by the Office. If allowed, these would widen the "margin of error" and constrict the confidence limits of the respective reliability metrics. On that basis, the 2021 Non-Reportable sustained/forced outages was restricted to the defined limit of 5%, for the purpose of the relevant 2021 Q-Factor computations.

10.21 OUR's Review of JPS's 2021 Daily System Customer Count Data

10.21.1 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.

10.21.2 With respect to the 2021 system customer count, the data records in the 2021 Outage Dataset indicate that each of the outages recorded for 2021 (January 1 - December 31), was assigned the "daily customer count" for the specific day on which that outage was initiated. This critical requirement is necessary to facilitate greater accuracy in the calculation of the defined quality indices. The customer count data included in the 2021 Outage Dataset is summarized in Table 9.7 below.

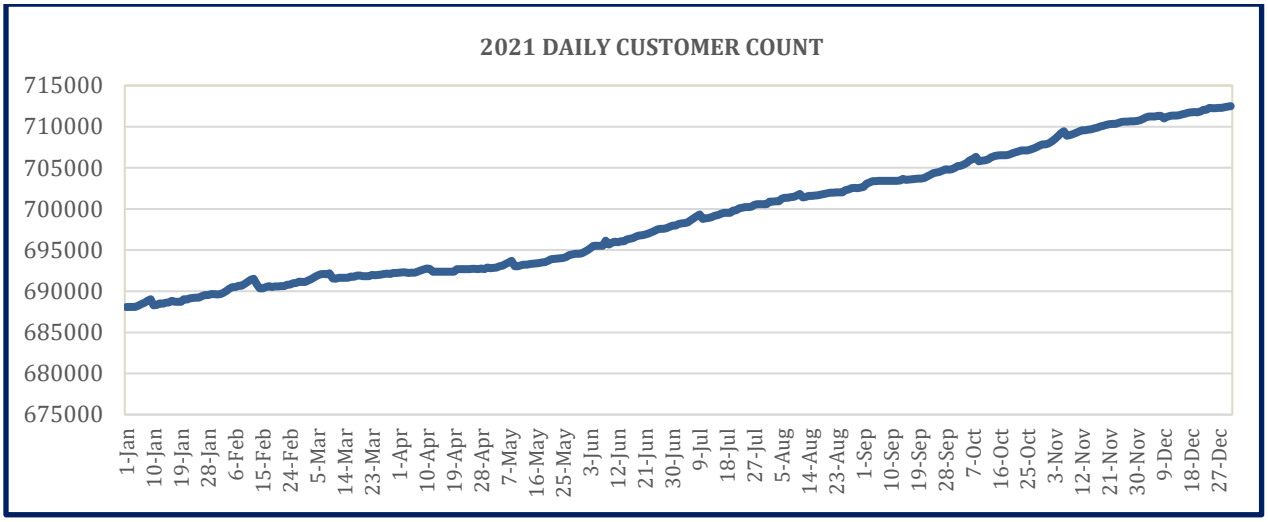
Table 9.7: 2021 Outage Dataset Daily Customer Count Statistics

JPS DAILY CUSTOMER COUNT SUMMARY STATISTICS - 2021 OUTAGE DATA						
MINIMUM	MAXIMUM	AVERAGE	AVG. DAILY Δ	MAX. DAILY Δ	COUNT @ 2021JAN01	COUNT @ 2021DEC31
688,073	**712,495**	**698,935**	**67**	**640**	**688,073**	**712,495**

10.21.3 JPS noted in its submissions that the Ventyx OMS daily customer count utilized to compute the reliability indices is extracted once a day through an automated process from the CIS versus the new Electra OMS which is fully synchronized with the CIS and is 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. However, “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 daily customer count numbers. A plot of the 2021 daily system customer count profile included is exhibited in Figure 9.3 below.

Figure 9.3: JPS 2021 System Daily Customer Count Profile



10.21.4 As demonstrated in Table 9.92 and Figure 9.92 above, the 2021 system daily customer count increased from 688,073 customers at the start of the year to a maximum of 712,495 on 2021 December 31, representing an overall customer gain of 3.5% for 2021. However, as reflected in the plot, the rate of increase in the customer count was much greater for period 2021 May-December than for the preceding period. JPS provided no specific reason for this profile. Nonetheless, the maximum single-day variation in customer count observed derived from the data was 640, down by a large margin relative to the variation observed in the 2020 Outage Dataset (1,422).

Perceived Inconsistency in JPS’ Reported Customer Count Data

10.21.5 During this Annual Review, the issue of inconsistency with customer count data source has re-emerged. The situation is that there are significant disparities with the customer count data included in the 2021 Outage Dataset and those reported in other JPS submissions to the OUR. Some of the inconsistencies are shown in Table 9.8 below.

Table 9.8: JPS System Customer Count across Data Sources

SYSTEM CUSTOMER COUNT ACROSS DIFFERENT DATA SOURCES					
Year/Month	**JPS 2021 Outage Dataset (OMS)**	**JPS 2021 Fuel Reports**	**JPS 2021 Final Dataset**	**Variance (OMS vs 2021 Fuel Reports)**	**Variance (OMS vs 2021 Final Dataset)**
2021 January	689,623	678,775	678,775	10,848	10,848
2021 February	691,124	680,155	680,156	10,969	10,968
2021 March	692,232	681,449	681,449	10,783	10,783
2021 April	692,870	681,405	681,405	11,465	11,465
2021 May	694,605	682,650	682,650	11,955	11,955
2021 June	697,954	683,969	683,969	13,985	13,985
2021 July	700,577	684,975	684,975	15,602	15,602
2021 August	702,599	685,744	685,744	16,855	16,855
2021 September	704,821	686,406	686,406	18,415	18,415
2021 October	707,869	685,524	686,984	22,345	20,885
2021 November	710,694	686,455	687,908	24,239	22,786
2021 December	712,495	689,132	689,132	23,363	23,363

10.21.6 Notably, this issue was raised with JPS as part of the OUR's request for clarification/additional information in relation to its Annual Review submissions. 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 Customer Count reported in 2022 Annual Review Filing relates to "Active Customers".
- Both datasets were retrieved from the CIS at different intervals.

10.21.7 JPS also asserted that the "daily system customer count" used to calculate the quality indices is retrieved at 12am 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 posits 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).

10.21.8 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 be

largely in alignment, but JPS' clarification seems to be saying otherwise. In addition, JPS reasoning seems to suggest that the customer count in the Final Dataset would be higher than that in the Annual Outage Dataset. It is the reverse that should be true.

10.21.9 From the OUR's perspective, it is understandable that daily variations in the system customer count is an intrinsic feature of JPS's commercial 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. Nonetheless, the OUR expects that the operation of the new OMS which is fully integrated with the CIS should enhance this process by eliminating any embedded systemic errors and ensuring greater accuracy and consistency in the reporting of system customer count data. Finally, it is important to highlight those inaccuracies in the customer count data is a recipe for errors in the computed quality indices, which potentially can bring the credibility of the determined Q-Factor adjustment into question. Therefore, despite the availability of the advanced information/data management systems, JPS in the capacity of System Operator, should ensure that the reported customer count data are appropriately verified, audited and reconciled for regulatory reporting on an ongoing basis.

10.21.10 In light of 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.

10.22 OUR's Evaluation of the 2021 Forced Outage Data

10.22.1 JPS proposed that the 2021 SAIFI, SAIDI and CAIDI to be used in the 2021 quality of service measurements should be 7.7 (interruption/customer), 1862.7 (minutes/customer), and 243.2 (minutes/interruption), respectively. These indices were derived from the "Reportable" sustained/forced outages (53,524), shown in the 2021 system forced outages breakdown provided in Table 9.9 below.

Table 9.9: JPS's 2021 Forced Outages Breakdown

2021 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**
70,563	4,064	66,499	66,449	4,671	**61,828**	66,499	**57,333**	**9,166**
BREAKDOWN OF 2021 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**
61,828	**53,524**	**8,304**	**61,294**	**53,017**	**8,277**	**534**	**507**	**27**

10.22.2 In the process of evaluating JPS's 2021 Q-Factor proposals, the OUR performed its own "quality of service" calculations using the total 2021 "Reportable" sustained/forced outages, plus the excess 2021 "Non-Reportable" sustained/forced outages above the established 5% limit. The OUR's allocation of 2021 sustained forced outages (IPP excluded) versus the allocation proposed by JPS is presented in Table 9.10 below.

Table 9.10: 2021 Sustained Forced Outages Allocations (OUR versus JPS)

JPS/OUR 2021 SUSTAINED FORCED OUTAGES APPLIED IN Q-FACTOR CALCULATIONS (IPP F/O EXCLUDED)							
Description	**Total Sustained (F/O)**	**Reportable Sustained F/O (JPS Classified)**		**Non-Reportable Sustained F/O used in Q-Factor Calculations**		**Non-Reportable Sustained F/O Excluded from Q-Factor Calculations**	
		Number	% of Total	Number	% of Total	Number	% of Total
JPS Allocation	61,294	53,017	86.50%	0	0.00%	8,277	13.50%
OUR Allocation	**61,294**	**53,017**	**86.50%**	**5,212**	**8.50%**	**3,065**	**5.00%**

10.23 OUR's Selection of Allowable Non-Reportable Sustained Forced Outages (5%)

10.23.1 In sieving out the allowable 5% Non-Reportable sustained/forced outages from the total 8,277 (IPP excluded), the OUR applied the established Q-Factor principles, and arrived at the composition represented in Table 9.11 below.

Table 9.11: Allowable Non-Reportable Sustained Forced Outages Composition

ALLOWABLE (5%) AND EXECESS (8.5%) NON-REPORTABLE SUSTAINED FORCED OUTAGES COMPOSITION (IPP EXCLUDED)						
Condition	**Rule Applied**	**Total Sustained Forced Outage**	**Total Non-Reportable**	**Allowed Non-Reportable (5%)**	**Excess Non-Reportable included in Q-Factor Calculations**	**Remarks**
Excessive Customer Count	Rule 1		1,220	0	1,220	
Non-Utility Related Outage	Rule 2		2,988	2,988	0	4.8% of total sustained F/O.
Incorrect Customer-to-Device Mapping	Rule 3		2,500	52	2,448	
Operator Error	Rule 4		1,569	25	1,544	
Total			**8,277**	**3,065**	**5,212**	
		61,294	**13.50%**	**5.00%**	**8.50%**	

10.23.2 In screening these Non-Reportable outages, the OUR considered those described as "Non-Utility Related Outages" to be largely outside the control of JPS, and therefore, were totally included in the 5% subset. However, for those connected to the other identified conditions ("Excessive Customer Count", "Incorrect Customer to Device Mapping" and "Operator Error"), the OUR's evaluation found that most of these outage irregularities should not exist, considering the level of reliability investments made since 2018, to modernize the system infrastructure/processes and to cure embedded defects, including, the conditions in question. Therefore, despite the applicable calibration rules and given the factors cited,

JPS's classification of the sustained forced outages associated with these three (3) specific conditions as "Non-Reportable", was not considered to be "prudent and reasonable". Accordingly, the majority of these specific Non-Reportable outages, were not accepted by the OUR.As a result, the respective outages were not excluded from the relevant Q-Factor calculations. In summary, the excess Non-Reportable sustained forced outages (8.5%) included in the JPS 2021 Outage Dataset, were not treated as such by the OUR.

10.23.3 In summary, the OUR in keeping with the Office's defined criteria (5%), allocated the 2021 sustained forced outages for the 2021 Q-Factor calculations are shown in Table 9.12 below.

Table 9.12: 2021 Sustained Forced Outage used in OUR's 2021 Q-Factor Calculations

2021 SUSTAINED FORCED OUTAGES USED IN OUR 2021 Q-FACTOR CALCULATIONS					
Description	Total Sustained Forced Outage (F/O)	Reportable Sustained F/O (JPS Classified) used in OUR Q-Factor Calculations	Excess Non-Reportable Sustained F/O used in OUR Q-Factor Calculations	Total Sustained F/O used in OUR Q-Factor Calculations	Non-Reportable Sustained F/O Excluded from OUR Q-Factor Calculations
2021 Sustained F/O	**61,294**	**53,017**	**5,212**	**58,229**	**3,065**
Relative Proportions	**100.0%**	**86.5%**	**8.5%**	**95.0%**	**5.0%**

10.24 Treatment of IPP Forced Outages in the Q-Factor Scheme

10.24.1 Based on the established Q-Factor principles, JPS shall not be penalized under the Q-Factor adjustment scheme for IPP related generation outages (sustained and/or momentary), unless the cause of such outages is due to conditions arising from JPS action or inaction. The OUR's review of the 2021 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 2021 Annual Outage Dataset, were excluded from the relevant 2021 Q-Factor calculations. A breakdown of the 2021 IPP related forced outages is provided in Table 9.13 below.

Table 9.13: Reported 2021 IPPs Related Outages Categorization and Reliability Indicators

2021 IPP FORCED OUTAGE CATEGORIZATION AND RELIBILITY INDICATORS									
YEAR	IPP FORCED OUTAGES	IPP F/O (Momentary & Sustained)		IPP SUSTAINED F/O (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**	**1.94**	**64.07**	**33.10**	**0.405**

10.24.2 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 effects of these outages on the

quality of service experienced by customers. As shown in Table 9.97, there was an overall reduction in IPP-related forced outages in 2021 relative to 2020, with commensurate improvements in reliability performance.

10.25 OUR'S 2021 QUALITY INDICES

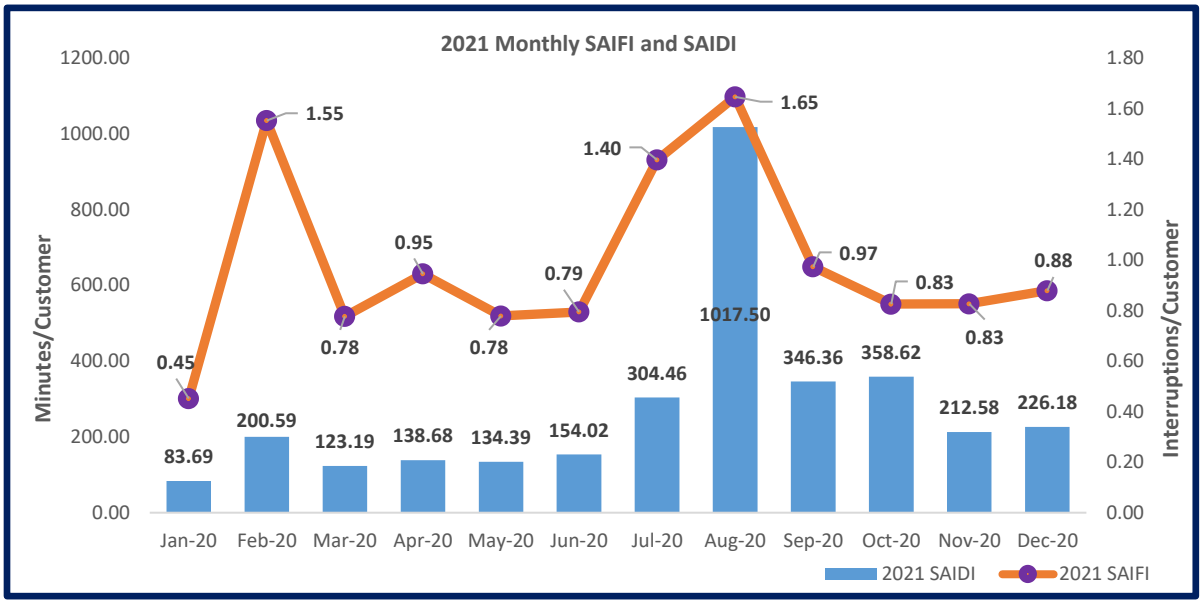
10.25.1 Using the applicable 2021 outage data inputs, such as, the number/duration of supply interruptions linked to the total admissible sustained forced outages (95% of total), and associated customer count, the OUR computed the 2021 quality indices required for the 2021 "Quality of service" measurements defined in the Licence 2016. The OUR computed 2021 quality indices are presented in Table 9.14 below.

Table 9.14: OUR Determined 2021 Quality Indices

OUR/JPS 2021 QUALITY INDICES (IPP F/O EXCLUDED)					
Index	**Unit**	**JPS Calculated Indices (13.5% Non-Rept. Sustained F/O)**	**OUR Calculated Indices (13.5% Non-Rept. Sustained F/O)**	**OUR Calculated Indices (5.0% Non-Rept. Sustained F/O)** [Used for 2021 Q-Factor]	**Variance in Indices (OUR vs JPS)**
SAIFI	Interruptions/Customer	7.7	7.7	**11.8**	53.3%
SAIDI	Minutes/Customer	1,862.7	1,862.7	**3,300.0**	77.2%
CAIDI	Minutes/Interruption	243.2	243.2	**278.5**	14.5%

10.25.2 As indicated, the OUR's 2021 SAIFI, SAIDI, and CAIDI, derived from 5.0% Non-Reportable Sustained Forced Outage (F/O) scenario, are much greater than those proposed by JPS. Obviously, this is attributable to the inclusion of the excess Non-Reportable outages (8.5%) in the respective calculations, which is justifiable in the context of the Office's imposed limit on Non-Reportable forced outages. Consequently, the OUR computed 2021 SAIFI (11.8 interruptions/customer), SAIDI (3,300 minutes/customer), and CAIDI (278.5 minutes/interruption), were used to calculate the 2021 Q-Factor, required for determining the "RCy(1+dPCI)" component of the 2022 ART. A more granular view of the system reliability performance in 2021, in terms of the 2021 monthly SAIFI and SAIDI indicators, is provided in Figure 9.4 below.

Figure 9.4: Variation in 2021 Monthly SAIFI and SAIDI



10.26 OUR DETERMINATION OF THE 2021 Q-FACTOR

10.26.1 To determine the 2021 Q-Factor, the OUR computed SAIFI, SAIDI, and CAIDI values were measured against the corresponding 2021 SAIFI, SAIDI, and CAIDI targets approved in the 2019-2024 Rate Review Determination Notice, in accordance with the quality of service performance criteria/Q-Factor adjustment system defined under Exhibit 1, Schedule 3 of the Licence 2016. The results from these measurements are presented in Table 9.15 below.

10.27 Quality Points System and Q-Factor Adjustment

10.27.1 As currently structured, the Q-Factor adjustment 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 process, this model was executed by OUR to determine the 2021 Q-Factor as demonstrated in Table 9.15 below.

Table 9.15: OUR's 2021 "Quality of Service" Measurement and Q-Factor Derivation

OUR 2021 QUALITY OF SERVICE MEASUREMENT AND 2021 Q-FACTOR ADJUSTMENT						
DESCRIPTION	**APPLICABLE PERIOD**	**SAIFI (Interruptions/ Customer)**	**SAIDI (Minutes/ Customer)**	**CAIDI (Minutes/ Interruptions)**	**TOTAL QUALITY POINTS**	**Q-FACTOR ADJUSTMENT**
Q-Factor Baseline (2019-2024)	2019-2024 Rate Review	1,582.0	12.9	122.7		
Office Approved 2021 Q-Factor Targets	2022-2023 Annual Review	**SAIFIbase*(1- 0.09) = 11.7**	**SAIDIbase*(1-0.11) = 1,408.0**	**CAIDIbase*(1-0.02) = 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 2021 Quality Indices (13.5% Non-Rept F/O)	2022-2023 Annual Review	7.7	1,862.7	243.2		
JPS 2021 Quality Indices Relative to Targets		**- 34.4%**	**32.3%**	**102.3%**		
JPS 2021 Quality Points & Q-Factor (13.5% Non-Rept)	2022-2023 Annual Review	**3**	**- 3**	**- 3**	**- 3**	**- 0.25%**
OUR 2021 Quality Indices (5% Non-Rept F/O)	2022-2023 Annual Review	**11.85**	**3,300.0**	**278.5**		
OUR 2021 Quality Indices Relative to Targets		**0.5%**	**134.5%**	**131.6%**		
OUR 2021 Quality Points & Q-Factor (5% Non-Rept F/O)	2022-2023 Annual Review	**0**	**- 3**	**-3**	**- 6**	**- 0.40%**

10.27.2 As indicated in Table 9.15 above, the quality points attributable to the SAIFI, SAIDI and CAIDI (OUR calculated), based on the 2021performance measurements, are **0, -3,** and **-3** respectively, which sums to **minus six (- 6)**. Based on the defined "quality points scoring system", for a cumulative score of -6, **Q = -0.40%** (refer to Figure 9.5 below**)**. This means that the 2021 Q-Factor is **-0.40%,** which represents the adjustment to be applied to the "RCy(1+dPCI)" component of the 2022 ART, at this 2022 Annual Review.

10.27.3 This 2021 Q-Factor adjustment will be applicable to 2022-2023 review period, and it is the first Q-Factor determination that will result in financial penalties to JPS, since 2001.

Figure 9.5: Quality of Service Performance Criteria/Q-Factor Quality Points System

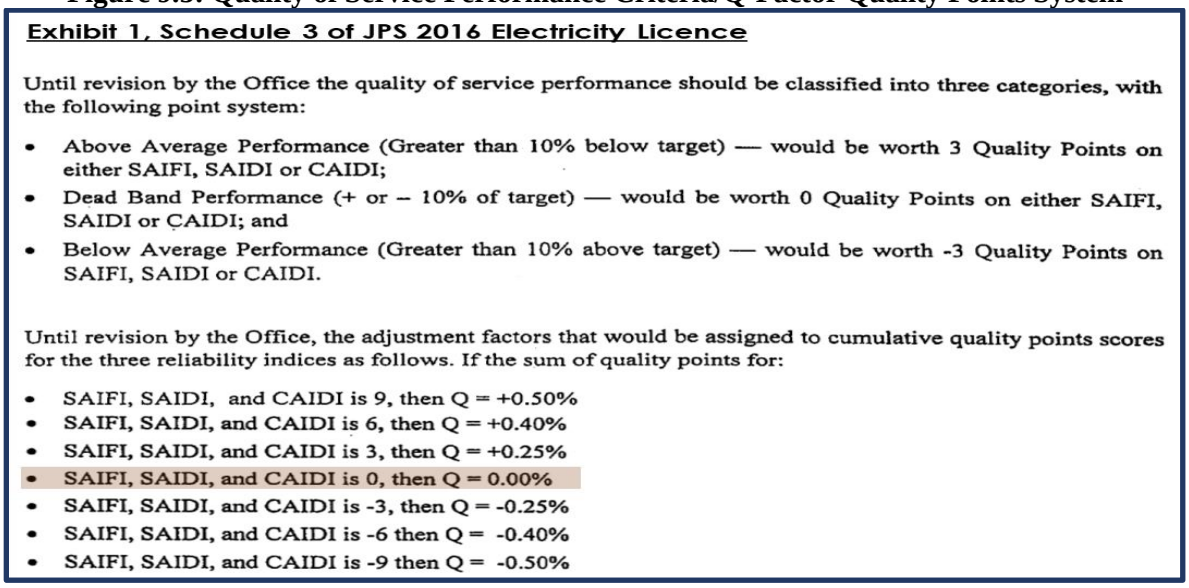


Exhibit 1, Schedule 3 of JPS 2016 Electricity Licence

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%

10.28 Reliability Performance Across the Power System

10.28.1 In the process of measuring quality of service performance of electric utilities through a Q-Factor scheme, comprising reliability indices such as SAIFI, SAIDI and CAIDI, a major shortcoming to such approach, are that these global indices only measure average system-wide reliability performance. In other words, they do not necessarily convey discrete service quality information, such as the disparities in supply reliability across the various service areas/territories served by the electricity system. Although, in electricity system operations in many countries/regions, some degree of variations in supply reliability across service areas is not uncommon. In some cases, this may be due to the geographical orientation of the service territories and the configuration of the power system, among other factors. Notwithstanding, it should be recognized 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.

10.29 Variation in Reliability Performance across Service Areas

10.29.1 In the case of JPS operations, 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 2021 outage data also show a similar pattern. As currently structured, the Annual Outage Datasets provided by JPS contains locational data for each outage event, which includes the parish and the specific feeder associated with the 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. Resultantly, for 2021, the number of outages and corresponding SAIFI & SAIDI, applicable to each parish/major service area across the island, were determined and distributed as shown in Table 9.16 below.

Table 9.16: 2021 Forced Outages and related SAIFI, SAIDI & MAIFI per Parish/Service Area

NUMBER OF FORCED OUTAGES AND ESTIMATED SAIFI, SAIDI & MAIFI PER PARISH/REGION FOR 2021							
Parish/ Service Area	**Total F/O (Allowed)**	**Total F/O (Sustained)**	**Total F/O (Momentary)**	**SAIDI**	**SAIFI**	**MAIFI**	**REMARKS**
KSAN	7332	6,828	504	409.68	0.93	1.03	
KSAS	4,429	4,027	402	150.44	0.68	0.63	
Portmore	2,311	2,212	99	138.19	0.71	0.44	
St. Catherine	6,645	6,352	293	218.67	1.09	0.89	
Clarendon	4,196	3,984	212	264.91	0.77	0.96	
Manchester	4,093	3,863	230	182.15	0.81	0.89	
St. Elizabeth	4,002	3,818	184	213.50	0.98	0.39	
Westmoreland	2,940	2,739	201	139.09	0.67	0.56	
Hanover	2,840	2,603	237	137.13	0.55	0.42	
St. James	7,952	7,513	439	424.60	1.95	0.93	Worst "quality of service".
Trelawny	2,676	2,519	157	93.37	0.36	0.19	
St. Ann	5,442	5,037	405	389.43	1.01	3.92	
St. Mary	4,294	3,983	311	262.10	0.57	0.55	
Portland	1,609	1,532	77	92.24	0.37	0.12	
St. Thomas	1,784	1,726	58	184.77	0.40	0.05	
TOTAL	**62,545**	**58,736**	**3,809**	**3,300.26**	**11.85**	**11.96**	

10.29.2 As indicated in Table 9.16, the parish of St. James experienced the worst quality of service in terms of the number of forced outages, SAIFI and SAIDI. This is quite revealing as there have been numerous complaints from customers in this parish of frequent and extended electricity supply interruptions in 2021, which continued into 2022. These indications appear to have corroborated the claims made by customers in this parish, and therefore, this matter will be the subject of further review by the OUR. Further, JPS service quality levels varied significantly across the different Parishes/Service Areas during an operation 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 those in the parish of Portland and St. Thomas. 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.

10.30 Reliability Performance across Distribution Feeders

10.30.1 As part of the OUR's evaluation of JPS's 2021 quality of service performance, the reliability performance of the distribution feeders was also assessed. This assessment found that the forced outages that interrupted electricity supply to customers in 2021 were associated with 114 distribution feeders. During the evaluation process, the ten (10) worst performing feeders (highest number of F/O) and the ten (10) best performing feeders (lowest number of F/O), were identified, and analysed. These feeders listed in Table 9.17 below.

Table 9.17: Distribution Feeders with Highest/Lowest Number of Sustained Forced Outages in 2021

DISTRIBUTION FEDERS WITH HIGHEST & LOWEST NUMBER OF FORCED OUTAGES IN 2021									
HIGHEST NUMBER OF REPORTABLE OUTAGES					**LOWEST NUMBER OF FORCED OUTAGES**				
#	**Feeder**	**Momentary Outages**	**Sustained Outages**	**Total Outages**	**#**	**Feeder**	**Momentary Outages**	**Sustained Outages**	**Total Outages**
1	Bogue 310	72	2,434	**2,506**	1	Hunts Bay 610	0	2	**2**
2	Orange Bay 310	112	2,176	**2,288**	2	Queens Drive 510	0	2	**2**
3	Cardiff Hall 310	190	1,909	**2,099**	3	Monymusk 310	3	7	**10**
4	Bogue 610	45	1,844	**1,889**	4	Twickenham 410	2	10	**12**
5	Constant Spring 410	41	1,829	**1,870**	5	Hunts Bay 110	3	15	**18**
6	Spur Tree 310	72	1,543	**1,615**	6	Rockfort 310	6	18	**24**
7	May Pen 110	88	1,418	**1,506**	7	Up Park Camp 310	13	28	**41**
8	Spur Tree 210	68	1,416	**1,484**	8	Hunts Bay 210	9	39	**48**
9	Kendal 210	61	1,404	**1,465**	9	Hope 310	12	37	**49**
10	Queens Drive 710	128	1,331	**1,459**	10	Three Miles 310	9	44	**53**
TOTAL		**877**	**17,304**	**18,181**			**57**	**202**	**259**

10.30.2 As indicated in Table 9.17 above, the ten (10) worst performing feeders in 2021, accounted for 18,181 (29%) of the total allowed forced outages (61,851). It should be noted that nine (9) of the feeders in this set of 10 worst performing feeder, were also in the list for 2020, and five (5) of the said 9 feeders have resided in that zone since 2016. In contrast, the ten (10) distribution feeders with the least number of outages accounted for just 259, accounting for less than 0.5% of the total allowed forced outages (less than 0.5%). The evidence is also clear that the low reliability levels associated with these worst performing feeders have been a primary source of most of the quality of service complaints being logged by customers.

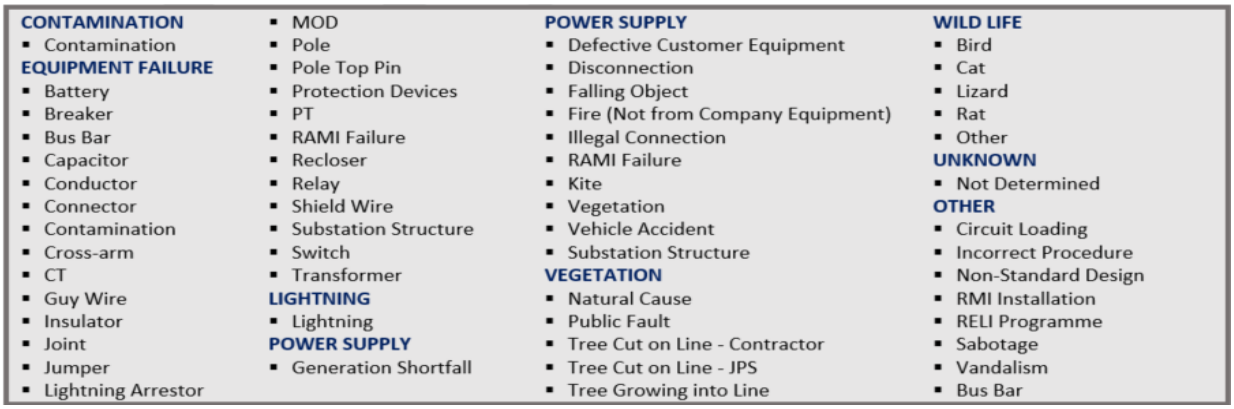
10.30.3 Without question, the obvious disparity with the worst and best performing feeders further evidence of the uneven quality of service being delivered by JPS across the country. This is evidenced by the fact that the identified 10 worst/best performing distribution feeders

supply most of the service areas experiencing very low reliability levels and those areas receiving satisfactory quality of service, respectively. In view of this reliability situation and taking into account the above mentioned quality of service issues, the OUR urges JPS to take urgent action to improve the ongoing poor performance of the identified feeders.

10.31 Outage Causation

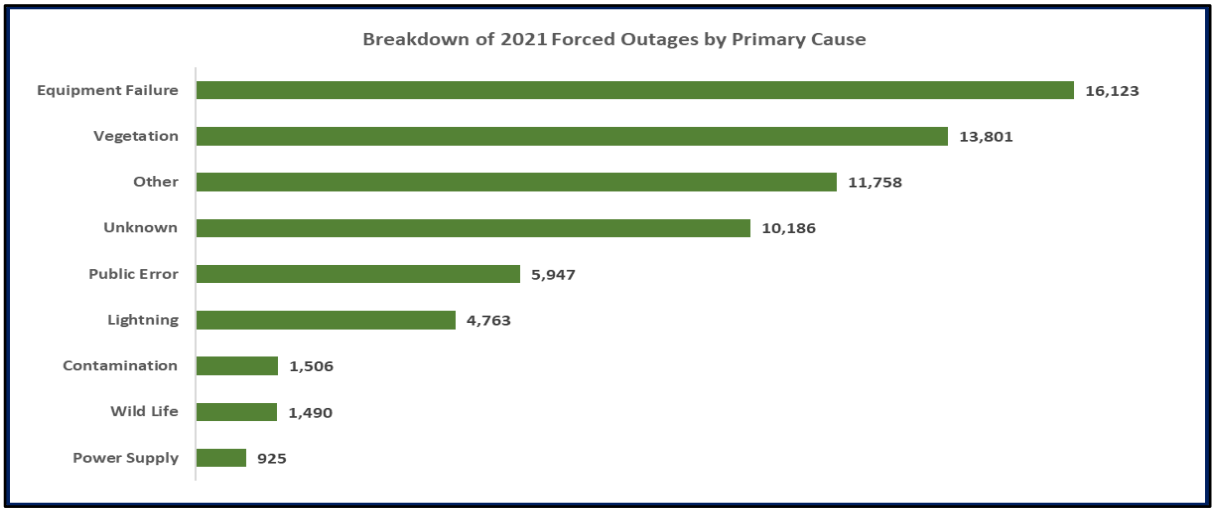
10.31.1 In the 2019-2024 Rate Review Determination Notice, the Office determined that going forward, JPS shall include specific outage causation information for each outage occurring on the system during each year, to facilitate the annual quality of service assessments and Q-Factor determination. In 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, listed in Figure 9.6 below.

Figure 9.6: JPS Reported Outage Causes - 2021 Forced Outages



10.31.2 With respect to the primary causes, the breakdown for the total 2021 forced outages (Reportable and Non-Reportable) by cause is presented in Figure 9.7 below.

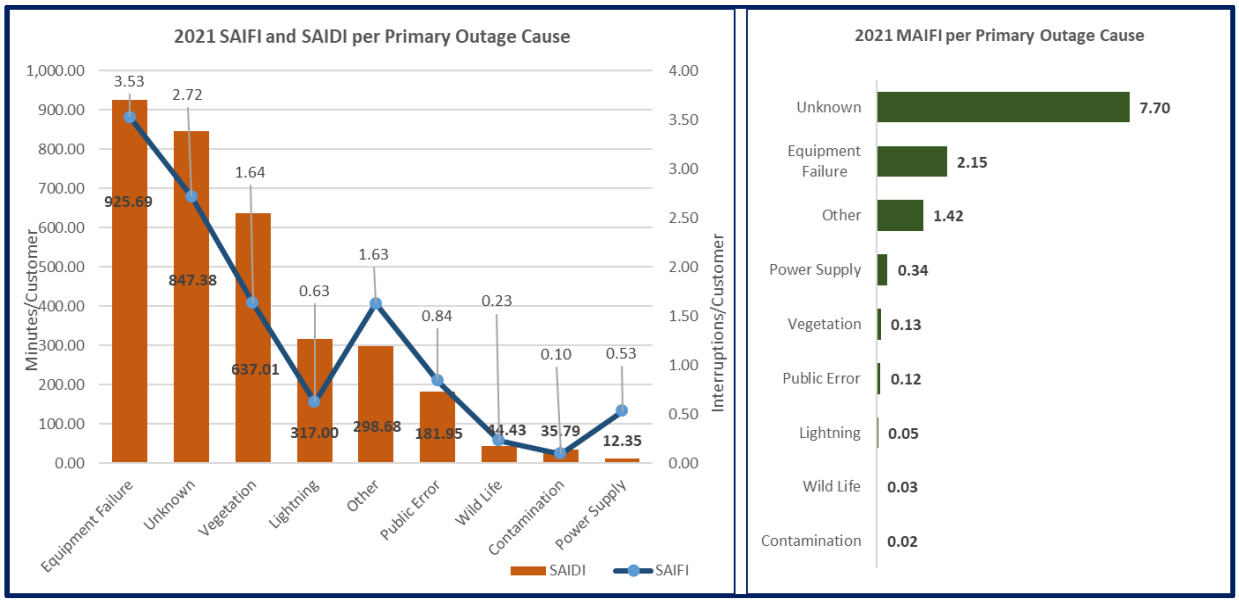
Figure 9.7: Breakdown of 2021 Forced Outages by Primary Cause



10.31.3 As indicated in Figure 9.7 above, the dominant causes of forced outages in 2021 were "Equipment Failure and "Vegetation" impingement. Further, the OUR's outage cause analysis found these two causes combined, accounted for the larger proportion (~ 50%) of the overall 2021 SAIDI. For SAIFI, "Equipment Failure" was the dominant contributor in 2021, with a contribution of approximately 29% (~ 3.5 interruptions/customer) of the total 2021 SAIFI. The breakdown of the 2021 SAIFI and SAIDI by primary outage cause is illustrated Figure 9.8 below.

10.31.4 In its submissions, JPS indicated that the outages associated with "Equipment Failure" were largely due to the impact of three tropical storms impacting the island during the year. The company also indicated that its T&D Structural Integrity Programme should address some of these equipment failure issues. Since the evidence shows that the reliability situation surrounding "Equipment Failure" worsened in 2021, this brings into question the effectiveness of the JPS curtailment/mitigation strategy.

Figure 9.8: 2021 SAIDI, SAIFI and MAIFI by Primary Outage Cause



10.31.5 The OUR's outage cause analysis also identified a significant number of forced outages causes defined by JPS as "Unknown" (10,186). As represented in Figure 9.7, the recorded forced outages with causes unknown to JPS also had sizeable contributions to the overall 2021 SAIFI and SAIDI and was also a dominant factor in the 2021 MAIFI indicator.

10.31.6 As was the case with the 2019 and 2020 Outage Datasets, the reported forced outages with "Unknown" causes, accounted for over 15% of the total number. JPS, in its submissions, acknowledged the OUR's repeated concerns about the uncharacteristically high level of forced outages with "Unknown" cause. In the scheme of things, the company indicates that efforts are being intensified to better identify the cause of these outages but did not provide any specific details. However, the submitted 2021outage data shows that system forced outages with "Unknown" caused have not been curtailed. In fact, these outages cause have expanded, increasing from 9,492 in 2020 to 10,186 in 2021. Given the adverse effects of these outages of unknown origins, JPS is required to take urgent action to rectify this problem.

10.32 Momentary Interruptions and Regulatory Requirements

10.32.1 MAIFI Considerations

10.32.2 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 electricity supply to customers and report these outages/interruptions to the

OUR on an on-going basis. However, based on the existing configuration/capabilities of JPS's outage data acquisition equipment/devices, currently 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 to address. Despite this constraint, JPS reported that the 2021 momentary interruption occurrences were recorded and included in submitted 2021 Annual Outage Dataset. This OUR's initial check confirmed that indeed momentary interruptions data was in included the referenced dataset.

10.32.3 In the OUR's assessment of JPS's 2021 quality of service performance, the forced outages that resulted in momentary service disruptions were also evaluated. This assessment identified and analysed the forced outages that initiated momentary interruption events in 2021, and estimated their effects on service quality, by means of the MAIFI metric. A summary of the 2021 momentary interruptions indicators is provided in Table 9.18 below.

Table 9.18: 2021 Momentary Interruption Events Indicators

2021 MOMENTARY INTERRUPTIONS									
YEAR	MOMENTARY FO/ Interruptions	MOMENTARY FO/Interruptions (IPP Excluded) [Reportable & Non-Reportable]			IPP MOMENTARY FO/Interruptions (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**

Momentary Interruption Issues

10.32.4 While the annual MAIFI measure reflects an overall reduction in 2021 (13% relative to 2020 level), there was a significant rise in the measurement for some months in the year, particularly, for June and August. According to JPS, this was primarily due to an increase in feeder cycling events associated with severe weather by the three (3) named tropical storms in 2021. Notwithstanding, the OUR's reliability evaluation found that the largest cause contributor to the 2021 MAIFI, was described by JPS as "Unknown". This issue appears to be like that observed for the sustained forced outage events as described herein, which needs to be rectified by JPS. With the capabilities of the new Electra OMS, it is expected that some of these issues will be eliminated, and not reappear in the 2022 Annual Outage Dataset.

Effects of Momentary Interruptions on Customers

10.32.5 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. Given these effects, it is imperative that the utility ensures that the electricity supply network, is appropriately designed/configured,

maintained, and reinforced through the approved capital investment programme, so as to minimize the interruptions experienced by customers.

10.33 Major System Failure Events

10.33.1 In reviewing the 2021 Outage Dataset, the OUR identified **138** forced outages that satisfied the criteria for a "Major System Failure" as established in the legal & regulatory framework. Section 45 (16) of the Electricity Act, 2015 defines a "Major System Failure" 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. Based on this threshold, 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 of the System Operator (JPS) when a Major System Failure occurs but were not executed for the reason cited. JPS argued that the Electricity Act, 2015's definition for a Major System Failure is far more restrictive than that used in other jurisdictions and recommended that it be amended. The OUR concurs with that position. Therefore, recognizing the scope of the defined standard in the Electricity Act, the OUR will be collaborating with JPS on this issue, where possible, to facilitate normalization. Additionally, based on comments submitted by the OUR and JPS, this issue is expected to be rectified during the current review of the existing Electricity Act, 2015.

10.34 Force Majeure Outages

10.34.1 JPS purported that during 2021, Tropical Storms Ida, Elsa and Grace (as classified by the Meteorological Service of Jamaica) materially and adversely affected its quality of service performance, with a penalty equivalent of -3 quality points under the Q-Factor scheme, in addition to its inability to recover sums expended to restore the Network through the EDF because the trigger threshold was not reached. Citing these circumstances, JPS 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" events. The 2021 "quality of service" performance inclusive of the assumed Force Majeure (FM) events, as measured by JPS is shown in Table 9.19 below.

Table 9.19: JPS 2021 Quality of Service Performance Measurements (Force Majeure Scenario)

	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	1408.0	1862.7	-32%	11.7	7.7	34%	120.2	243.2	-102%
Without FM	1408.0	1187.8	16%	11.7	6.8	42%	120.2	175.2	-46%

10.34.2 Based on these measurements, with the exclusion of Force Majeure events, JPS stated that the company has performed 42% and 16% better for SAIFI and SAIDI, respectively, and 46% worse for CAIDI, relative to the approved targets. This translates to total quality points score of +3 (Q-Factor = 0.25%).

OUR's Position

10.34.3 In the 2019-2024 Rate Review Determination Notice, the Office made it clear that the relevant quality of service provisions in 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, as revealed by JPS in the 2022 submissions, no approval was granted for these Force Majeure events in accordance with Condition 11(3). Accordingly, the 2021 Q-Factor including the forced outage purportedly caused by the Force Majeure events, is Not Allowed.

10.35 Issues and Findings Emanating from the OUR's Q-Factor Review

10.35.1 The findings and issues resulting from the OUR's evaluation of JPS' 2021 quality of service performance and 2021 Q-Factor proposals, are summarized 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 2021 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. While the new Electra OSI OMS is expected to address these issues, for clarity and transparency, and to engender confidence in the reliability performance measurement process. JPS is required to provide a detailed breakdown of the CIS/OMS customer count data used in the relevant Q-Factor computations, by customer categories and status. This must be included the reliability reports to be submitted to the Office.

Outage Data Calibration Issues

2) As was highlighted in the OUR's previous reliability assessments herein, for the 2021 Outage Dataset, the adjustments made by JPS to the "Raw Data" reported in the Annual Outage Dataset to compile the "Calibrated Data" (mainly the Reportable outages), were not clearly and specifically shown. Further, the specific reasons for these modifications were also not stated in the schedule. To ensure transparency and efficiency in the regulatory review process, going forward, JPS is required to appropriately address these issues in the relevant reliability reports to be submitted to the OUR.

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. The legal & regulatory framework dictates that there should be no discrimination in electricity rate based on customer location, thus, 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 2021 Q-Factor analysis of the 2021 outage data, as well as previous annual outage data, has revealed significant disparities in reliability performance across the distribution feeders' network 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, it has been found that a number of these have exhibited consistently poor performance, in terms of the number of outages, and SAIFI & SAIDI, from year to year. Given these findings, and considering the approved 2019-2024 reliability improvement programme, there needs to be greater focus by JPS on elevating the reliability performance of these feeders, and to ensure greater consistency in the quality of service to customers in the service areas across the network.

Outage Causation Issues

4) The OUR's analysis of reported causes of the 2021 forced outages revealed that a significant percentage of these outages were linked to causes described by JPS as "Unknown" on the basis that the specific caused 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 identify the precise causes of these forced outages. In addition, the OUR is of the view that with the commissioning of the new Electra OSI OMS, JPS should now be better equipped to remedy this problem.

New OMS System

5) Regarding the new OSI OMS, JPS had indicated that it was in the process of conducting post-commissioning performance validation and stress testing on the platform to ensure technical compliance, system integration compliance and regulatory compliance, which was projected to be completed by the end of 2022 June. In addition, 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 grants a waiver of the reliability reporting requirement for the period 2022 March – June.

OUR's Position

In response, the OUR via letter (dated 2022 June 20) to JPS, indicated that it has taken note of the developments regarding the new Electra 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, no specific OMS anomalies/errors encountered since the start of commercial operations had been reported by the company. Notably, up to this point, JPS has not sought to 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 submissions). Absent this information, the OUR is unable to make an informed decision regarding the requested waiver. Notwithstanding, the OUR is not averse to looking at possible OMS issues that may emerge, 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, is presented to the OUR for review. Additionally, a copy of the full OMS commissioning report should be submitted to the OUR.

Rules-Based Data Dictionary Issues

6) The OUR's 2021 Q-Factor evaluation revealed that approximately 15% of the 2021 sustained forced outages designated as "Non-Reportable" by JPS, were given that classification after the application of Rule 1 of Rules-Based Data Dictionary. However, the remedial actions specified in the Data Dictionary to normalize the conditions triggered under Rule 1 ("Excessive Customer Count") do not include any option for a "Non-Reportable" classification. As such, JPS needs to provide clarification/explanation, as to why these outage events were classified in this manner. Additionally, with the implementation of the new OSI OMS, there will be need for JPS to update the existing rules in the Data Dictionary, as some of the stated irregular outage conditions are expected to be eliminated by the new OMS, which means that the respective rules and related actions may become irrelevant. Hence the need for the revision of the Rules, which is expected to commence immediately after the effective date of this Determination Notice.

JPS 2021 Capital Projects Reliability Impact

7) For 2021, JPS reported that it spent US$16.90M out of the approved 2021 CAPEX (US$17.98M) on the implementation of JPS' planned reliability projects, with three (3) reported completed at the end of the year. However, JPS did not provide the specific completion dates and the associated reliability impact were not quantified. This information is necessary to support regulatory assessment of the cost effectiveness of the completed reliability projects and realized benefits to ratepayers. Therefore, going forward, this important project information must be provided by the company.

Customers' Complaints of increased Power Outages and poor Service Quality

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. The OUR has been looking into these claims, but constraints such as the existing lag in the reliability reporting process, 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's position is that the system reliability reports should now be submitted on a monthly basis, and then, at the end of each year the full and final compilation must be submitted to the Office for review and evaluation.

OUR Summary Comments

10.35.2 From the OUR's 2021 Q-Factor review, it can be deduced that while there has 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. In light of these findings, JPS needs to take urgent action to resolve the identified issues and to improve its declining quality of service performance.

10.36 **Office 2022 Annual Review Q-Factor Determination**

2022 Q-Factor Determination

10.36.1 In making its determination on JPS's 2021 Q-Factor adjustment, the Office took into consideration, among other things, the following:

- The results of the OUR's 2021 Q-Factor evaluation.
- The relevant provisions of the Licence 2016, and legal & regulatory framework; and
- The "quality of service" and Q-Factor determinations set out in the 2019-2024 Rate Review Determination Notice.

10.36.2 Accordingly, the Office determines that the 2021 Q-Factor applicable to the "RCy(1+dPCI)" component of the 2022 ART is **- 0.40%**.

10.37 **Q-Factor Determination Summary**

10.37.1 The Office Q-Factor determinations are summarized as follows:

Determination 9

1) The Q-Factor to be applied in the 2022 PBRM is - 0.40%.

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:
   - 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.

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. This breakdown shall be included in the Monthly Reliability Reports to be submitted to the Office.

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.

5) In reference to DETERMINATION #22(d) of the 2019-2024 Rate Review Determination Notice, the OUR shall continue to factor Non-Reportable forced outages (sustained) above 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 the total sustained forced outages recorded for each year.

6) JPS shall submit to the OUR, 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.

7) JPS shall submit a copy of the New OSI OMS commissioning report, within one (1) week after the effective date of this Determination Notice.

11 Other Regulatory Matters

11.1 JPS Proposal on the Adaptation of IFRS 16 Lease

11.1.1 In its Annual Review submission, JPS advised that the International Accounting Standards Board (IASB) published a new international financial reporting standard (IFRS) in 2016 January known as IFRS 16 – with an effective date of 2019 January 1. JPS indicated that IFRS 16 requires that the company recognizes almost all leases, including assets of IPPs, on its balance sheet. The company said that the adoption of the new standard has had a negative economic and financial impact on the company.

11.1.2 JPS outlined that with the adoption of IFRS 16, its leases are accounted for based on a "right of-use model", where the established terms of arrangement substantially transfer all the risks and rewards of the lease assets to the lessee, based on a fixed obligation over the lease term. In light of this rule change, JPS indicated that a variety of its current Power Purchase Agreements (PPAs), as well as property, motor vehicles and equipment rental agreements, are recognized as leases in its accounts.

11.1.3 JPS advised that based on the criteria set in the IFRS 16 standards, the impact will only affect fixed term PPA contracts, and will not affect PPAs with only variable payments, such as renewable energy PPAs. According to JPS, the affected PPAs are as follows:

- South Jamaica Power Company Limited
- Jamaica Energy Partners
- West Kingston Power Partners
- Jamaica Private Power Company Limited

11.1.4 The company opined that the general implementation of IFRS is an obligation under the Licence 2016, and cited the accounting principles established under Condition 5 of the Licence 2016, which states in part:

"*Condition 5: Accounts for the Licensed Business*

1…

2. The Licensee shall maintain such Regulatory Accounts as may reasonably be specified by the Office consistent with generally accepted accounting principles and the EA.

3. The Licensee shall in respect of the Licensed Business:

(a) keep or cause to be kept for the period referred to in Section 145 of the Companies Act and in the manner referred to in that Section such accounting records in respect of the Licensed Business as would by sections 144 and 146 of the Companies Act be required to be kept;

(b) prepare on a consistent basis from such accounting records, accounting statements which conform to generally accepted accounting practices, state the accounting policies adopted and are in such form and in such detail as the Office may from time to time reasonably require;

(c) procure in respect of accounting statements prepared in accordance with this Condition, a report by the Licensee's auditors for the time being and addressed to the Office, stating whether in their opinion those statements have been properly prepared in accordance with this Condition and give a true and fair view of revenues, costs, Assets, liabilities, reserves and provisions of, or reasonably attributable to, the Licensed Business; and

(d) deliver to the Office a copy of the accounting statements required to be prepared by this Condition together with the Auditor's report referred to in sub-paragraph (c) above as soon as reasonably practical and in any event within three (3) months after the end of the period to which they relate.

4. The Licensee shall in respect of its financial affairs:

(a) keep and prepare such accounts and accounting statements for, and as at the end of each financial year, as would be required by Sections 144 and 146 of the Companies Act to be kept by the Licensee if the Licensee were a Licensee which was not a Subsidiary of any other company and which did not have any subsidiaries or Affiliate(s); and

(b) procure in relation to such accounting statements a report of the auditors addressed to the Office, and deliver a copy of such accounting statements to the Office, in accordance with, mutatis mutandis, the requirements of sub-paragraph (c) and (d) of paragraph 3….."

11.1.5 JPS also pointed out that the Licence 2016 makes reference to IFRS in respect of the depreciation of capitalized maintenance activities in the last paragraph of Schedule 4, which states as follows:

"The depreciation rates to be applied to the sub-components of the major plant categories delineated above will be determined with reference to the manufacturer's recommended useful life subject to the approval of the OUR. Additionally, major plant maintenance activities prescribed by equipment manufacturers will be depreciated over the period between each recommended maintenance activity in accordance with IFRS. Changes to depreciation rates should be applied prospectively to the net book value of the affected assets at the date such changes are brought into effect."

11.1.6 JPS suggested that the application of IFRS 16 results in the inclusion of IPPs in its asset base, and that these and other leases are to be reported as right-of-use assets. Since its adoption of IFRS 16 on 2019 January 1, the company and its group have reportedly

recognized additional right-of-use assets of $147,079,000 and additional lease liabilities of $147,079,000.

11.1.7 JPS advised that since the implementation of the new standard, the economic cost of leases is reflected in its accounts as a liability which pays interest, and the corresponding asset is depreciated over the life of the related contract. As these values are equivalent to the net present value of the periodic payment to be made under the relevant lease contract, it has resulted in a mismatch between the amounts recovered by JPS through IPP charges (which are treated as O&M costs in the OUR approved tariff), and the associated costs reflected in the company's accounting system. Table 10.1 below shows JPS's calculated impact on the different types of lease cost on its 2021 income statement following IFRS 16, and the OUR recognized O&M costs.

Table 10.1: JPS calculated Impact on Income Statement in 2021

Description	IPP leases		Distribution associated leases (Jameco, Head Office, Budget Cars, Printers & Other Leased Property)	
	USD (000)	*JMD (000)*	USD (000)	*JMD (000)*
Costs of leases under previous accounting rule				
IPP Lease Payments	(63,713)	*(9,875,552)*	-	-
Operating Expenses	-	-	(2,961)	(458,921)
Costs under IFRS 16:				
Asset Depreciations	37,320	*5,784,627*	2,497	*387,100*
Interest Expenses	40,517	*6,280,166*	471	*73,042*
Total Variance	**14,124**	***2,189,241***	**8**	***1,221***

11.1.8 JPS explained that for the year 2021, a variance of US$14,124,000 and US$8,000 was recognized on its income statement for IPP lease costs and other O&M leases respectively. The company stated that the 2019-2024 Rate Review determination, included among the approved O&M costs, leases, which were projected assuming they would be treated as O&M. The company argued that this categorization changed with the implementation of IFRS 16.

11.1.9 JPS advised that there is a resulting gap of J$2,148M [J$2,190M] due to the mismatch between the economic costs of the leases and the values currently recognized as O&M costs under the 2019-2024 Rate Review determination.

11.2 JPS's Rationale for a Z-Factor Claim

11.2.1 JPS expressed the view that the change in the accounting standards with the implementation of IFRS 16 is a special circumstance that qualifies as a Z-Factor claim pursuant to paragraph 46(d)(i) of Schedule 3 of the Licence 2016. The provision reads:

> *"d. The **Z-factor** reflects the adjustment to the non-fuel rate due to special circumstances. 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."*

11.2.2 The company argued that the adoption of IFRS 16 was mandatory for all companies as of 2019, and that its implementation of the new accounting standard was therefore not a managerial decision, but rather in compliance with its licence obligations. JPS further stated that the under recovery of its lease related costs due to the mismatch between the economic costs now recognized in its accounts, and the value currently recognized as O&M costs in the OUR's approved tariff, is of a value far in excess of the $50 million threshold established in the Z factor provision in the Licence 2016.

11.2.3 JPS also highlighted that the IFRS 16 treatment of leases is consistent with its tariff methodology. The company argued that the Licence 2016 establishes a tariff determination mechanism based on economic costs of the service as reflected in JPS's financial statements.

11.2.4 JPS has requested that the OUR sets out the treatment of IFRS 16, on the basis that the implementation of IFRS 16 implies a change in the time profile of costs to ensure an efficient recovery of all costs. The company stated that this change requires that future IPP charges and O&M leases are based on the economic costs reflected in JPS's books.

11.3 OUR's Review and Recommendation

11.3.1 IFRS on its webpage states that, "In January 2016, the International Accounting Standards Board issued a new IFRS® Standard to improve the financial reporting of leases. IFRS 16

Leases replaces IAS 17 Leases and its related Interpretations. IFRS 16 has an effective date of 1 January 2019, but earlier adoption is permitted".

11.3.2 Prior to the implementation of IFRS 16, IAS 17 was the accounting standard in use by JPS. With IAS 17, leases were categorized as financial or operational, and JPS had classified most of its leases as operational. However, over time it was recognized that the classification of leases was very subjective under the IAS 17 standard and as such, it was replaced with the new standard, IFRS 16.

11.3.3 Under IFRS 16, a lease is now defined as a contract, or part of a contract, that conveys the right to control the use of an asset for a period of time in exchange for consideration. Consequently, the key elements for a contract to be considered a lease under the new accounting standard is that there must be an identifiable asset, from which a person obtains substantially or all of the economic benefits, and over which the person obtains a right to direct its use.

11.3.4 Entities which apply IFRS are required to apply IFRS 16 to all contracts deemed to be leases, including leases of right-of-use assets in a sublease, except for the following:

a) leases to explore for or use minerals, oil, natural gas and similar non-regenerative resources.
b) leases of biological assets within the scope of IAS 41 Agriculture held by a lessee.
c) service concession arrangements within the scope of IFRIC 12 Service Concession Arrangements.
d) licences of intellectual property granted by a lessor within the scope of IFRS 15 Revenue from Contracts with Customers; and
e) rights held by a lessee under licensing agreements within the scope of IAS 38 Intangible Assets for such items as motion picture films, video recordings, plays, manuscripts, patents, and copyrights.

11.3.5 Condition 5 of the Licence 2016, which is referenced by JPS in its submission, sets out the obligations of the JPS with regard to the maintenance of financial and accounting records in respect of its licensed business. The Condition requires that the company prepare and maintain accounts that are consistent with generally accepted accounting principles and practices and should keep accounting records as are required under the Companies Act. The Companies Act requires that accounting records be maintained in accordance with standards promulgated by the Institute of Chartered Accountants of Jamaica (ICAJ). The ICAJ has adopted IFRS as the accounting standard applicable to companies operating in Jamaica. It is therefore agreed that the preparation and maintenance of some of the accounting records referenced in Condition 5 of the Licence 2016 must be compliant with applicable IFRS standards. Condition 5, however does not purport to prescribe the standards and principles upon which the non-fuel rates paid by electricity customers should be designed and determined, as this can be found in Schedule 3 to the Licence 2016. The

usual audited financial report, along with any regulatory accounts that may be required by the OUR, provides a source of information that will inform the analysis and deliberations of the regulator when assessing the company's tariff submission and approving its rates.

11.3.6 Accounting standards are designed to present to shareholders and other stakeholders a full picture of the state of affairs of the company. Where the facts of an asset or liability were already disclosed in financial reports, a different presentation of that asset or liability occasioned by a new accounting standard should not affect the risk profile, cash flow or value of the company. Regardless of the application of IFRS 16 or any other accounting standards to the capacity payments made by JPS to the IPPs under the respective PPAs, a fundamental principle in determining the rates ultimately payable for electricity supply, would be that consumers, who bear IPP costs as a pass through in the tariffs, should not be required to pay a cent more or less than what is actually paid by JPS to the IPPs over the period of the PPAs.

11.3.7 With regard to the treatment of IPP costs in relation to the implementation of IFRS 16, the questions to be answered are as follows:-

1) *Are the capacity payments to the IPPs properly classified as leases under IFRS 16?*

Given the definition of a lease as "a contract, or part of a contract, that conveys the right to use an asset for a period of time in exchange for consideration", it is not clear that the PPAs convey any right for JPS to 'use' the IPPs' assets. Rather JPS is obliged to pay for the electricity produced by the IPPs and taken by JPS. The fact that the payments are broken down into fixed and variable charges is not different from the construct that JPS uses in the demand and energy charges paid by large consumers.

2) *Assuming the PPAs are leases under IFRS 16, what are the assumptions made in computing the asset values, liabilities and interest charges?*

JPS has not provided information on the basis of computing the asset values and interest charges. A PPA can have various adjustments that can be made to the capacity payments each month. These include, Libor rates, working capital, inflation, etc. thus, making it difficult to ensure that the IFRS treatment is equivalent to the present value of the capacity payments. JPS would need to demonstrate that the current treatment, and that which is being proposed, have equivalent net present values. The request by JPS at 8.3.1 of its submission would indicate that it is yet to determine the profile of future IFRS 16 related costs.

3) *Does the tariff treatment and regulatory accounting have to be the same as the IFRS treatment?*

It is common practice for regulatory accounting to vary from what is in the financial statements. One example of this is the treatment of extraordinary items in the

financial statements. The best practice regulatory treatment is to spread these types of costs over the number of years that the benefits are enjoyed. In fact, the levelisation of costs to avoid extreme volatility is common in the current regime. Capacity payments are for the most part a levelising of fixed costs faced by the IPPs. The five-year tariff regime of JPS is based on a forward-looking revenue cap. Actual costs, as per the financial statements, are decoupled from the revenue requirements for each year. The revenue requirement for each year incorporates some levelisation of capital costs projected to be incurred over the five years.

4) *Does the proposed treatment increase uncertainty and risk?*

The current regime is based on levelised capacity charges with a monthly true up mechanism to ensure that JPS recovers from customers the exact amount paid to the IPPs. JPS has not indicated how the new IFRS cost profiles are to be incorporated in the revenue cap regime and how adjustments to the capacity payments are to be treated but has instead suggested that the OUR put forward a proposal. Since the present values of the current regime and that being proposed by JPS should be the same, there is little or negative value moving to a regime where the cash received and paid are not equivalent.

5) *Does the result of the prosed treatment qualify as a Z-factor adjustment?*

The proposed IFRS presentation of capacity payments will not cause JPS to pay out any additional funds to the IPPs other than what is due under the relevant PPAs. Any new cost profile presentation should not affect the value of the business. The impact will not meet the threshold of $50 million to qualify as Z-factor adjustment.

11.3.8 The impact, if any, of the implementation of the IFRS 16 accounting standard on the actual costs of JPS arising from its obligations under the PPAs, will be the subject of further discussions between the OUR and JPS leading up to the next five-year tariff reset. In the meantime, the current treatment of these expenses as O&M costs, and the pass through to JPS's customers of the actual IPP charges paid by JPS under the PPAs, will continue through to the end of the current five-year tariff period.

11.4 JPS's Smart Led Streetlight Programme

Background

11.4.1 As reflected under section 19.2 of the 2019-2024 Rate Review Determination Notice, JPS in the Rate Review Application reported that up to 2019 December, a total of 65,613 HPS streetlights were replaced (62.5% of the 105,000 target) with the smart LED type under phases 1&2 at a total capital expenditure of US21.97M.

11.4.2 Based on the original SSP proposal, phase 3, the final stage of the programme was initially scheduled for execution during the period 2019 April-December. However, in the 2019-2024 Rate Review Application, JPS indicated that this initial timeline was extended by

about eighteen (18) months, with full programme completion expected in 2021 June, with the replacement of a total of 63,202 HPS lamps with LED fixtures. The phase 3 budget for 2020 and 2021 proposed by JPS were US$8.994M and US$6.984M, respectively.

11.5 JPS Compliance with Office SPP Determinations

11.5.1 In the 2019-2024 Rate Review Determination Notice, the Office made several decisions on JPS's SSP, which are captured in DETERMINATION #31. As specified, JPS was required to submit the SSP deliverables defined in DETERMINATION #31 (4, 5 & 6) to the Office for review. However, the OUR's records up 2022 January indicate that the company had not complied with these requirements, despite several reminders from the OUR to the company for the submission of the deliverables.

11.5.2 Based on the lack of compliance from JPS, the OUR on 2022 January 26, requested an update from JPS on the programme, particularly, in relation to items 4 & 5 of DETERMINATION #31. In response, JPS, on 2022 March 7, submitted an SSP update (with no date), summarizing the programme activities undertaken in 2021. According to the update, 20,732 HPS streetlights were replaced with smart LED types in phase 3 of the SSP in 2021, bringing the total number of streetlight LED/HPS streetlight replacements to 105,615. The company indicated that of this total, 94,809 have been commissioned in the Central Management System (Streetlight Vision), with the completion of the commissioning activities planned for the end of the first quarter of 2022. In addition, the OUR's review found that the 2022 March SSP update did not provide adequate and specific details about the status of the SSP intelligent features defined under Condition 28 of the Licence 2016, which was the subject of the DETERMINATION #31(4) of the 2019-2024 Rate Review Determination Notice. The review also identified some discrepancies with the targeted number of LED/HPS streetlight replacements and the installations reported completed.

11.5.3 Given these deficiencies, during the 2022 Annual Review proceedings, the OUR via letter dated 2022 May 26, requested that JPS provides a "Detailed Status Report" on the SSP implementation activities up to the end of 2022 May, to support the OUR's assessment of the programme.

11.6 OUR's Review of JPS's SSP Reports

11.6.1 In response to the OUR's 2022 May 26 information request, JPS on 2022 June 10, uploaded the following items on its ShareFile platform:

1) A short Power Point Presentation entitled "SSP update reports May 2022 for OUR"
2) Excel File named as "2017-2021 Capital Expenditure (incl. IDC)"
3) Excel File named as "Streetlight OUR report"

11.6.2 These documents were retrieved by the OUR and subsequently reviewed. The OUR's review revealed that the SSP information provided was incomplete and inadequate and did not satisfy the requirements specified in DETERMINATION #31 (4 & 5) of the 2019-2024 Rate Review Determination Notice.

11.6.3 In the 2022 Annual Review submissions, JPS confirmed that the targeted 105,000 LED/HPS streetlights replacement was completed as at the end of 2021, but due to disruptions to global supply chains, the installation of the smart controllers was deferred to 2022. However, to date, no official project completion report has been submitted by the company.

11.7 Integration of SSP Advanced Features

11.7.1 Having reviewed the SSP status reports, the Office is of the view that there is not sufficient clarity and details on the integration of the intelligence features/capabilities specified in paragraphs 6 and 8 of Condition 28 of the Licence 2016. This issue needs to be addressed by the Company.

11.8 Office Determination

11.8.1 Based on the findings and observations from the OUR's SSP review, the Office determinations are as follows:

Determination #10

1) JPS is required to submit an official project completion report to the Office, which should:
   a. Appropriately address, among other things, the requirements specified in DETERMINATION #31 of the 2019-2024 Rate Review Determination Notice.
   b. Include all relevant SSP costs, which must be fully disaggregated, reconciled and validated for each year of the programme.
   c. Specifically address the issue of the integration of the SSP intelligence features/capabilities.
   d. Be submitted within 90 days after the effective date of this Determination Notice.

2) JPS shall submit to the Office the complete smart LED streetlight inventory of the 105,000 streetlights within 30 days after the effective date of this Determination Notice. This schedule shall include the following information for each streetlight:
   a. Parish, Division, JPS pole #, GPS coordinates
   b. Installation date, year
   c. Power Rating of the installed LED lamp and the HPS lamp removed
   d. Energy consumption measurements obtained from the advanced metering system
   e. The avoided energy (kWh) consumption
   f. The annual demand (MW) impact

12 Extra-ordinary Rate Review Capital Investment Proposal Assessment

12.1 Capital Investment Proposal Assessment

Introduction

12.1.1 In its Annual Review submissions, JPS submitted a number of capital projects and related expenditure forecasts to be assessed under the Extra-ordinary Rate Review provisions, pursuant to paragraphs 59-61 of Schedule 3 of the Licence 2016 .

12.1.2 JPS cited what it considers a number of extraordinary events that has precipitated the Extraordinary Rate Review application. These include;

- the retirement of the 68.4 MW Hunts Bay B6 unit in the corporate area energy system (CAES).
- the lack of adequate generating capacity on the North Coast of the Island; and
- the imperative to postpone the retirement of 171.5 MW of generating capacity from 2023, as per the Minister's Retirement Schedule, to 2026, because of scheduling challenges.

12.1.3 This section of the Determination Notice sets out the details of the OUR's assessments of JPS's Extra-ordinary Rate Review projects submission. This includes an outline of the methodology utilized in carrying out the assessments, the findings, and the Office's decision.

12.2 JPS's Extraordinary Rate Review Submissions

JPS 2022 Extra-ordinary Rate Review Projects

12.2.1 In its Extra-ordinary Rate Review application, JPS submitted several generation and transmission systems capital projects for review.

12.2.2 **Projects for Extra-ordinary Rate Review**

1. ***The corporate area capacitor bank installation project:*** this project requires a capital investment of US$1.3 M. The stated objective is to ensure energy security in the Corporate Area based on grid system supply-demand dynamics including, voltage stability and operation and maintenance (O&M) cost reduction. This project was previously submitted to the OUR for evaluation in 2021 and the OUR had given its 'no-objection'.

2. ***The Hunts Bay GT10 hot gas path inspection (HGPI);*** this project involves the rehabilitation and replacement of critical hot gas path components, with a capital expenditure of US$2.43M. JPS asserted that the objective of this project includes mitigating load shedding in the Corporate Area; avoiding unserved energy of

approximately 20,000 MWh per year; and maintaining voltage quality and grid stability. This project was previously submitted to the OUR for evaluation in 2021and the OUR had given its 'no-objection'.

3. ***Rehabilitation and maintenance package for a set generating units;*** according to JPS, these generating units require the extension of their operating lives beyond their 2023 retirement date. The extension would result in the delay of their respective retirement dates from 2023 to 2026. Total capital expenditure proposed is US$10.961 M. The proposed plants identified for this project are:
    1) Rockfort Unit 1
    2) Rockfort Unit 2
    3) Hunts Bay GT 5
    4) Bogue GT 3
    5) Bogue GT 6
    6) Bogue GT 11

4. T***he North East Coast Voltage Security Improvement project:*** JPS indicated that this project was submitted in its 2021 Annual Review filing. The scope of this project includes the installation of an additional 40/60 MVA interbus transformer at the Bellevue Substation along with the installation of 30 MVAR of capacitor banks. According to JPS, the objective of this project is to improve voltage stability and system reliability in the North East Coast region of the island. JPS requested a capital expenditure of US$6.182M.

12.2.3 Projects that were previously submitted along with their costs and proposed timing are shown in Table 11.1 below.

Table 11.1: Projects Previously Submitted by JPS

Project					
Generation	**2023**	**2024**	**2025**	**2026**	**Total**
	US$'000'	**US$'000'**	**US$'000'**	**US$'000'**	**US$'000'**
Hunts Bay GT 10 Hot Gas Path	2,430				
Transmission & Distribution					
Installation of 40 MVAR capacitor banks in CAES	1,340				
North East Cost voltage Improvement Projects	6.182				
Total	**9,952**				**9,952**

12.2.4 Tables 11.2 and 11.3 below provides a summary of the rehabilitation and project maintenance activities proposed by JPS.

Table 11.2: Rehabilitation Activities

Rehabilitation Activities					
Generation	**2023**	**2024**	**2025**	**2026**	**Total**
	US$'000'	**US$'000'**	**US$'000'**	**US$'000'**	**US$'000'**
Rockfort MOH- RF1	3,363				3,363
Rockfort MOH- RF2	150	4,028			4,178
Hunts Bay GT 5 HGPI	300	2,270			2,570
Hunts Bay GT 10	-				-
Bogue GT 3 HGPI	2,050				2,050
Bogue GT 6 GGOH	1,500				1,500
Bogue GT 7					-
Bogue GT 9					-
Bogue GT HIS & CCR	(2,700)				(2,700)
Total	**4,663**	**6,298**	**-**	**-**	**1 0,961**

Table 11.3: Project Maintenance Activities

	2023	**2024**	**2025**	**2026**	**Total**
Maintenance Activities	**US$000**	**US$000**	**US$000**	**US$000**	**US$000**
Rockfort MOH- RF1	367	261			628
Rockfort MOH- RF2	239	351			590
Hunts Bay GT 5	106	46			152
Hunts Bay GT 10	310	45			355
Bogue GT 3		50			50
Bogue GT 6		80			80
Bogue GT 7		80			80
Bogue GT 9		80			80
Total	**1,022**	**993**	**0**	**0**	**2,015**

12.3 Extraordinary Rate Review Projects Objectives and Strategy

12.3.1 JPS outlined that the objectives of its generation extraordinary maintenance programme are geared towards improving and maintaining the reliable and efficient operations of its generating assets. The submission takes into consideration the fact that the assets were initially scheduled for retirement by 2023, but now will be required to operate until 2026. JPS proposed strategy to achieve the stated objective is to undertake targeted maintenance initiatives and programmes to extend the lives of the assets.

12.3.2 To support the Extra-ordinary Rate Review submission, JPS provided the additional documentation including the relevant business cases for the units proposed for rehabilitation.

12.3.3 Further, give the scope of the projects, the OUR requested and received the following information regarding;

a. The letter of Notification dated 2022 February 3 (Right of First Refusal) to replace 171.5 MW of retiring Generation Capacity.
b. JPS's Comments and Responses to the Office of Utilities Regulation *2022 Annual Tariff Adjustment Application & Extraordinary Rate Review - Additional data requirement Request*

12.4 JPS's Requests

12.4.1 JPS indicated that pursuant to the OUR's approval in 2021 for the installation of 40 MVar of capacitor banks at selected corporate area substations and the Hot Gas Path Inspection of Hunts Bay GT 10, the Extra-ordinary Rate Review application is for the commensurate incremental revenue requirements.

12.4.2 With regard to JPS's extraordinary maintenance project, the company has stated that it is seeking the OUR's approval for the alignment on cost recovery with the additional capital expenditure to maintain existing generating units until the new 171.5MW replacement generation capacity enters service. These units form a part of the sets originally slated for retirement in 2023. However, given the proximity of the retirement date and the impracticality of replacing 171.5MW by that time, the retirement date has now been revised to 2026 under the revised Minister's Retirement Schedule. In summary, the following is being sought:

1. Approval for US$12.98 M in additional capex to:

    a. Carry out additional maintenance activities (projects) which JPS stated will be done before July 2024. The projected capex expenditure is US$10.96M. Secure an expedited approval for Rockfort 1 major overhaul which JPS asserted is due in January 2023.
    b. Procure additional critical spares in line with life extension of the identified units. The projected cost is US$2.015M.

2. Agreement on cost recovery for additional capex for:

    a. The detail costing of the project to be executed in 2023 in an Extra-ordinary Rate Review filing in 2023 to recover those costs; and
    b. Other projects scheduled to occur in 2024 would be included in the 5-year Rate Review filing for 2024 to 2029.

12.4.3 JPS has noted that the amount of US$12.98M includes an offset of US$2.7M. JPS explained that the total amount is actually US$15.68M, however, US$2.70 M was already approved for GT11 and thus, US$12.98M of additional capex is required.

12.5 OUR's Assessment of the Extra-ordinary Rate Review Projects

Assessment Methodology

12.5.1 In assessing JPS's proposals, the OUR examined the submissions to ensure that the application met the threshold set out in paragraphs 59-61 of Schedule 3 of the Licence; the information provided was consistent with requirements outlined in the Final Criteria (GUIDELINES FOR REVIEWING PROPOSED PROJECTS IN THE BUSINESS PLAN) and with the requirements of CRITERIA: SUPPORTING DOCUMENTS. The project information was checked for completeness, accuracy, reasonableness of costs, schedule, the economic feasibility of the project and the project's ability to deliver on the proposed objectives.

12.5.2 The OUR in carrying out its assessment examined the following attributes of each project:

- Minimizing unscheduled maintenance
- Avoiding catastrophic failures
- Maintaining an adequate level of service.
- Assuring the safety of the users, utility employees and the public
- Minimize systematic risks and vulnerabilities
- Equipment Life cycle costs

12.6 OUR's Assessment of Extraordinary Submissions

OUR's Assessment of Projects Submissions Conformity to Licence 2016 Provisions

40 Mvar Capacitor Bank installation and Hunts Bay GT 10 HGPI

12.6.1 JPS justified these extraordinary rate review projects on the basis that upon the retirement of the Hunt's Bay B6 Unit, the anticipated impact on the load centres in the Corporate Area Energy System (CAES), as well as the projected increased operation of GT10, makes the intervention necessary. In this regard, JPS requested the OUR's approval of proposed project solutions for reactive power support, to ensure grid stability in the system, given the generation-load imbalance in the CAES.

12.6.2 These projects were previously assessed and approved, subject to JPS submitting the requested information detailed in the OUR's assessment report, "Evaluation of JPS' Projects Proposal: Corporate Area Bulk Capacitor Bank & Hunts Bay GT10 Hot Gas Path Inspection 2021".

12.6.3 The OUR is satisfied that consequent on: the retirement of the Hunts Bay 68.5 MW B6 unit: the postponement of the retirement of the units under the Minister's Retirement Schedule, including GT 10, and the expiration of the 60 MW JPPC unit's renewed PPA in 2025, an extraordinary situation exists to warrant the submission of these projects under the Extraordinary Rate Review provisions of the Licence 2016.

North East Coast Voltage Security Improvement project 2022/2023

12.6.4 This project was submitted as part of JPS capital projects submission in the 2019-2024 Rate Review Application, but was not approved, as the OUR was not satisfied that the scope submitted at the time provided the solution to the voltage problems being experience in the North East Coast area of the system. After considering the OUR suggestions, JPS submitted a re-scoped project in the 2021 Annual Review. The project was however, not reviewed by the OUR at that point since it should have been submitted for an extraordinary rate review.

12.6.5 The OUR recognizes that there is a persistent voltage stability and reliability issues that is experienced on the North East coast of the island due to the low level of generation on the north coast, and the impending retirement of the Bogue peaking plants. Considering these circumstances, the OUR is satisfied that an extraordinary circumstance now exists that warrants the submission of this project under the Extraordinary Rate Review provisions of the Licence 2016.

Maintenance of Generating Units' Package

12.6.6 JPS requested capital expenditure to maintain existing generating units (Rockfort unit#1, Rockfort unit #2, Hunts Bay GT5, Bogue GT3, Bogue GT6 and GT11) until the new 171.5MW replacement generation capacity enters service.

12.6.7 The OUR is satisfied after due consideration of the original retirement dates, the lead time for new replacement capacity, and given the absence of a plausible timetable for the replacement capacity, it is clear that the commissioning date previously established for the identified replacement capacity is no longer achievable. The OUR is also mindful of the significant technical challenges of meeting system demand on the retirement of the 171.5 MW before the Commercial Operations Date (COD) of the replacement capacity, and the potential of significant technical and economic challenges of having adequate generating capacity to meet consumers' demand.

12.6.8 In light of the this, the OUR is of the view that the projects submitted is in keeping with the Extraordinary Rate Review provisions of the Licence 2016.

12.7 Extraordinary Maintenance of Generating Units Project Submission Status

12.7.1 The status of the project components submitted for each of the generation project is shown in Table 11.4 below.

Table 11.4: Status of Extraordinary Project Components

Item	Submission	Status of Submission						
		RFT 1 OH	RFT 2 OH	HB GT 5 OH	HB GT 10 OH	GT3 HGPI	GT6,7,9 Rehab	NE Cost Voltage Security
1	Description of Facilities	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Project Specification and Design	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Project Site Description and layout	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Implementation Schedule and Project Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Project Cost Estimate	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	Project Benefits	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	Project Evaluation Models	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Project Risk Assessments	Yes	Yes	Yes	Yes	Yes	Yes	Yes

OH- Overhaul, HGPI – Hot Gas Path Inspection

Table 11.5 below shows the costing methodology presented by JPS in developing projects' capital expenditure.

Table 11.5: Project Costing Methodology

Costing methodology	Equipment quantities, unit prices and labour resources were estimated based on the following: 1. Expert judgement: Subject matter experts estimates and engineers' estimates 2. Historical data 3. competitive Bidding 4. Project documents from past projects of similar nature: budget sheet templates, 5. Proposal from suppliers 6. Labour rates for JPS staff

12.8 Project Risk Assessment and Risk Mitigation Strategies

12.8.1 JPS also submitted a project risk analysis for the execution of the maintenance project. This included the following assessment and mitigation measures (see Tables 11.6 and 11.7 below).

Table 11.6: JPS Project Risk Analysis Considerations

Potential Risks	• External activities extending the critical path of the Outage • Delay in the shipment and Delivery of Materials and Tool • Inadequate Technical Support and documentation required for Outage Activities • Inadequate Tools for the Execution of Outage Activities • Premature Failure of Generating Unit during Commissioning • Poor Communication Plan

Table 11.7: JPS Project risk Mitigation Strategies

Mitigation Strategies	• Define a detail scope and maintain the critical path for the Outage. Provide a detail outline of all materials required which includes quantity, and organize with the relevant personnel and third party in regards to notification of items for shipment and the readiness • Execution of the specified OEM Maintenance Programs as outlined in the problem statement • Perform the necessary evaluation based on the feedback attain from the prospective External Support in order to determine best candidate for the execution of the Project Activities • Ensure the necessary Project Planning is carried out and the required resources are allocated for the execution of the specified OEM Maintenance Programs • Conduct routine pre-outage meeting prior to the beginning of the project and host daily outage meeting with the dissemination of daily status reports to inform the relevant Stakeholders about the status of the project. Develop Communication Plan and disseminate to the relevant task holders

12.9 Specific Projects' Assessments

Justification of Generating Plant Maintenance Packages

12.9.1 The 2019 Minister's Retirement Schedule mandated that 171.5MW of existing generating plant capacity be replaced with new capacity by 2023. However, the requisite Letter of Notification (LON) from MSET authorizing the commencement of the process was only issued on 2022 February 3. Consequently, JPS has projected the COD of the new

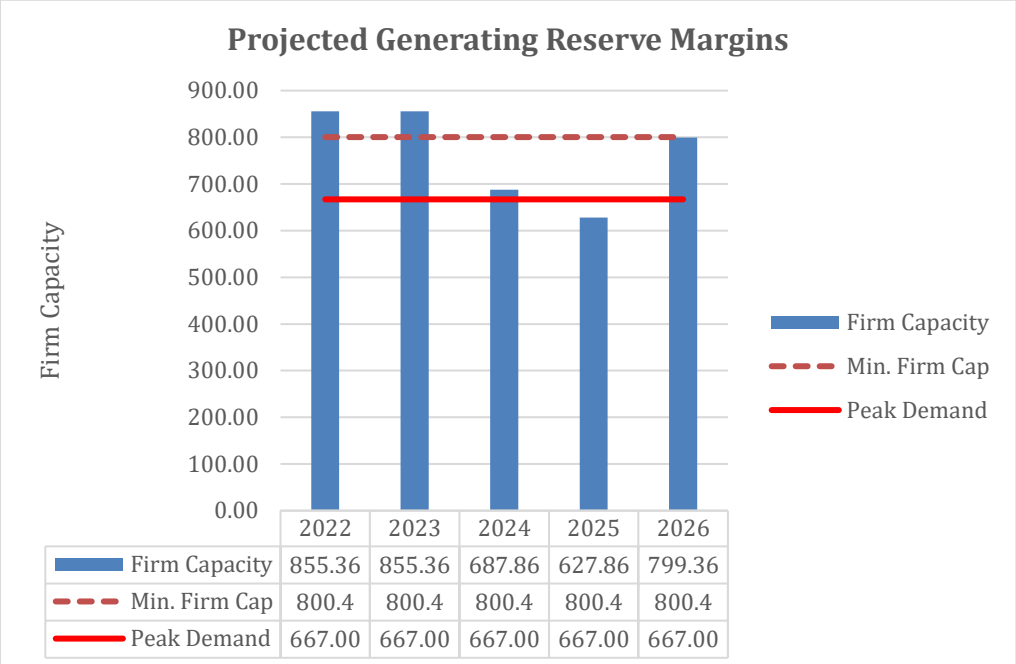
replacement 171.5 MW capacity in Q1 2026. The pending expiration of the 60 MW JPPC PPA in 2025, and the lack of clear guidance from the IRP, is also a matter of concern for the OUR as this could have a negative impact on the system generation capability and reliability.

Notably, the OUR received a letter dated 2022 July 4 from MSET seeking its 'no objection' to a request from JPS dated 2022 March 31 for an extension of the retirement dates from 2023 to 2026. The OUR, after due consideration of the retirement dates and the risk of retiring the 171.5 MW of plant before the COD of the replacement capacity on the electricity sector and the economy, gave its 'no objection' to the proposed new retirement dates as detailed in the revised schedule in Table 11.7 below.

Table 11.7: Minister's Retirement Schedule

Unit	Location	Capacity (MW)	Existing Retirement Date	Proposed New Retirement Date
Rockfort Unit #1	Rockfort, Kingston	20	2023	2026
Rockfort Unit #2	Rockfort, Kingston	20	2023	2026
GT#5	Hunts Bay, Kingston	21.5	2023	2026
GT#10	Hunts Bay, Kingston	32.5	2023	2026
GT#3	Bogue, Montego Bay	21.5	2023	2026
GT#6	Bogue, Montego Bay	18	2023	2026
GT#7	Bogue, Montego Bay	18	2023	2026
GT#9	Bogue, Montego Bay	20	2023	2026
Total		**171.5**		

Table 11.7: Projected Generating System Reserve Margin Analysis



	2022	2023	2024	2025	2026
Firm Capacity	855.36	855.36	687.86	627.86	799.36
Min. Firm Cap	800.4	800.4	800.4	800.4	800.4
Peak Demand	667.00	667.00	667.00	667.00	667.00

12.9.2 Table 11.8 below shows the system reliability analyses outcome based on the loss of load probability assessment and the resulting energy not supplied (load shedding) and the economic cost to the society.

12.9.3 The cost of unserved energy, based on a study carried by JPS, was provided. This was US$4.77/kWh, where the cost of unserved energy is the cost to the economy of not supplying to the consumers that incremental energy when required.

Table 11.8: Generating System Reliability and Energy Not Served

Year	Net Generation GWh	Load Shed KWh	Cost of load shed (US$000)	Reliability Index %
2024	4,386	12,478,000	59,518	4.975
2023	4,407	453,000	2,162	0.205

12.9.4 The OUR's analysis of the system reserve margin before and after the initial proposed retirement date shows that if the plants are retired at end of 2023, the resulting system firm capacity of 627.86 MW would be well below the required minimum firm capacity of 800.4 MW necessary to achieve the minimum reserve margin criterion of 20%. The implications

of this would be a severe restriction to meet system demand, with the consequences of inadequate spare capacity to allow timely maintenance of units.

12.9.5 Based on the above analysis, it is critical that the generating units originally slated for retirement in 2023 be life extended to 2026 or be aligned to the COD of the replacement capacity.

12.10 Assessment of Status of Existing Generating System

12.10.1 As at 2022 March 31, the total installed generation capacity is approximately 1,043 MW, located at seven major generating stations locations across the island. JPS currently owns and operates ten (10) thermal power generating units at three sites (Rockfort, Hunts Bay, Bogue) as well as six (6) hydro-electric plants each separately located across the island. The peak demand hovers at approximately 667 MW.

12.10.2 Key to assessing the proposed maintenance requirement is the current status of the generating assets selected for extraordinary maintenance activities.

12.10.3 JPS stated in the submission that a key element of this programme is an "Asset Health Indexing" (AHI) methodology, which is one of the new approaches used by asset owners in the utility industry to assess the operational status of their assets. Based on this methodology, JPS classified its generating assets according the "Asset health index rubric as detailed in Table 11.9 below.

Table 11.9: JPS's Asset Health Index Rubric

JPS's Asset Health Index Rubric		
	Excellent **86-100%**	Asset is in new or recently rehabilitated
	Good **71-85%**	Asset is no longer new but is fulfilling its function. Preventative maintenance is beneficial
	Fair **51-70%**	Deterioration is evident but asset continues to fulfil its function. Preventative maintenance is beneficial
	Poor **31-50%**	Significant deterioration is evident, and service is at risk
	Very Poor **0-30%**	Asset is beyond expected life and has deteriorated to the point that it may no longer be fit to fulfil its function

12.10.4 Based on the AHI methodology, JPS assessed the condition of the operating assets proposed for life-extension and rehabilitation (see Table 11.10 below).

Table 11.10: Asset Health Index of Units

Generating Unit	Transformer	Generator	Turbine	Controls	Auxiliaries	Gas Generators	Barge Structure	Asset Health
Rockfort - RF1	64%	62%	n/a	70%	78%	n/a	67%	70%
Rockfort - RF2	70%	69%	n/a	75%	77%	n/a	67%	76%
Hunts Bay GT 10	64%	54%	50%	60%	50%	n/a	n/a	56%
Hunts Bay GT 5	72%	63%	60%	60%	60%	n/a	n/a	63%
Bogue GT 3	80%	57%	60%	60%	75%	n/a	n/a	66%
Bogue GT 6	60%	53%	53%	40%	53%	33%	n/a	49%
Bogue GT 7	68%	73%	87%	40%	85%	93%	n/a	74%
Bogue GT 9	60%	57%	67%	40%	65%	60%	n/a	58%

12.10.5 The AHI indicated that of the eight units (all with 2023 retirement date), which merit consideration for rehabilitation works, two were in good condition, five were in fair condition, and one was deemed to be in poor condition. More specifically:

- **Hunts Bay Units GT 5 and GT 10:** Assessed as fair with AHI of 56% and 63% respectively.
- **Rockfort slow speed Diesel units 1 and 2:** The Rockfort **Diesel plant** consists of two 20 MW slow speed Diesel engines utilizing heavy fuel oil (HFO).Unit 1 assessed as fair **(70%)**, and unit 2 as good (76%).
- **Bogue Fast Starting Gas Turbine GT 3:**This unit is an industrial frame gas turbine and provides peaking service and grid reliability. Based on the AHI of 66% the unit condition is classified as fair.
- **Bogue Fast Starting Gas Turbine GT 6, 7, 9:**These units, which are aero-derivative gas turbines, provide fast start peaking service and grid reliability. GT 6 AHI is classified as **poor (49%)** with the most significant impairments being the gas generator defects and obsolete control systems. Gas Turbines overall condition based on the index is good (74%). GT 9 is fair with an AHI of 58%. Both GT7 & GT9 have obsolete control systems.

12.11 Assessment of Extraordinary Generating Plant Maintenance Project

12.11.1 The details of the OUR's assessment of the extraordinary generation maintenance project are set out in Annex 2. However, approval has been given for the requested work to be done on all the units identified by JPS. The total capital expenditure approved amounts to US$12.98M for which $10.96M and US$2.02 have been assigned to rehabilitation and maintenance respectively. The expenditures for each unit involved in relation to rehabilitation and maintenance are provided in Tables 11.11 and 11.12 below.

Table 11.11: Rehabilitation Activities

Rehabilitation Activities					
Generation	2023	2024	2025	2026	Total
	US$'000'	US$'000'	US$'000'	US$'000'	US$'000'
Rockfort MOH- RF1	3,363				3,363
Rockfort MOH- RF2	150	4,028			4,178
Hunts Bay GT 5 HGPI	300	2,270			2,570
Hunts Bay GT 10	-				-
Bogue GT 3 HGPI	2,050				2,050
Bogue GT 6 GGOH	1,500				1,500
Bogue GT 7					-
Bogue GT 9					-
Bogue GT HIS & CCR	(2,700)				(2,700)
Total	**4,663**	**6,298**	**-**	**-**	**1 0,961**

Table 11.12: Project Maintenance Activities

	2023	2024	2025	2026	Total
Maintenance Activities	US$000	US$000	US$000	US$000	US$000
Rockfort MOH- RF1	367	261			628
Rockfort MOH- RF2	239	351			590
Hunts Bay GT 5	106	46			152
Hunts Bay GT 10	310	45			355
Bogue GT 3		50			50
Bogue GT 6		80			80
Bogue GT 7		80			80
Bogue GT 9		80			80
Total	**1,022**	**993**	**0**	**0**	**2,015**

12.12 Corporate Area Bulk Capacitor Bank Installation & Hunts Bay GT10 Hot Gas Path Inspection 2021

12.12.1 The Minister's Retirement Schedule mandated the retirement of the aged and inefficient generating plants in two phases over the 2019-2023 period. Consequently, the Hunts Bay B6 68.5 MW unit was retired from service at 2020 December 31, after over 44 years of commercial operation. The corporate area energy system (CAES) is the country's largest load centre, accounting for approximately 270 MW or 41% of total system peak demand of 667 MW. The HB B6 unit when in operation supplied approximately 25% of the CAES demand, hence its retirement exacerbated the generation imbalance in the CAES.

12.12.2 JPS had expressed concerns to the OUR that until the planned Old Harbour to Hunts Bay 138 kV transmission line is commissioned in 2023, the retirement of the HB B6 unit will negatively impact the generation/load balance in the CAES, and will expose the electricity grid to security problems and operational constraints.

12.12.3 Consequently, in 2020 December, JPS submitted, a project proposal document entitled, "**Corporate Area Bulk Capacitor Bank & Hunts Bay GT10 Hot Gas Path Inspection 2021**" dated 2020 December 22 ('the Proposal"). In its Proposal, JPS set out short to medium term project solutions to address the operating concerns. The company also requested OUR's approval to undertake the required capital investments to implement the projects. The proposed projects scope and investment included:

1. Installing and commissioning of 30 MVAR of new capacitor banks and restoring of 10 MVAR of existing capacitor banks in the CAES substations (S/S). JPS proposed capital investment outlay of US$1,337,558 to carry out this project, within 12 months.
2. Hot Gas Path Inspection of the 32.5 MW GT 10 Gas Turbine located at the Hunts Bay power station to include the rehabilitation and replacement of critical components of the gas turbine. The projected capital investment required to undertake this activity is US$2,429,900.

12.12.4 The OUR had carried out technical and economic evaluations of JPS's project proposal to verify the technical and economic bases for JPS's assertions regarding the impacts of the proposed projects on the CAES operation, as well as to validate the efficacy of the proposed projects in mitigating these impacts.

12.12.5 These projects were submitted in the 2022 Review as Extra-ordinary Rate Review projects. The OUR notes that an amount of US$429,900 was already approved by the OUR to carry out a combustion inspection (CI) of the unit. JPS in this Extra-ordinary Rate Review requested approval of the balance of US$2,000,000. JPS estimated the project duration to be 23 days.

Project Name	**Installation of 40 MVAR of Bulk Capacitor Banks**
Technical Justification	The Corporate Area comprising substations east of Duhaney shown in Figure 2 is the largest load center in Jamaica, accounting for over 40 percent of total system demand, and having great potential for growth and development. The weekday day peak demand has the largest corporate area real power import and reactive demand thus making this period vulnerable to voltage violations and voltage instability. These vulnerabilities to voltage violations and voltage instability are expected to be compounded due to the decommissioning of Hunt's Bay B6 (68.5 MW) at the end of 2020. To provide reactive power support to the Corporate Area in light of the decommissioning of Hunt's Bay B6, a total installed capacity of 40 MVAR of capacitor banks is required by the year 2021. The 40 MVAR capacity will consist of 30 MVAR of new capacitor banks and the restoration of 10 MVAR of existing capacitor banks at the substation medium voltage level.
Scale and Scope	Area and Scope: Six (6) New Capacitor Banks Each Rated at 5.0 MVAR each interconnected to the 13.8 kV & 24 kV distribution busbars at the following substation locations: Greenwich Road T2, Hope T1, Hunt's Bay T3, Rockfort T1, Three Miles T1, Washington Boulevard T2. Restoration of Two (2) Capacitor Banks Each Rated at 5.0 MVAR each interconnected to the 24 kV distribution busbars at the following substation locations: Constant Spring T1 and Washington Boulevard T2.
Timing	Project duration: 12 Months Start date: January 2021 End date: December 2021
Technical characteristics	This project involves the design, installation and commissioning of 5.0 MVAR Open-Air Capacitor and/or Metal Enclosed Capacitor Banks (based on evaluation of quotes provided by Suppliers through RFQ) in JPS substations interconnected to the 13.8/24 kV distribution bus. These installations are similar to a number of capacitor banks already installed across JPS substations such as at Hunt's Bay, Up Park Camp, Orange Bay and Cardiff Hall.

Project Site

Location	13.8 kV Busbars at the Following Substations: Three Miles T1, Hunt's Bay T3. 24 kV Busbars at the Following Substations: Greenwich Road T2, Hope T1, Rockfort T1, Washington Boulevard T2, Constant Spring T1 and Washington Boulevard T2.

Project Cost Estimate

Key Resources	JPS Engineering and procurement services, third party contractors.
Total Cost	US$1,337,558
Costing methodology	Budgetary quotes were requested from three (3) suppliers and compared to develop the cost for the overseas components. These includes the capacitor banks components, switches, circuit breaker and all support equipment. The cost of the labour was derived from recent estimates JPS received to complete works associated with the third-party contractors and internal labour rates for the other labour items.

Project Benefits

Benefits	Lower Capacity Factors for Hunt's Bays GTs 5 & 10 • Lower Transmission Technical Losses by 0.014% • Improve Corporate Area Bus Voltages by 2% • Avoided Annual Energy Consumption of 33 MWh from the hybrid energy storage system (HESS).

Project Risks

Potential Risks	Expensive Hunt's Bay GT 5 & 10 and Hybrid Energy Storage System (HESS) must be dispatched to solve voltage constraints in the corporate area. Increased Fuel & IPP charges to JPS customers. Possibility of voltage instability with increasing load and continued generation constraints.
Mitigation Strategies	Security Dispatch Hunt's Bay GT 5 & 10 and Hybrid Energy Storage System (HESS) to solve voltage constraints in the corporate area.

OUR Comments

12.12.6 The retirement of the HB B6 unit has resulted in a net loss of reactive power generation of approximately 58 MVAR in the CAES. Based on system performance simulation assessments, the OUR is of the view that the grid security concerns of JPS are well founded and credible. The system simulation analyses have shown that the majority of substations in the corporate area will experience low voltages under credible contingency conditions. In order to improve system reliability and reduce load shedding, the analyses have shown

that it is necessary to install reactive power sources to correct the low voltages experienced under contingency conditions.

12.12.7 Further to a request for further information, JPS in addition to its Extraordinary Rate Review Submission provided the following:

a. A planned maintenance programme for the existing bulk capacitor banks in the system, and the proposed capacitor banks.
b. The rationale for not considering installing new capacitor banks at Lyssons substation.
c. The Technical Standards to which the equipment and construction would be carried out, as is required by the Electricity Sector Codes.

12.12.8 The OUR, based on the outcome of the project's evaluation carried out, takes the view that a 'no objection' be given to JPS for the implementation of the **40 MVAR bulk capacitor bank project at an investment cost of US$ 1,337,558 costs.**

Hunts Bay GT 10 Hot Gas Path Inspection Project

12.12.9 JPS has proposed to carry out Hot Gas Path Inspection the 32.5 MW GT 10 Gas Turbine located at the Hunts Bay Power Station, under the Extraordinary Rate Review provision of the Licence 2016.

OUR's Assessment of Hunts Bay GT 10 Hot Gas Path Inspection Project

12.12.10 The OUR has conducted detailed evaluation of JPS's Hot Gas Path project proposal to verify the technical and economic viability of the project and is satisfied that the project continues to be relevant, viable and justified.

12.12.11 The OUR has since received in the JPS Extraordinary Rate Review submission the GT 10 Asset Health Index previously requested as a condition for its "No Objection" to the implementation of the project.

Project: North East Coast Voltage Security Improvement Project

12.12.12 The details of this project are provided below:

Justification	The North East Coast of Jamaica (substations east of Duncans to Port Antonio) is a large load center in the island with a significant generation-load imbalance capacity. Due to the configuration of the network and minimal injection of real and reactive power for that section of the island, there exists voltage security issues due to the N-1 of the following transmission elements: (1) Bellevue T1 40/60 MVA inter-bus transformer (2) Bellevue – Lower White River 69 kV line (3) Duncans – Cardiff Hall 69 kV line and (4) Ocho Rios – Lower River 69 kV line. In the JPS 2019-2023 transmission system capital investment plan, JPS submitted a proposal for the construction of a new Bellevue – Roaring 69 kV line at an estimated cost of US$ 6,759,092 to alleviate the N-1 contingencies with the "Bellevue – LWR 69 kV line and the Duncans – Rio Bueno 69 kV line." This submission was rejected by the OUR based on its relative ineffectiveness as a complete solution as the proposed line "will not be able to address an outage of the Bellevue substation inter-bus transformer, which is the worst outage contingency in that area." Based on the OUR's assessment, they recommended a second 40/60 MVA inter-bus transformer at the Bellevue substation at an estimated cost of US$ 2,600,000 as an alternative for JPS to explore. JPS in its review of the OUR's proposal and its analyses for the North East Coast of the island, notes the following: ○ JPS agrees with the OUR that the most significant voltage contingency and security event is the loss of the existing Bellevue T1 40/60 MVA inter-bus transformer. JPS agrees a second inter-bus transformer is required at the Bellevue station and in its review is recommending a second 60/80 MVA inter-bus transformer instead of the 40/60 MVA recommended by the OUR to account for the thermal loading under normal and contingency situations for the normal lifetime of 25 years of the asset and the possible extended lifetime of 50 years. ○ Even with the second inter-bus transformer at Bellevue installed, there would still exist 69 kV line contingencies of the Bellevue – Lower White River, Duncans – Cardiff Hall and Ocho Rios – Lower White River 69 kV lines which would lead to N-1 voltage violations. JPS in its review recommends a combination of 20 MVAR of new capacitor banks and the upgrade to 10 MVAR of existing capacitor banks at the substation medium voltage level (24 kV) at the Ocho Rios, Roaring River and Cardiff Hall substations as the least cost solution to mitigate these line contingencies. ○ Based on JPS review, the optimal solution set for a complete solution along the North East Coast would be the installation of a new additional 60/80 MVA inter-bus transformer at the Bellevue

<table>
<tr><td></td><td>Substation along with the installation of 30 MVAR of capacitor banks. A comparison of the solutions is highlighted below:
<table>
<tr><th>Solution</th><th>Cost (US$)</th><th>Effect</th><th>Comment</th></tr>
<tr><td>Installation of a second 60/80 MVA Inter-bus Transformer at Bellevue Substation + 30 MVAR of capacitor banks</td><td>6,078,230</td><td>Alleviates the N-1 of the existing Bellevue T1 40/60 MVA inter-bus transformer and 69 kV line contingencies along the north east coast</td><td>Complete solution to solve for both Bellevue T1 inter-bus and 69 kV line contingencies.

New proposal made by JPS.</td></tr>
</table></td></tr>
<tr><td>Scale and Scope</td><td>Segment: Energy Delivery (Substation, T&D)
Area and Scope:
One (1) New 60/80 MVA 69/138 kV Inter-bus Transformer at the Bellevue Substation
This transformer will be installed as a new additional transformer to supplement the existing Bellevue T1 40/60 MVA
Four (4) New Capacitor Banks Each Rated at 5.0 MVAR each interconnected to the 24 kV distribution busbars at the following substation locations.
Roaring River T1 (2 x 5.0 MVAR), Ocho Rios T1 (2 x 5.0 MVAR)
Upgrade of Two (2) Existing Capacitor Banks Each Rated at 5.0 MVAR each interconnected to the 24 kV distribution busbars at the following substation locations:
Cardiff Hall T1 (2 x 5.0 MVAR)</td></tr>
<tr><td>Timing</td><td>Project duration: 15 Months
Start date: January 2022
End date: March 2023</td></tr>
<tr><td>Technical characteristics</td><td>Technological solution proposed:
This project consists of two (2) main initiatives:
1. Inter-bus Transformer Installation and Commissioning
Design, installation, and commissioning of a new 60/80 MVA 69/138 kV Inter-bus Transformer at the Bellevue Substation. This installation is like the recently installed Duncans T4 inter-bus transformer.
Major systems and equipment involved:
Rated: 60/80 MVA
Voltage: 69/138 kV
Type: Power Transformer
Frequency: 50 Hz

2. Capacitor Bank Installation and Commissioning</td></tr>
</table>

	Design, installation, and commissioning of 5.0 MVAR Open-Air Capacitor and/or Metal Enclosed Capacitor Banks (based on evaluation of quotes provided by Suppliers through RFQ) in JPS substations interconnected to the 24 kV distribution bus. These installations are similar to a number of capacitor banks installed across JPS substations such as at Hunt's Bay, Up Park Camp, and Orange Bay.

Implementation Schedule

Key Milestones	Total duration: 15 months Pre-construction phase: starts on January 2022 and finishes on March 2022. . Construction phase: starts on April 2022 and finishes on February 2023. Testing and Commissioning: starts on December 2022 and finishes on March 2023

Benefits	• Lower Transmission Technical Losses by 0.05% • Improve North East Coast Voltages by 2% • Prevent N-1 voltage contingencies • Prevent load shedding of several thousand customers for N-1 of Bellevue T1 Inter-bus, Bellevue - Lower White River 69 kV line and Ocho Rios – Lower White River 69 kV line.
Quantification of Benefits	Reference 'Grid Study – North East Coast Voltage Security Improvement.pdf' Document No. NECVS-01

12.12.13 The OUR has assessed the project proposal and grid analyses studies submitted and is satisfied that the objectives of the project will be met on successful execution of the project.

12.13 Findings and Conclusions

1. Extraordinary Rate Review projects' capital investment of US$22.498M is required to facilitate the life extension of generation assets originally earmarked from retirement in 2023 along with other projects to improve the stability and reliability of grid. The details of the projects and the associated costs are set out in Table 11.13 below.
2. JPS sought to justify the implementation of the generation life-extension project mainly on the basis that it is necessary in order to avoid large scale load shedding and the consequence of the economic costs. The OUR analyses have supported this viewpoint. It is estimated that the avoidance of widespread load shedding due to shortage of generating capacity, voltage instability and the consequential economic loss to the society estimated at US$59.5M annually.

3. The generating units will be subjected to capital maintenance initiatives over the period to sustain the assets' operating reliability until replacement generating unit is available for commercial operations.
4. The OUR is concerned that in the absence of a duly completed IRP, it is not aware of provisions in place by JPS to plan for the replacement of the retired capacity on a timely basis in order to meet the expected COD of the 171.5 MW replacement plant.
5. The installation of capacitor banks in the CAES and on the North Eastern region of the island will ensure voltage stability and quality of supply. The installation of 60 MVA transformer at the Bellevue s/s is required to maintain supply reliability in contingency cases, e.g. loss of a transmission system elements. The approved cost of this project is $6.2M.
6. The proposed maintenance activities should reduce the risk of forced outage due to premature and costly failures or catastrophic damages. Adherence to the OEM maintenance schedule will help to preserve the equipment technical useful life, fewer outages and shorter periods of downtime.
7. JPS had expectation that, at least, some of these projects would have triggered an adjustment to the 2022 revenue requirement. However, to facilitate the proper realignment of JPS's cumulative capital projects with the regulatory rate base these adjustments will be done in the 2023 Annual Review.

Table 11.13: Power Delivery Extraordinary Rate Review Project

	2023	2024	2025	2026	Total
Project Description	**US$000**	**US$000**	**US$000**	**US$000**	**US$000**
Generating Plants Rehabilitation	4,663	6,298	-	-	10,961
Generation Plants Extra-ordinary maintenance	1,022	993	-	-	2,015
Sub-total	**5,685**	**7,291**	**0**	**0**	**12,976**
Corporate Area 40 Mvar capacitor banks installation	1,340				1,340
Hot Gas Path GT10	2,000				2,000
North East Coast Voltage Security Improvement project 2022/2023	6,182				6,182
Total	**7,522**				**22,498**

Determination 11

The OUR has assessed JPS's Extraordinary Rate Review application and has weighed the circumstances that triggered the company's submissions for four (4) distinct projects. Arising from this evaluation, the Office has determined that:

a) JPS shall be allowed additional capital expenditure amounting to US$22.498M, not originally approved in the 2019-2024 Rate Review Determination Notice. The approved projects and the associated allocated sums are as follows:

- Generation plant life-extension project –US$12.98M
- GT hot gas path project – US$2.00M
- Corporate Area 40 Mvar capacitor bank project – US$1.34M
- North East Coast Voltage Security Improvement project – US$6.182M

b) To facilitate a proper alignment of these newly approved projects with the rate base the associated capital adjustments shall be reflected in the approved revenue requirement in 2023.

c) JPS shall be allowed be required to provide quarterly reports on the expenditure and progress of the approved projects.

13 ANNEX 1

5.1 US and Jamaican Consumer Price Indices

5.1.1 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											

Source: United States Department of Labour Bureau of Labor Statistics

5.1.2 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	**120.50**									

Source: https://statinja.gov.jm/Trade-Econ%20Statistics/CPI/NewCPI.aspx

5.2 Estimated Bill Impact of OUR's Approved Annual Tariff Adjustment

5.2.1 Bill Comparison for a Typical Rate 10 Consumer with consumption < 100 kW

Usage 90 kWh

Rate 10	July Bill			August Bill		Bill Impact	
Below 100 kWh	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
90		145.00	151.56	155.00	151.56		
	Usage kWh	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
ENERGY							
Energy 1st	90	**7.32**	$ 658.80	**7.93**	$ 713.39	$ 54.59	8.29%
Energy Next	0	**21.03**	$ -	**22.76**	$ -	$ -	0.00%
Customer Charge		**531.93**	$ 531.93	**575.72**	$ 575.72	$ 43.79	8.23%
SUBTOTAL			**$ 1,190.73**		**$ 1,289.11**	**$ 98.38**	**8.26%**
FX Adjust		3.618%	$ 43.08	-1.777%	$ (22.90)	$ (65.98)	-153.16%
Fuel Charge	90	32.180	$ 2,896.23	32.180	$ 2,896.23	$ -	0.00%
IPP Variable Charge	90	13.629	$ 1,226.62	13.629	$ 1,226.62	$ -	0.00%
TOTAL ELECTRICITY CHARGES			**$ 5,356.66**		**$ 5,389.05**	**$ 32.39**	**0.60%**
G.C.T			Not Applicable		Not Applicable		
BILL TOTAL			**$ 5,356.66**		**$ 5,389.05**	**$ 32.39**	**0.60%**

5.2.2 Bill Comparison for a Typical Rate 10 Consumer with consumption 101kWh </= 150kWh

Usage 150 kWh

Rate 10	July Bill			August Bill		Bill Impact	
Above 100 but ≤ 150 kWh	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
150		145.00	151.56	155.00	151.56		
	Usage kWh	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
ENERGY							
Energy 1st	100	**7.32**	$ 732.00	**7.93**	$ 792.66	$ 60.66	8.29%
Energy Next	50	**21.03**	$ 1,051.50	**22.76**	$ 1,138.08	$ 86.58	0.00%
Customer Charge		**531.93**	$ 531.93	**575.72**	$ 575.72	$ 43.79	8.23%
SUBTOTAL			**$ 2,315.43**		**$ 2,506.45**	**$ 191.02**	**8.25%**
FX Adjust		3.618%	$ 83.78	-1.777%	$ (44.53)	$ (128.30)	-153.15%
Fuel Charge	150	32.180	$ 4,827.05	32.180	$ 4,827.05	$ -	0.00%
IPP Variable Charge	150	13.629	$ 2,044.36	13.629	$ 2,044.36	$ -	0.00%
TOTAL ELECTRICITY CHARGES			**$ 9,270.61**		**$ 9,333.33**	**$ 62.72**	**0.68%**
G.C.T			Not Applicable		Not Applicable		
BILL TOTAL			**$ 9,270.61**		**$ 9,333.33**	**$ 62.72**	**0.68%**

5.2.3 Bill Comparison for a Typical Rate 10 Consumer with consumption 150kWh and above

Usage 214 kWh

Rate 10	July Bill				August Bill			Bill Impact	
Above 150 kWh	2022 Current Rates				2022 Adjusted Rates				
Description		Base Exch. Rate	Billing F/X Rate		Base Exch. Rate	Billing F/X Rate		JMD Change	% Change
214		145.00	151.56		155.00	151.56			
	Usage kWh	Rate (J$)	Total (J$)		Rate (J$)	Total (J$)			
ENERGY									
Energy 1st	100	7.32	$ 732.00		7.93	$ 792.66		$ 60.66	8.29%
Energy Next	114	21.03	$ 2,397.42		22.76	$ 2,594.81		$ 197.39	0.00%
Customer Charge		531.93	$ 531.93		575.72	$ 575.72		$ 43.79	8.23%
SUBTOTAL			$ 3,661.35			$ 3,963.19		$ 301.84	8.24%
FX Adjust		3.618%	$ 132.48		-1.777%	$ (70.41)		$ (202.88)	-153.15%
Fuel Charge	214	32.180	$ 6,886.59		32.180	$ 6,886.59		$ -	0.00%
IPP Variable Charge	214	13.629	$ 2,916.62		13.629	$ 2,916.62		$ -	0.00%
TOTAL ELECTRICITY CHARGES			$ 13,597.03			$ 13,695.98		$ 98.96	0.73%
G.C.T			647.88			654.40			
BILL TOTAL			$ 14,244.91			$ 14,350.38		$ 105.48	0.74%

5.2.4 Bill Comparison for a Typical Rate 20 Consumer with consumption ≤ 100 kWh

Usage 90 kWh

Rate 20	July Bill				August Bill			Bill Impact	
	2022 Current Rates				2022 Adjusted Rates				
Description		Base Exch. Rate	Billing F/X Rate		Base Exch. Rate	Billing F/X Rate		JMD Change	% Change
90		145.00	151.56		155.00	151.56			
	Usage kWh	Rate (J$)	Total (J$)		Rate (J$)	Total (J$)			
Energy	90	9.03	$ 812.70		9.78	$ 879.92		$ 67.22	8.27%
Customer Charge		1,134.20	$ 1,134.20		1,227.56	$ 1,227.56		$ 93.36	8.23%
SUBTOTAL			$ 1,946.90			$ 2,107.47		$ 160.57	8.25%
FX Adjust		3.618%	$ 70.44		-1.777%	$ (37.44)		$ (107.88)	-153.15%
Fuel Charge	90	32.180	$ 2,896.23		32.180	$ 2,896.23		$ -	0.00%
IPP Variable Charge	90	20.698	$ 1,862.81		20.698	$ 1,862.81		$ -	0.00%
TOTAL ELECTRICITY CHARGES			$ 6,776.38			$ 6,829.07		$ 52.69	0.78%
G.C.T			1,016.46			1,024.36			
BILL TOTAL			$ 7,792.83			$ 7,853.43		$ 60.59	0.78%

5.2.5 Bill Comparison for a Typical Rate 20 Consumer with consumption 101kWh - 1000kWh

Usage 750 kWh

Rate 20	July Bill			August Bill		Bill Impact	
	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
750		145.00	151.56	155.00	151.56		
	Usage kWh	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
Energy	750	9.03	$ 6,772.50	9.78	$ 7,332.63	$ 560.13	8.27%
Customer Charge		1,134.20	$ 1,134.20	1,227.56	$ 1,227.56	$ 93.36	8.23%
SUBTOTAL			$ 7,906.70		$ 8,560.18	$ 653.48	8.26%
FX Adjust		3.618%	$ 286.08	-1.777%	$ (152.07)	$ (438.15)	-153.16%
Fuel Charge	750	32.180	$ 24,135.23	32.180	$ 24,135.23	$ -	0.00%
IPP Variable Charge	750	20.698	$ 15,523.38	20.698	$ 15,523.38	$ -	0.00%
TOTAL ELECTRICITY CHARGES			$ 47,851.40		$ 48,066.72	$ 215.33	0.45%
G.C.T			7,177.71		7,210.01		
BILL TOTAL			$ 55,029.11		$ 55,276.73	$ 247.63	0.45%

5.2.6 Bill Comparison for a Typical Rate 20 Consumer with consumption 1001kWh - 7500kWh

Usage 5000 kWh

Rate 20	July Bill			August Bill		Bill Impact	
	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
5000		145.00	151.56	155.00	151.56		
	Usage kWh	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
Energy	5000	9.03	$ 45,150.00	9.78	$ 48,884.17	$ 3,734.17	8.27%
Customer Charge		1,134.20	$ 1,134.20	1,227.56	$ 1,227.56	$ 93.36	8.23%
SUBTOTAL			$ 46,284.20		$ 50,111.73	$ 3,827.53	8.27%
FX Adjust		3.618%	$ 1,674.66	-1.777%	$ (890.24)	$ (2,564.90)	-153.16%
Fuel Charge	5000	32.180	$ 160,901.55	32.180	$ 160,901.55	$ -	0.00%
IPP Variable Charge	5000	20.698	$ 103,489.22	20.698	$ 103,489.22	$ -	0.00%
TOTAL ELECTRICITY CHARGES			$ 312,349.63		$ 313,612.25	$ 1,262.63	0.40%
G.C.T			46,852.44		47,041.84		
BILL TOTAL			$ 359,202.07		$ 360,654.09	$ 1,452.02	0.40%

5.2.7 Bill Comparison for a Typical Rate 40 (Std.) Consumer

Usage 34,417 kWh
Demand 117 kVA

Rate 40 LV (Std)	July Bill			August Bill		Bill Impact	
	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
34,417		145.00	151.56	155.00	151.56		
	Usage	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
Energy (kWh)	34417	**6.09**	$ 209,586.87	**6.59**	$ 226,838.25	$ 17,251.38	8.23%
Demand (kVa)	117	**2737.13**	$ 320,244.21	**2962.42**	$ 346,603.66	$ 26,359.45	8.23%
Customer Charge		**7,990.99**	$ 7,990.99	**8,648.74**	$ 8,648.74	$ 657.75	8.23%
SUBTOTAL			**$ 537,822.07**		**$ 582,090.65**	**$ 44,268.58**	**8.23%**
FX Adjust		3.618%	$ 19,459.52	-1.777%	$ (10,340.93)	$ (29,800.45)	-153.14%
Fuel Charge	34417	30.893	$ 1,063,247.74	30.893	$ 1,063,247.74	$ -	0.00%
IPP Variable Charge	34417	2.500	$ 86,037.77	2.500	$ 86,037.77	$ -	0.00%
IPP Fixed Charge	117	664.666	$ 77,765.94	664.666	$ 77,765.94	$ -	0.00%
TOTAL ELECTRICITY CHARGES			**$ 1,784,333.04**		**$ 1,798,801.18**	**$ 14,468.13**	**0.81%**
G.C.T			**267,649.96**		**269,820.18**		
BILL TOTAL			**$ 2,051,983.00**		**$ 2,068,621.36**	**$ 16,638.35**	**0.81%**

5.2.8 Bill Comparison for a Typical Rate 50 (Std.) Consumer

Usage 500,000 kWh
Demand 1500 kVA

Rate 50 MV (Std)	July Bill			August Bill		Bill Impact	
	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
11,748		145.00	151.56	155.00	151.56		
	Usage	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
Energy (kWh)	11748	**4.32**	$ 50,744.20	**4.67**	$ 54,921.02	$ 4,176.82	8.23%
Demand (kVa)	566.4	**1896.55**	$ 1,074,203.72	**2052.65**	$ 1,162,622.89	$ 88,419.17	8.23%
Customer Charge		**7,990.99**	$ 7,990.99	**8,648.74**	$ 8,648.74	$ 657.75	8.23%
SUBTOTAL			**$ 1,132,938.91**		**$ 1,226,192.65**	**$ 93,253.74**	**8.23%**
FX Adjust		3.618%	$ 40,992.07	-1.777%	$ (21,783.51)	$ (62,775.58)	-153.14%
Fuel Charge	11748	30.893	$ 362,932.11	30.893	$ 362,932.11	$ -	0.00%
IPP Variable Charge	11748	4.380	$ 51,457.41	4.380	$ 51,457.41	$ -	0.00%
IPP Fixed Charge	566.4	1745.294	$ 988,534.49	1745.294	$ 988,534.49	$ -	0.00%
TOTAL ELECTRICITY CHARGES			**$ 2,576,854.99**		**$ 2,607,333.15**	**$ 30,478.16**	**1.18%**
G.C.T			**386,528.25**		**391,099.97**		
BILL TOTAL			**$ 2,963,383.24**		**$ 2,998,433.13**	**$ 35,049.88**	**1.18%**

5.2.9 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			August Bill		Bill Impact	
	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	%Change
1,331,784		145.00	151.56	155.00	151.56		
	Usage	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
Energy (kWh)	1331784	**4.31**	$ 5,739,022.86	**4.66**	$ 6,211,409.64	$ 472,386.78	8.23%
Demand (kVa)	566.4	**2513.67**	$ 1,423,744.20	**2720.58**	$ 1,540,934.52	$ 117,190.32	8.23%
Customer Charge		**7,990.99**	$ 7,990.99	**8,648.74**	$ 8,648.74	$ 657.75	8.23%
SUBTOTAL			**$ 7,170,758.05**		**$ 7,760,992.90**	**$ 590,234.85**	**8.23%**
FX Adjust		3.618%	$ 259,452.86	-1.777%	$ (137,875.29)	$ (397,328.15)	-153.14%
Fuel Charge	1331784	30.893	$ 41,142,933.27	30.893	$ 41,142,933.27	$ -	0.00%
IPP Variable Charge	1331784	0.380	$ 505,893.24	0.380	$ 505,893.24	$ -	0.00%
IPP Fixed Charge	566.4	424.136	$ 240,230.77	424.136	$ 240,230.77	$ -	0.00%
TOTAL ELECTRICITY CHARGES			**$ 49,319,268.20**		**$ 49,512,174.90**	**$ 192,906.70**	**0.39%**
G.C.T			**7,397,890.23**		**7,426,826.23**		
BILL TOTAL			**$ 56,717,158.43**		**$ 56,939,001.13**	**$ 221,842.70**	**0.39%**

5.3 Estimated Bill Impact of JPS's Proposed Annual Tariff Adjustment

5.3.1 Bill Comparison for a Typical Rate 10 Consumer with consumption < 100 kW

Usage 90 kWh

Rate 10	July Bill			August Bill		Bill Impact	
Below 100 kWh	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	%Change
90		145.00	151.56	155.00	151.56		
	Usage kWh	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
ENERGY							
Energy 1st	90	**7.32**	$ 658.80	**8.59**	$ 773.10	$ 114.30	17.35%
Energy Next	0	**21.03**	$ -	**25.44**	$ -	$ -	0.00%
Customer Charge		**531.93**	$ 531.93	**608.13**	$ 608.13	$ 76.20	14.33%
SUBTOTAL			**$ 1,190.73**		**$ 1,381.23**	**$ 190.50**	**16.00%**
FX Adjust		3.618%	$ 43.08	-1.777%	$ (24.54)	$ (67.62)	-156.95%
Fuel Charge	90	32.180	$ 2,896.23	32.180	$ 2,896.23	$ -	0.00%
IPP Variable Charge	90	13.629	$ 1,226.62	13.629	$ 1,226.62	$ -	0.00%
TOTAL ELECTRICITY CHARGES			**$ 5,356.66**		**$ 5,479.54**	**$ 122.88**	**2.29%**
G.C.T			**Not Applicable**		**Not Applicable**		
BILL TOTAL			**$ 5,356.66**		**$ 5,479.54**	**$ 122.88**	**2.29%**

5.3.2 Bill Comparison for a Typical Rate 10 Consumer with consumption 101kWh </= 150kWh

Usage 150 kWh

Rate 10	July Bill			August Bill		Bill Impact	
Above 100 but ≤ 150 kWh	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
150		145.00	151.56	155.00	151.56		
	Usage kWh	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
ENERGY							
Energy 1st	100	**7.32**	$ 732.00	**8.59**	$ 859.00	$ 127.00	17.35%
Energy Next	50	**21.03**	$ 1,051.50	**25.44**	$ 1,272.00	$ 220.50	0.00%
Customer Charge		**531.93**	$ 531.93	**608.13**	$ 608.13	$ 76.20	14.33%
SUBTOTAL			**$ 2,315.43**		**$ 2,739.13**	**$ 423.70**	**18.30%**
FX Adjust		3.618%	$ 83.78	-1.777%	$ (48.66)	$ (132.44)	-158.08%
Fuel Charge	150	32.180	$ 4,827.05	32.180	$ 4,827.05	$ -	0.00%
IPP Variable Charge	150	13.629	$ 2,044.36	13.629	$ 2,044.36	$ -	0.00%
TOTAL ELECTRICITY CHARGES			**$ 9,270.61**		**$ 9,561.87**	**$ 291.26**	**3.14%**
G.C.T			**Not Applicable**		**Not Applicable**		
BILL TOTAL			**$ 9,270.61**		**$ 9,561.87**	**$ 291.26**	**3.14%**

5.3.3 Bill Comparison for a Typical Rate 10 Consumer with consumption 150kWh and above

Usage 160 kWh

Rate 10	July Bill			August Bill		Bill Impact	
Above 150 kWh	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
214		145.00	151.56	155.00	151.56		
	Usage kWh	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
ENERGY							
Energy 1st	100	**7.32**	$ 732.00	**8.59**	$ 859.00	$ 127.00	17.35%
Energy Next	114	**21.03**	$ 2,397.42	**25.44**	$ 2,900.16	$ 502.74	0.00%
Customer Charge		**531.93**	$ 531.93	**608.13**	$ 608.13	$ 76.20	14.33%
SUBTOTAL			**$ 3,661.35**		**$ 4,367.29**	**$ 705.94**	**19.28%**
FX Adjust		3.618%	$ 132.48	-1.777%	$ (77.59)	$ (210.06)	-158.57%
Fuel Charge	214	32.180	$ 6,886.59	32.180	$ 6,886.59	$ -	0.00%
IPP Variable Charge	214	13.629	$ 2,916.62	13.629	$ 2,916.62	$ -	0.00%
True-Up Adjustment	214	-0.113	$ (24.18)	0.000	$ -	$ 24.18	-100.00%
TOTAL ELECTRICITY CHARGES			**$ 13,572.85**		**$ 14,092.91**	**$ 520.06**	**3.83%**
G.C.T			**647.88**		**638.07**		
BILL TOTAL			**$ 14,220.73**		**$ 14,730.98**	**$ 510.25**	**3.59%**

5.3.4 Bill Comparison for a Typical Rate 20 Consumer with consumption ≤ 100 kWh

Usage 90 kWh

Rate 20	July Bill			August Bill		Bill Impact	
	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
90		145.00	151.56	155.00	151.56		
	Usage kWh	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
Energy	90	**9.03**	$ 812.70	**9.85**	$ 886.50	$ 73.80	9.08%
Customer Charge		**1,134.20**	$ 1,134.20	**1,284.83**	$ 1,284.83	$ 150.63	13.28%
SUBTOTAL			**$ 1,946.90**		**$ 2,171.33**	**$ 224.43**	**11.53%**
FX Adjust		3.618%	$ 70.44	-1.777%	$ (38.57)	$ (109.02)	-154.76%
Fuel Charge	90	32.180	$ 2,896.23	32.180	$ 2,896.23	$ -	0.00%
IPP Variable Charge	90	20.698	$ 1,862.81	20.698	$ 1,862.81	$ -	0.00%
TOTAL ELECTRICITY CHARGES			**$ 6,776.38**		**$ 6,891.79**	**$ 115.41**	**1.70%**
G.C.T			**1,016.46**		**1,033.77**		
BILL TOTAL			**$ 7,792.83**		**$ 7,925.56**	**$ 132.73**	**1.70%**

5.3.5 Bill Comparison for a Typical Rate 20 Consumer with consumption 101kWh - 1000kWh

Usage 750 kWh

Rate 20	July Bill			August Bill		Bill Impact	
	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
750		145.00	151.56	155.00	151.56		
	Usage kWh	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
Energy	750	**9.03**	$ 6,772.50	**9.85**	$ 7,387.50	$ 615.00	9.08%
Customer Charge		**1,134.20**	$ 1,134.20	**1,284.83**	$ 1,284.83	$ 150.63	13.28%
SUBTOTAL			**$ 7,906.70**		**$ 8,672.33**	**$ 765.63**	**9.68%**
FX Adjust		3.618%	$ 286.08	-1.777%	$ (154.07)	$ (440.15)	-153.85%
Fuel Charge	750	32.180	$ 24,135.23	32.180	$ 24,135.23	$ -	0.00%
IPP Variable Charge	750	20.698	$ 15,523.38	20.698	$ 15,523.38	$ -	0.00%
TOTAL ELECTRICITY CHARGES			**$ 47,851.40**		**$ 48,176.88**	**$ 325.48**	**0.68%**
G.C.T			**7,177.71**		**7,226.53**		
BILL TOTAL			**$ 55,029.11**		**$ 55,403.41**	**$ 374.31**	**0.68%**

5.3.6 Bill Comparison for a Typical Rate 20 Consumer with consumption 1001kWh - 7500kWh

Usage 5000 kWh

Rate 20	July Bill			August Bill		Bill Impact	
	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
5000		145.00	151.56	155.00	151.56		
	Usage kWh	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
Energy	5000	9.03	$ 45,150.00	9.85	$ 49,250.00	$ 4,100.00	9.08%
Customer Charge		1,134.20	$ 1,134.20	1,284.83	$ 1,284.83	$ 150.63	13.28%
SUBTOTAL			$ 46,284.20		$ 50,534.83	$ 4,250.63	9.18%
FX Adjust		3.618%	$ 1,674.66	-1.777%	$ (897.76)	$ (2,572.42)	-153.61%
Fuel Charge	5000	32.180	$ 160,901.55	32.180	$ 160,901.55	$ -	0.00%
IPP Variable Charge	5000	20.698	$ 103,489.22	20.698	$ 103,489.22	$ -	0.00%
TOTAL ELECTRICITY CHARGES			$ 312,349.63		$ 314,027.84	$ 1,678.21	0.54%
G.C.T			46,852.44		47,104.18		
BILL TOTAL			$ 359,202.07		$ 361,132.02	$ 1,929.94	0.54%

5.3.7 Bill Comparison for a Typical Rate 40 (Std.) Consumer

Usage 35,000 kWh

Demand 100 kVA

Rate 40 LV (Std)	July Bill			August Bill		Bill Impact	
	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
34,417		145.00	151.56	155.00	151.56		
	Usage	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
Energy (kWh)	34417	6.09	$ 209,586.87	6.74	$ 231,970.58	$ 22,383.71	10.68%
Demand (kVa)	117	2,737.13	$ 320,244.21	3,095.77	$ 362,205.09	$ 41,960.88	13.10%
Customer Charge		7,990.99	$ 7,990.99	9,063.83	$ 9,063.83	$ 1,072.84	13.43%
SUBTOTAL			$ 537,822.07		$ 603,239.50	$ 65,417.43	12.16%
FX Adjust		3.618%	$ 19,459.52	-1.777%	$ (10,716.65)	$ (30,176.16)	-155.07%
Fuel Charge	34417	30.893	$ 1,063,247.74	30.893	$ 1,063,247.74	$ -	0.00%
IPP Variable Charge	34417	2.500	$ 86,037.77	2.500	$ 86,037.77	$ -	0.00%
IPP Fixed Charge	117	664.666	$ 77,765.94	664.666	$ 77,765.94	$ -	0.00%
TOTAL ELECTRICITY CHARGES			$ 1,784,333.04		$ 1,819,574.31	$ 35,241.27	1.98%
G.C.T			267,649.96		272,936.15		
BILL TOTAL			$ 2,051,983.00		$ 2,092,510.46	$ 40,527.46	1.98%

5.3.8 Bill Comparison for a Typical Rate 50 (Std.) Consumer

Usage 11,748 kWh

Demand 566.40 kVA

Rate 50 MV (Std)	July Bill			August Bill		Bill Impact	
	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
11,748		145.00	151.56	155.00	151.56		
	Usage	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
Energy (kWh)	11748	**4.32**	$ 50,744.20	**4.52**	$ 53,100.96	$ 2,356.76	4.64%
Demand (kVa)	566.4	**1,896.55**	$ 1,074,203.72	**2,339.04**	$ 1,324,832.26	$ 250,628.54	23.33%
Customer Charge		**7,990.99**	$ 7,990.99	**9,063.83**	$ 9,063.83	$ 1,072.84	13.43%
SUBTOTAL			**$ 1,132,938.91**		**$ 1,386,997.05**	**$ 254,058.14**	**22.42%**
FX Adjust		3.618%	$ 40,992.07	-1.777%	$ (24,640.23)	$ (65,632.30)	-160.11%
Fuel Charge	11748	30.893	$ 362,932.11	30.893	$ 362,932.11	$ -	0.00%
IPP Variable Charge	11748	4.380	$ 51,457.41	4.380	$ 51,457.41	$ -	0.00%
IPP Fixed Charge	566.4	1745.294	$ 988,534.49	1745.294	$ 988,534.49	$ -	0.00%
TOTAL ELECTRICITY CHARGES			**$ 2,576,854.99**		**$ 2,765,280.83**	**$ 188,425.84**	**7.31%**
G.C.T			**386,528.25**		**414,792.12**		
BILL TOTAL			**$ 2,963,383.24**		**$ 3,180,072.96**	**$ 216,689.72**	**7.31%**

5.3.9 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			August Bill		Bill Impact	
	2022 Current Rates			2022 Adjusted Rates			
Description		Base Exch. Rate	Billing F/X Rate	Base Exch. Rate	Billing F/X Rate	JMD Change	% Change
1,331,784		145.00	151.56	155.00	151.56		
	Usage	Rate (J$)	Total (J$)	Rate (J$)	Total (J$)		
Energy (kWh)	1331784	**4.31**	$ 5,739,022.86	**4.04**	$ 5,380,407.36	$ (358,615.50)	-6.25%
Demand (kVa)	566.4	**2513.67**	$ 1,423,744.20	**3115.68**	$ 1,764,721.15	$ 340,976.96	23.95%
Customer Charge		**7,990.99**	$ 7,990.99	**9,063.83**	$ 9,063.83	$ 1,072.84	13.43%
SUBTOTAL			**$ 7,170,758.05**		**$ 7,154,192.34**	**$ (16,565.71)**	**-0.23%**
FX Adjust		3.618%	$ 259,452.86	-1.777%	$ (127,095.38)	$ (386,548.24)	-148.99%
Fuel Charge	1331784	30.893	$ 41,142,933.27	30.893	$ 41,142,933.27	$ -	0.00%
IPP Variable Charge	1331784	0.380	$ 505,893.24	0.380	$ 505,893.24	$ -	0.00%
IPP Fixed Charge	566.4	424.136	$ 240,230.77	424.136	$ 240,230.77	$ -	0.00%
TOTAL ELECTRICITY CHARGES			**$ 49,319,268.20**		**$ 48,916,154.25**	**$ (403,113.95)**	**-0.82%**
G.C.T			**7,397,890.23**		**7,337,423.14**		
BILL TOTAL			**$ 56,717,158.43**		**$ 56,253,577.38**	**$ (463,581.05)**	**-0.82%**

5.4 Approved Fuel Rates: Simulated as at 2021 June

BILLING EXCHANGE RATE J$148.5164 = US$1.00				
OUR Approved Heat Rate Target= 9,667				
Fuel Rates for June 2021				
Class	Std.	Off Peak	Partial Peak	On Peak
Rate 10				
- 1st. 100 kWh	21.305			
- Over 100 kWh	21.305			
Rate 20	21.305			
Rate 40 LV	20.452	17.044	22.251	27.730
Rate 40A LV	20.452			
Rate 50 MV	20.452	17.044	22.251	27.730
Rate 60	20.452			
Rate 70	20.452	17.044	22.251	27.730
Traffic Signal	20.452			
Electric Vehicles	21.305	17.044	22.251	27.730
IPP Rates for June 2021				
Class		IPP Variable TOU Rate J$/kWh	IPP Variable Rate J$/kWh	IPP Fixed Rate J$/kVa
Rate 10			11.28	
- 1st. 100 kWh				
- Over 100 kWh				
Rate 20			18.77	
Rate 40 LV			1.08	664.67
Rate 40 TOU		2.16		1,003.76
Rate 50 MV			2.56	1,745.29
Rate 50 TOU		2.23		831.79
Rate 60 & Traffic Signal			17.44	
Rate 70			0.10	424.14
Rate 70 TOU		0.20		92.71
Electric Vehicles			11.28	

14 ANNEX 2

5.4.1.1 Rockfort Units 1& 2 Major Overhaul Projects

Rockfort 1& 2: Description of Facilities

Rockfort Power Station comprises two slow speed two stroke diesel barge mounted generating units, Rockfort 1and 2, each of 20 MW, totaling 40 MW of capacity and constitutes the only utility scaled diesel generating units in the JPS owned system at present. The plant is located on the southeastern coast of Kingston and is moored in the Kingston Harbour.

Table 16: Rockfort Unit 1&2 Data

	Make		Date COD	Capacity MCR
Unit	**Engine**	**Generator**		
RF 1	Mitsubishi	Medinsha	1985	20.0
RF 2	Mitsubishi	Medinsha	1985	20.0

These units use heavy fuel oil (HFO) or Bunker C, Marine Diesel Oil, cylinder oil and system oil.

Project Name: RF1- 2023 Major Overhaul Inspection Maintenance & Services

Justification	In light of the fact that the planned 171MW replacement generation will not be ready before 2025, the Rockfort units 1and 2 will require operation beyond its retirement date in 2023 as per their initial retirement schedule. In order to reliably extend the operation of the units beyond 2023, the required maintenance in the form of a major overhaul will be necessary to guarantee reliable and safe operation. The Rockfort Unit 1 has been in operation over 36 years and so regular maintenance is necessary for efficiency. Components within the Main Engines are subject to significant levels of wear based on the operating regime. The OEM recommends 12,000 hours between overhauls to sustain reliable operation. With experience, JPS has managed to increase this limit to 16,000 hours. Exceeding this limit will place the asset at high risk which could result in catastrophic failure as these components have exceeded their useful life and are now displaying significant wear and fatigue. This Maintenance Project is expected to provide reliable base load power to the grid until the unit is retired and suitable replacement is commissioned.
Scale and Scope	**Segment**: Generation **Area**: Rockfort Diesel Station **Scope:** Major maintenance services on RF1 unit
Timing	**Unit 1 Project duration**: **Start date**: February 2022 **End date**: June 2023
Technical characteristics Rockfort 1	This project involves the rehabilitation and replacement of critical components, not limited to the following: □ Overhaul Main Engine Combustion Components □ Replacement of Cross Head Pins & Bearing. □ Replacement of Main Bearing □ Maintenance service of Turbochargers. □ Unit Generator □ Balance of Plant (BOP) and auxiliary systems □ Overhaul of Fuel Oil Pumps & Accessory.
Project Plan	The Main activities associated with the RF1 Unit will be done by the Original Equipment manufacturer (OEM) or equivalent overseas technical provider along with JPS Generation maintenance teams supported by local Third Party Services.

Project Cost Estimate	$4,242,315.00 some of this total is already approved, the remaining capex is $3,953,256.25.
Project Benefits	Reliability of the RF1 Unit beyond 2023 to extend operating life. Grid Security and ability to meet consumer's demand.
Project Risks	JPS as provided project risks and risk mitigation strategies.

Project Name: RF2- 2024 Major Overhaul Inspection

Maintenance & Services

Justification	In light of the fact that the planned 171MW replacement generation will not be ready before 2025, the Rockfort unit 2 will require operation beyond its retirement date in 2023 as per their initial retirement schedule. In order to reliably extend the operation of the units beyond 2023, the required maintenance in the form of a major overhaul will be necessary to guarantee reliable and safe operation. The Rockfort Unit 2 has been in operation over 36 years and so regular maintenance is necessary for efficiency. Components within the Main Engines are subject to significant levels of wear based on the operating regime. The OEM recommends 12,000 hours between overhauls to sustain reliable operation. With experience, JPS has managed to increase this limit to 16,000 hours. Exceeding this limit will place the asset at high risk which could result in catastrophic failure as these components have exceeded their useful life and are now displaying significant wear and fatigue. This Maintenance Project is expected to provide reliable base load power to the grid until the unit is retired and suitable replacement is commissioned.
Scale and Scope	**Segment**: Generation **Area**: Rockfort Diesel Station **Scope:** Major maintenance services on RF1 unit
Timing	**Unit 2 Project duration**: **Start date**: February 2023 **End date**: June 2024
Technical characteristics Rockfort 1	This project involves the rehabilitation and replacement of critical components, not limited to the following: □ Overhaul Main Engine Combustion Components

	□ Replacement of Cross Head Pins & Bearing. □ Replacement of Main Bearing □ Maintenance service of Turbochargers. □ Unit Generator □ Balance of Plant (BOP) and auxiliary systems □ Overhaul of Fuel Oil Pumps & Accessory.
Project Plan	The Main activities associated with the RF1 Unit will be done by the Original Equipment manufacturer (OEM) or equivalent overseas technical provider along with JPS Generation maintenance teams supported by local Third Party Services.
Project Cost Estimate	Capital expenditure estimate, $4,178,265.
Project Benefits	Reliability of the RF2 Unit beyond 2023 to extend operating life. Grid Security and ability to meet consumer's demand up until cOD of replacement generating capacity.
Project Risks	JPS as provided by JPS project risks and risk mitigation strategies.

Project Name: Generation Critical Spares

Justification	The 171.5MW replacement generation will not be implemented in time to allow for several units to retire in 2023. The operation of said units beyond 2023 will require additional critical capital spares as per industry best practices. − With the absence of these critical spares, the Auxiliary Equipment and Generating Assets are exposed to extended downtime which can result in load shedding and decline in production. − Critical Spares are required to maintain good reliability, availability and EFOR KPI targets of the JPS power plants. − The Generation plants also include necessary Balance of Plant equipment that enable them to function efficiently. Several balance of plant equipment require replacing and so have been included in this request.
Scale and Scope	**Segment**: Generation To procure and maintain an inventory of spare parts for critical equipment at the Generation facilities in order to maintain the reliability and availability of the Generating Units in the event of failure.
Timing	The project will be executed on an ongoing annual basis, the details shown below refer to the period covered by this Business case **Project duration**: Year 1 **Project duration:** Year 2:

	Start date: January 2023 **Start Date**: Jan 2024 **End date**: December 2023 **End Date :** Dec 2024
Technical characteristics	The technological solution provided for the Critical Spares Programme is to procure critical spares from the OEM or alternate vendors in order to maintain a direct part replacement.
Project Plan	The Main activities associated with the RF1 Unit will be done by the Original Equipment manufacturer (OEM) or equivalent overseas technical provider along with JPS Generation maintenance teams supported by local Third Party Services.
Project Cost Estimate	Capital expenditure estimate, US$1,725,000.
Project Benefits	Reliability of the RF Unit units and Hunts Bay units beyond 2023 to extend operating life. These units are part of the set to be retired under the 171.5MW tranche of ROFR execution. Until the new replacement plant is commissioned in 2026, the existing units will be required to be maintained in a reliable condition to ensure customers can be reliably served. The loss of 171.5MW of existing generation before the replacement is commissioned would violate the minimum reserve margin of 20%. Grid Security and ability to meet consumer's demand up until COD of replacement generating capacity.
Project Risks	JPS as provided by JPS project risks and risk mitigation strategies.

Project Name: Hunts Bay GT 5 Major Overhaul

Justification	The 171.5MW replacement generation will not be implemented in time to allow for several units to retire in 2023. Considering that the 171.5MW replacement capacity will not be implemented in time to allow for the retirement of this unit and others scheduled for retirement in 2023, this investment will be needed to ensure the capability of the unit to provide power reliably beyond said retirement date in 2023
Scale and Scope	**Segment**: Generation **Area**: Hunts Bay Power Station **Scope**: GT 5 Hot Gas Path
Timing	**Project duration**: 12 months **Start date**: April 2023 **End date**: May 2024
Technical characteristics	**Technical Solution Proposed:**

	This project involves the rehabilitation and replacement of critical components, not limited to the following: □ Hot Gas Components □ Servicing of the obsolete Triconnex Controls system □ Load Gear box and accessory gear box □ Exhaust stack □ Unit Generator □ Balance of Plant (BOP) and auxiliary systems
Project Plan	The Main activities associated with the Unit will be done by the Original Equipment manufacturer (OEM) or equivalent overseas technical provider along with JPS Generation maintenance teams supported by local Third Party Services.
Project Cost Estimate	Capital expenditure estimate, US$2,569,927.5
Project Benefits	Reliability of the Hunts Bay GT 5 unit during and beyond 2024 and life extension. This unit is a part of the set to be retired under the 171.5MW tranche of ROFR execution. Until the new replacement plant is commissioned in 2026, the existing units will be required to be maintained in a reliable condition to ensure customers can be reliably served. The loss of 171.5MW of existing generation before the replacement is commissioned would violate the minimum reserve margin of 20%. Grid Security and ability to meet consumer's demand up until COD of replacement generating capacity.
Project Risks	JPS has provided by project risks and risk mitigation strategies**.**

Project Name: **Bogue GT3 Hot Gas Path Inspection 2023**

Description of Facilities

1.1 Gas Turbine GT3 is located at the JPS Bogue power station and is an industrial Frame 5, simple cycle, single shaft John Brown Engineering manufactured gas turbine unit rated to at 20 MW. The unit, which utilize automotive diesel oil (ADO) was commissioned in 1973.

Justification	The 171.5MW replacement generation will not be implemented in time to allow for several units to retire in 2023. Considering that the 171.5MW replacement capacity will not be implemented in time to allow for the retirement of this unit and others scheduled for retirement in 2023, this investment will be needed to ensure the capability of the unit to provide power reliably beyond said retirement date in 2023.

	Currently, the unit has less than 100 starts to the recommended for a HGPI interval of every 1200 starts. Considering that the projected number of starts for 2022 is 150, a HGPI will be due in 2023. Additionally, cracks were observed on trailing edge of 3rd stage buckets during the last borescope inspection Nov 2021. To maintain the reliability and availability of GT 3 Units in order to mitigate the occurrence of load shedding due to the fluctuation of megawatt output from Renewables Power Plant and megawatt shortfall. Do note that in the event of load shedding, a single block (feeder) can be de-energize, which can result in a minimum of 8,000 customers being without power. To maintain the reliability and availability of GT 3 Unit in order to provide Black Starting capabilities in event of any Natural Disaster emergency. In addition, the execution of GT 3 Unit Maintenance Intervention will stabilise the peaking capacity to react to shortfall in supply due to production challenges on Base Load Units. The Aero-derivative Units provide fast starting and load ramp capabilities that reduce the spinning reserve and minimize customer load shedding on the JPS Grid In addition, conducting this maintenance initiative will restore the asset health index of GT 3 Hot Gas Path parts, which will allow the unit to operate until beyond 2023.
Scale and Scope	**Segment**: Generation **Area**: Bogue Power Station **Scope**: GT 3 Hot Gas Path to include; Procurement of HGP spares, disassembly and reassembly of turbine, borescope inspection of compressor, repair and replacement of defective components, major servicing of auxiliary equipment, reassemble and testing of equipment and re-commissioning of unit
Timing	**Project duration**: 10 months **Start date**: January 2023 **End date**: November 2023
Technical characteristics	**Technical Solution Proposed:** This project involves the rehabilitation and replacement of critical components, not limited to the following: Major systems and equipment involved: GT 3 Turbine Combustion and Hot Gas Parts GT 3 Generator GT 3 Unit Balance of Plant Equipment GT 3 Exhaust stack

Project Plan	The Main activities associated with the Unit will be done by the Original Equipment manufacturer (OEM) or equivalent overseas technical provider along with JPS Generation maintenance teams supported by local Third Party Services.
Project Cost Estimate	Capital expenditure estimate, US$2,569,927.5 Cost breakdown developed as described in Table xx
Project Benefits	Reliability of the Hunts Bay GT 5 unit during and beyond 2024 and life extension. This unit is a part of the set to be retired under the 171.5MW tranche of ROFR execution. Until the new replacement plant is commissioned in 2026, the existing units will be required to be maintained in a reliable condition to ensure customers can be reliably served. The loss of 171.5MW of existing generation before the replacement is commissioned would violate the minimum reserve margin of 20%. Grid Security and ability to meet consumer's demand up until COD of replacement generating capacity.
Project Risks	JPS has provided by JPS project risks and risk mitigation strategies**.**

Project Name: Bogue Aero- Derivatives GT package

Description of Facilities

1.2 JPS currently operates four aero-derivative gas turbine generating units located at the Bogue Power Station, these gas turbines are utilized mainly for peaking purposes. GT 8 has been retired, and GT 11 was refurbished and converted to burn natural gas. GT 6,7 and 9 all utilized automotive Diesel oil (ADO). Table 17 shows the units' basic data.

Table 17: Bogue Aero-derivative Gas Turbine Data

Unit	Manufacturer	COD	Capacity MW
GT 6	GTC	1990	14.0
GT 7	GTC	1990	14.0
GT 9	GTC	1992	22.0
GT 11	Pratt & Whitney	2001	20.0

Justification	The 171.5MW replacement generation will not be implemented in time to allow for several units to retire in 2023. Considering that the 171.5MW replacement capacity will not be implemented in time to allow for the retirement of this unit and others scheduled for retirement in 2023, this investment will be needed to ensure the capability of the unit to provide power reliably beyond said retirement date in 2023.

	Critical Spares are required to maintain good reliability, availability and targets of the JPS power plants. The Generation plants also include necessary Balance of Plant equipment that enable them to function efficiently. Several balance of plant equipment require replacing and so have been included in this request.
Scale and Scope	**Segment**: Generation **Area**: Bogue Power Station **Scope**: Hot Gas Path to include; Procurement of HGP spares, disassembly and reassembly of turbine, borescope inspection of compressor, repair and replacement of defective components, major servicing of auxiliary equipment, reassemble and testing of equipment and re-commissioning of unit
Timing	**Project duration**: **Start date**: January 2024 **End date**: December 2024
Technical characteristics	The technological solution provided for the Critical Spares Programme is to procure critical spares from the OEM or alternate vendors in order to maintain a direct part replacement.
Project Plan	The Main activities associated with the Unit will be done by the Original Equipment manufacturer (OEM) or equivalent overseas technical provider along with JPS Generation maintenance teams supported by local Third Party Services.
Project Cost Estimate	JPS estimates the capital expenditure at US$290,000. Cost breakdown developed as described in Table xx
Project Benefits	This unit is a part of the set to be retired under the 171.5MW tranche of ROFR execution. Until the new replacement plant is commissioned in 2026, the existing units will be required to be maintained in a reliable condition to ensure customers can be reliably served. The loss these units before their replacement is commissioned would violate the minimum reserve margin of 20%. Benefit would also include enhanced grid security and ability to meet consumer's demand up until COD of replacement generating capacity.
Project Risks	JPS has provided project risks and risk mitigation strategies.