

THE JAMAICA PUBLIC SERVICE COMPANY LIMITED

ANNUAL TARIFF ADJUSTMENT SUBMISSION FOR 2021

May 4, 2021

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Glossary

ABNF	- Adjusted Base-rate Non-Fuel
ADMS	- Advanced Distribution Network System
ADO	- Automotive Diesel Oil
ART	- Annual Revenue Target
CAIDI	- Customer Average Interruption Duration Index
CIS	- Customer Information System
ССМА	- Complex Connection Management Application
CPLTD	- Current Portion of Long Term Debt
CPI	- Consumer Price Index
СТ	- Current Transformer
DER	- Distributed Energy Resources
DMS	- Distribution Network System
DPCI	- 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
EAM	- Enterprise Asset Management
EEIF	- Electricity Efficiency Improvement Fund
EGS	- Electricity Guaranteed Standard
ELS	- Energy Loss Spectrum
EOS	- Electricity Overall Standard
FCAM	- Fuel Cost Adjustment Mechanism

FCI	- Fault Circuit Indicator
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
GWh	- Gigawatt-hours
HFO	- Heavy Fuel Oil
ICCP	- Inter-Control Center Communications Protocol
ICDP	- Integrated Community Development Programme
IPP	- Independent Power Producer
IEEE	- Institute of Electrical and Electronics Engineers
JEP	- Jamaica Energy Partners Limited
JMD	- Jamaican Dollar
JNTL	- Non-Technical Losses that are within JPS' control
JPS/Licensee	- Jamaica Public Service Company Limited
KVA	- Kilovolt-Ampere
KWh	- Kilowatt-hours
Licence	- The Electricity Licence, 2016
MAIFI	- Momentary Average Interruption Frequency Index
MED	- Major Event Day/s
MDMS	- Meter Data Management System

MSET	-	Ministry of Science Energy and Technology
MVA	-	Mega Volt Amperes
MW	-	Megawatt
MWh	-	Megawatt-hours
NBV	-	Net Book Value
NELRP	-	National Energy Loss Reduction Program
NFE	-	New Fortress Enterprise
NTL	-	Non-technical losses
NWC	-	National Water Commission
O&M	-	Operating and Maintenance
OCC	-	Opportunity Cost of Capital
Office/OUR	-	Office of Utilities Regulation
Old Licence	-	The Amended and Restated All-Island Electric Licence, 2011
OUR Act	-	The Office of Utilities Regulation Act
OMS	-	Outage Management System
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
PIOJ	-	Planning Institute of Jamaica
PLEXOS	-	PLEXOS is a simulation software that uses cutting-edge data handling, mathematical programming, and stochastic optimization techniques to provide a robust analytical framework for power market analysis

PPA	-	Power Purchase Agreement
RAMI	-	Residential Advanced Metering Infrastructure
RE	-	Renewable Energy
		The revenue requirement approved in the last Rate Review Process
Pavanua Can		as adjusted for the rate of change in non-fuel electricity revenues
Revenue Cap	-	(dPCI) at each Annual Adjustment date as set out in Exhibit 1 of
		Schedule 3 of the Licence.
REP	-	Rural Electrification Programme Limited
ROE	-	Return on Equity
ROI	-	Return on Investment
ROR	-	Return on Return
RPD	-	Revenue Protection Department
SAIDI	-	System Average Interruption Duration Index
SAIFI	-	System Average Interruption Frequency Index
SBF	-	System Benefit Fund
SCADA	-	Supervisory Control and Data Acquisition
SJPC	-	South Jamaica Power Company
T&D	-	Transmission & Distribution
TFP	-	Total Factor Productivity
TL	-	Technical Losses
TOU	-	Time of Use
USD	-	United States Dollar
VSP	-	Voltage Standardization Program

WACC - Weighted Average Cost of Capital
WKPP - West Kingston Power Plant
WT - Wholesale Tariff

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Executive Summary

Introduction

The current filing is a submission by JPS under the Electricity Licence, 2016 ("Licence") for an annual adjustment under the Performance Based Rate-making Mechanism ("PBRM") and is the Company's first application for rates adjustment following the conclusion of the 2019-2024 Rate Review Process under the new forward looking revenue cap regime.

The 2019-2024 Rate Review Determination Notice ("Final Determination") is the first OUR determination approving JPS' five-year Revenue Requirement, revenue caps, capital plan, demand projections and performance targets on a forward-looking basis. In addition to being the first Rate Review proceeding based on a forward-looking basis, the 2019-2024 Rate Review also took place amid an unprecedented pandemic which disrupted economic and social interactions impacting every business and individual across the world.

2020 was an unprecedented year globally, as many economies grappled with the social and economic fallout from the COVID-19 pandemic. Electricity supply chain disruptions, delayed response time to outages, reduction in electricity demand and financial stress were some of the many factors that impacted the operations of utilities worldwide, including JPS. COVID-19 containment measures in 2020, which included Government imposed lockdowns and restrictions on movement, as well as work from home orders, not only affected JPS' operations but also adversely affected the financials of the Company. Following five consecutive years of growth, JPS experienced a decline in electricity sales amounting to approximately 7%.

The Planning Institute of Jamaica (PIOJ), in a February 2021 media briefing, stated that based on projections, the Jamaican economy will return to its pre-COVID-19 level of economic activity by FY2023/24.

JPS supports the Government of Jamaica's COVID-19 recovery efforts, and will continue to align its capital investment activities to improve the quality of service it provides, while giving customers more choice and control.

BUSINESS PERFORMANCE

JPS consistently invests in improving the design of the network to improve reliability, improve safety and reduce technical losses. The accessibility of reliable electricity supply plays a pivotal role in ensuring the continuity of domestic and commercial activities. To this end, in 2020, JPS spent US\$59.7M on capital investments. The table below outlines the Capital Investment projects by functions:

Function	2020 Actuals US\$'000
T&D	30,060
Generation	11,544
Losses	14,133
Digital	1,938
General Property	2,031
Grand Total	59,705

2020 Actual Capital Investments

Improved reliability performance was realized from the successful completion of six major projects primarily aimed at grid modernization and expansion in addition to upgrading and replacing defective assets on the T&D network to become more compliant with grid codes while staying true to the service area concept. These investments will enable JPS to achieve its strategic objectives of exceptional customer service and growth thus improving the customer experience.

With continued focus on reliability and efficiency, the Bogue GT#13 and Rockfort Unit #2 major overhauls were both successfully completed. JPS continued targeted implementation of Smart Meters and Residential Automated Metering Infrastructure (RAMI), accomplishing for the most part, planned activities and exceeding its targets for recovered energy through its several initiatives. Although these initiatives exceeded the energy recovery targets in JPS' 2019-2024 Rate application by almost 100%, the non-technical loss rate increased by 11% due to significant decrease in generation.

Significant strides were made in the reduction of technical losses with major initiatives taking place on the distribution network. These included the continued execution of the Voltage Standardization Program (VSP). It is anticipated that the new 10MW Caribbean Broilers (CB) Hill Run Distributed Generation Project, the first of its kind, will yield additional benefits when commissioned later this year.

Overall, 2020 started out on a high, with all operational key performance indicators trending in the right direction. There was also heightened optimism as the system net generation for the first quarter was 2.7% ahead of the forecasted target, the highest 1st quarter demand ever recorded. However, with the onset of the COVID 19 pandemic in March, the outlook changed, and what was

previously poised for an excellent performance started to trend negatively, as the pandemic wreaked havoc across the Jamaican economy and the world at large.

PERFORMANCE FACTORS AND PROPOSED TARGETS FOR 2021

Paragraph 37 of Schedule 3 of the Licence stipulates that targets for losses, heat rate and quality of service should be "reasonable and achievable". This provision dictates that the targets must not only be capable of accomplishment by JPS, but must also be fair and appropriate based on all relevant circumstances. As mandated by the said paragraph 37, these circumstances are "*the Base Year, historical performance and the agreed resources included in the five (5) Year Business Plan, corrected for extraordinary events*".

The setting of targets by the OUR ought to ensure that the utility is able to generate sufficient revenues to permit future reinvestment necessary to provide high quality service to customers while providing a fair return to the shareholder. These targets ensure JPS bears a measure of financial responsibility if it fails to achieve the performance targets approved by the Regulator. Factor performance for 2020 is summarized below. Also outlined are JPS' proposed 2021 targets for system losses and heat rate:

Quality of Service (Q-Factor) is a regulatory performance factor that attracts penalties and incentives that can impact JPS' revenues. The 2021 Annual Review is the first year for the application of the Q-Factor mechanism in 2019-2024 Review period. The OUR evaluates the reliability performance of JPS' system based on three (3) quality indices, System Average Interruption Frequency Index (SAIFI), System Average Interruption Duration Index (CAIDI) - indicating the average frequency and duration of interruptions and the average time to restore service to customers, respectively.

SAIDI (min/customer)			(interi	SAIFI ruptions/cu	stomer)	CAIDI (min/customer)		
OUR Q-factor Target	JPS' Actual	Varianc e (%)	OUR Q-factor Target	JPS' Actual	Variance (%)	OUR Q-factor Target	JPS' Actual	Variance (%)
1502.9	1486.8	1%	12.4	8.6	31%	121.5	173.2	-43%

JPS 2020 Performance versus Q-factor targets

Based on the above 2020 performance, JPS has performed 1% and 31% better for SAIDI and SAIFI respectively, and 43% worse for CAIDI when compared to the established Q-Factor targets. JPS' customers would have experienced a reduction in the frequency of outages (SAIFI) moving from an average of approximately twelve (12) times in 2019 to nine (9) times in 2020. JPS' SAIFI performance is attributed to the benefits realized from its reliability improvement programmes. However, customers would have seen an increase in outage durations, as restoration efforts were

severely hampered by crews contracting the virus and the restrictions on movement, lockdowns and the quarantining of several communities imposed due to the COVID-19 pandemic.

Service delivery towards the latter part of 2020 was negatively impacted by tropical storms Laura, Zeta and Eta in August, October and November respectively. These weather systems had a major impact on JPS' electrical network resulting in numerous power outages across the island. The severity of weather conditions also hindered restoration efforts which were vastly impacted by flooding, landslides and impassable roadways.

The primary drivers of power interruptions were equipment failure (29%) and vegetation encroachment (28%). As such, to achieve its system improvement targets, JPS will be ramping up a number of initiatives in 2021 including: maintaining the structural integrity of the T&D Asset through replacement/rehabilitation of poles; vegetation management on T&D lines; distribution line upgrades; re-conductoring programme, and converting feeders from 12 kV to 24kV under the Voltage Standardization Programme.

System Losses (Y-factor): Managing system losses remains a very challenging problem especially as JPS continues to face electricity theft. In 2020, JPS saw a deterioration in this performance factor where losses increased from 26.05% in 2019 to 28.03%. The deterioration in losses was primarily due to the effects of the pandemic with the increase being the largest seen in over 10 years. This reversed the last four years of sustained loss reduction (as illustrated in chart below), which prior to 2020 was reducing by about 0.3 percentage points annually.



12-month rolling system loss rate trend from December 2016 to December 2020

In its 2019–2024 Rate Review Application, JPS proposed system losses targets and a target-setting mechanism that focused on the aspects of system losses within its control. Citing concerns with the use of the Energy Loss Spectrum (ELS) in setting targets for NTL, JPS proposed an alternative mechanism, however, the OUR continues to rely on the ELS for target setting. JPS reiterates the need for a structure that uses verifiable and mutually available variables to set targets, and for a mechanism that can equitably apportion responsibility for JNTL and GNTL. The drivers of NTL (electricity theft) are socioeconomic in nature therefore, JPS will continue to engage with the Regulator and the Government of Jamaica to sustainably reduce system losses and recover from the effects of the pandemic.

Though challenged by the pandemic, JPS remains committed to its loss reduction initiatives, which have yielded significant results with priority attention on regularization and elimination of as much illegal electricity use as possible. For 2021, JPS projects to reduce Energy Losses to 27.71% or 1,198 GWh (a reduction of 38 GWh) through the continuation of several loss reduction initiatives including 85,000 Audits and Investigations; the installation of 45,000 Smart Meters; and RAMI installations in 10 communities;

Thermal Efficiency (**H-Factor**) for 2020 was 10,262kJ/kWh representing a 9.4% improvement over 2019. The major contributors to this improvement in efficiency was the retirement of 262MW of Steam turbine generators, as well as prudent maintenance activities that were carried out on JPS generation assets over the period. The year 2020 also saw the commissioning of New Fortress 94MW CHP facility in March 2020, followed by the retirement of Hunts Bay B6 (68.5MW) at the end of 2020.

The monthly heat rate performance ranged from a high of 11,914kJ/kWh in 2019 to a low of 9,430kJ/kWh in 2020. Whilst heat rate performance has shown significant improvement, JPS forecasts for the July 2021 to June 2022 projects a below target performance of 56kJ/kWh with heat rate performance finishing at 9,723kJ/kWh.

The ongoing pandemic has significantly disrupted the demand for electricity across the island. This has negatively impacted JPS' optimal use of the thermal generation assets, specifically the Bogue CCGT plant, which is the Company's most efficient generating asset. Consequently, despite our efforts in maintaining the CCGT in its most efficient state, the low demand has caused a worsening of the CCGT heat rate by 200kJ/kWh than its pre-pandemic performance of low 9,000kJ/kWh. These are impactors outside of JPS' control that significantly affects the thermal heat rate performance.

2021 ANNUAL TARIFF ADJUSTMENT

2021 Annual Revenue Target reflects changes since 2018 in the value of the Jamaican dollar (JMD) against the US dollar (USD) and changes in the cost of providing electricity products and services related to inflation; as well as JPS' performance against the operational targets established by the OUR for 2020.

Annual Revenue Target parameters in this filing are consistent with the OUR's determinations as published in the Final Determination. Performance and growth related adjustments to the 2021 Annual Revenue Target (ART) comprise the following:

- dI growth adjustment of 18.51% to the 2021 approved revenue cap of J\$37.857B
- Volumetric performance adjustment of negative J\$0.038B
- System losses performance adjustment of negative J\$0.735B
- Foreign exchange surcharge of positive J\$1.978B
- Net interest expense surcharge of negative J\$0.271B
- Z-Factor adjustment of 8.51% to recover 2020 approved revenue shortfall due to delay in the approved tariffs implementation (revenue gap)

The proposed 2021 ART reflecting these adjustments is J\$49.130B. In reviewing the proposed 2021 ART the following should be noted:

1. System Losses Penalty:

While JPS included system losses penalty in the 2021 ART in this application, JPS believes that the target true-up for system losses should not be applicable for 2020 based on the following grounds:

- 1. The subject targets are applicable to periods prior to the effective date of the Final Determination and targets cannot be applied retroactively.
- 2. In any event, the system losses targets were set at the height of COVID-19 pandemic and are not reasonable and achievable and therefore inconsistent with the requirements of paragraph 37 of Schedule 3 of the Licence.

When the system losses target true-up is not applied, the 2020 system losses adjustment results in J\$0 revision and the proposed 2021 ART will correspondingly change to J\$49.953B, which related tariff adjustment and bill impacts provided in Appendix D.

2. Revenue Gap:

In the Final Determination, the Regulator approved a revenue cap for 2020 of J\$41.2 Billion to be collected through its levelized tariffs, and forecasted billing determinants. The levelized tariffs on which JPS would recover its revenues, however, was implemented February 2021 on account of the Final Determination from the OUR being late. In the absence of new rates in 2020, JPS revenues would have been collected on the basis of tariffs for the previous period, that is, for 2018,

which remained in effect until January 2021. The tariff delay implementation created a price variance and a resultant revenue gap of \$3.222B.

As set out in paragraph 46(d)(i) of Schedule 3 of the Licence allows for a Z-factor percentage increase in the revenue cap, among others, due to:

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.

Given that the 2018 tariffs had lower non-fuel rates and there was no opportunity for JPS to have utilized the rates approved for 2020 to recover approved revenue cap, the Company is proposing that the Z-Factor Adjustment be applied to compensate it for the 2020 revenue shortfall.

2020 Capital Investment Adjustment:

JPS proposes no adjustment to the 2020 approved capital investment implementation to account for COVID-19 implications and delayed approval of JPS' capital plan.

2021 Annual Tariff Adjustment Summary					
Item	Amount (J\$'M)				
Projected 2021 Revenue at Existing Tariffs	43,751				
Revenue Cap 2021	37,857				
dI Adjustment (18.51%)	7,008				
Q Factor (0%)	0				
Revenue Cap 2021 (Adjusted for Growth – dl)	44,865				
Performance Adjustments (note 1)					
Foreign Exchange Surcharge	2,213				
Interest Surcharge	(303)				
Volumetric kWh	1,266				
Volumetric kVA	(1,373)				
Customer Charge	64				
System Losses	(822)				
	1,044				
Z-Factor Adjustments					
2020 Revenue Gap	3,222				
All Adjustments	11,275				
2021 Annual Revenue Target	49,131				

Note: Performance adjustments have been adjusted by the Weighted Average Cost of Capital (WACC) of 11.87%

REGULATORY MATTERS

This 2021 Annual Tariff Adjustment Application comes only four months after the receipt of 2019-2024 Determination Notice in December 2020 from the OUR. Schedule 3, Paragraph 43 of the Licence states:

"The Licensee shall make annual filings to the Office at least sixty (60) days prior to the Adjustment Date. These filings shall include the support for the performance indices, the inflation and the proposed Non-Fuel Base Rates for electricity, and other information as may be necessary to support such filings...."

In keeping with this provision of the Licence, the 2021 Annual Review will be the first to be fully incorporated under a forward looking Revenue Requirement transitioning into Revenue Cap, as part of the Performance Based Rate-making Mechanism (PBRM). It is also noteworthy that JPS is being called to make this application under circumstances where it has exercised its Condition 32 right of appeal against certain aspects of the Final Determination and the Tribunal has ordered that those decisions shall remain in effect until the verdict of the appeal is determined. In these circumstances, JPS makes this Application without prejudice to its rights or position in respect of the matters which are subject of the appeal.

Designed as a link between revenue targets of the Company and specific performance factors, the PBRM ensures that JPS, through tariff adjustments to customers, is incentivized or penalized for its performance outcomes.

The annual adjustment in the Licence allows JPS to adjust its revenue target to reflect general movements in inflation, changes in service quality, changes in the base foreign exchange rate and, where applicable, an adjustment for unforeseen occurrences beyond management control not captured in the other elements of the PBRM. The mechanism also allows for a revenue surcharge which includes a true up for revenues, a system losses incentive mechanism and a FX surcharge, offset by net interest income received from customers.

In this Application, JPS requests the OUR's consideration and determination with respect to the following regulatory matters:

1. *Rate of Return Adjustment:* Paragraph 46 d. (i) of Schedule 3 of the Licence details the special circumstances that could trigger a Z-Factor adjustment in an Annual Review, particularly the revenue cap. Item (ii) in paragraph 46 establishes a revenue adjustment associated with JPS' rate of return, for which the relevant one is the Return on Equity. In particular, it sets a band of +1% and -3% beyond which a Z factor adjustment can be requested by the Licensee or the Minister.

The Determination defines a ROE of 10.78%. This means that if in any given year, ROE falls below 7.78% (approved target less 3%) or above 11.78% (approved target plus 1%), JPS or the Minister can require an adjustment to its revenues in the following year.

As established in the Licence, the following factors must be taken into consideration:

- the allowed true-up annual adjustments;
- special purpose funds included in the Revenue Requirement;
- awards of the Tribunal and determinations of the Office; and
- adjustments related to prior accounting periods.

The main issue at hand is to clearly define how to compute JPS' ROE for the purpose of this adjustment. In this Application, JPS proposes for the OUR's consideration and approval a mechanism for actual ROE computation on an annual basis to be included in the future Annual Adjustment Filing (AAF) submission.

2. Final Determination Issues and Opportunities

JPS received approval for its 2020 investment plan on December 24, 2020, just one week before the end of its 2020 financial year. The delayed approval of the investment plan means that if the Z-Factor related to capital investment plan is applied in this annual review it would amount to retroactive regulation, which is not in keeping with best practice or permitted under the Licence. JPS is a capital-intensive business that requires annual investment to keep customers connected within regulated standards of service and productivity. Breaching standards such as, losses, heat rate, reliability and productivity may result in penalties to the utility.

On account of its revenue implications, the Final Determination has raised significant concerns for JPS, particularly in relation to revenue gap, return on equity, growth rate in inflation and losses true-up, which are the subject of the foregoing referenced appeal.

Some of these have carried over to this Annual Review and will have an impact in the derivation of the rate adjustment and tariffs required for the 2021/22 tariff period. Notwithstanding, the Licence provides the basis and the mechanism by which JPS is required to submit, for review by the Office, an application for a rate adjustment - having factored various targets, incentives and/or penalties.

3. Billing Determinants: In applying the PBRM, the formula indicates that the volumetric adjustment for any year is dependent on the variance between the target billing determinants and those that were actually achieved during that year. Determination 24(b) states that "Given the uncertainties associated with forecasting demand in light of the COVID-19 pandemic, the OUR shall revisit the demand forecast in the 2021 Annual Review with a view of fine-tuning the projections." In JPS' view, Determination 24(b) is consistent with Paragraph 45 of Schedule 3 of the Licence which empowers the OUR to adjust the target billing determinants for known and measurable changes.

In light of the current economic conditions, the outlook for growth during 2021 and the relationship that exists between energy demand and economic activity, JPS anticipates a recovery across all its

billing determinants. The OUR approved forecast projected an increase of 8.8% (259 GWh) in energy sales over 2020 whereas JPS is anticipating a modest recovery of 2.6% (75.7GWh).

Though the Final Determination, due to the timing of its release had made allowance for the effect of the pandemic on 2020 energy sales vis-à-vis a discount factor relative to 2019, JPS' actual recorded numbers were relatively weak in comparison to the OUR's outlook, JPS has recorded 130 GWh or approximately 4.2% lower overall electricity sales in 2020 than had been determined by the OUR.

As per Paragraph 43 of Schedule 3 of the Licence, the Annual Revenue Target (ART) shall be adjusted on an annual basis, commencing July 1st of each year. A detailed analysis of the non-fuel tariff adjustment for 2021/2022 and the total bill impact for the typical JPS customer in each rate has been provided in Chapter 4. These rates shall be set to recover the ART requirement, given the target billing determinants (customer number, kWh energy sales, and kVA demand) for the year.

4. Standby Tariff: Determination 26 of the Final Determination approved Standby Tariffs in lieu of JPS' proposed Distributed Energy Resource (DER) framework and tariff. The OUR further invited JPS to review, amend and resubmit its DER proposal for their reconsideration.

The standby tariffs as currently described in the Rate Schedule preceded the current developments in the sector by decades, and were developed before the wide-scale availability and accessibility of these distributed generation technologies. As such they are neither appropriate nor fit for the current environment, compounded by JPS' regulatory obligations.

5. *Distributed Energy Resource:* The OUR as per its Determination #26(f) stated that "JPS proposed DER rates requires additional work before it can be implemented. In light of this, the Office has decided that JPS may, if it elects to do so, present its revised DER construct at the next Annual Review for regulator consideration."

Given the importance of the DER, and the level of rigour that is expected in any modification that is to be presented, and the need for engagement with the OUR and other stakeholders, JPS finds it prudent to defer its resubmission of its DER tariff to August 2021.

6. Transition of Net Billing Customers to Time-of-Use: Determination # 26(b) states that: "Existing Net-billing customers in the RT10 and RT20 classes shall be transferred to the RT10 TOU and the RT20 TOU 6-months after the effective date of this Determination Notice. During the transition period leading up to the transfer, JPS shall engage customers in a well-structured education /promotion programme concerning the nature of TOU rates."

The above Determination requires JPS to transition existing residential and small commercial Net-Billing to the OUR's approved respective variable charge only TOU tariffs. This decision is counter to JPS' proposal to have these customers transitioned to a more appropriate tariff for customers with distributed generation.

JPS has formally written to the OUR expressing its concerns related to the TOU tariffs, and the appropriateness of these customers migrating to such a rate. The appropriate billing construct for these customer must include a demand charge, and JPS is therefore reiterating its position to await a review of the DER tariff and framework before the decision is made to migrate these customers.

7. *TOU Rate Design:* Determination# 26 (a) approved the implementation of Time-of-Use (TOU) for Residential and Small Commercial customers and states that "the billing of customers in these two rate classes shall exclude the use of demand charges, and therefore the recovery of revenues shall be based entirely on the customer and energy charges."

JPS has expressed its concern with the approved rates. The rates if implemented as is, will also disadvantage JPS by reducing its ability to recover cost and put at risk its financial performance.

8. *Deferral of TOU Rate Implementation:* The benefits of the expansion of TOU tariffs to the wider customer is fully understood by JPS. If properly implemented there is the potential to significantly transform the way households and business utilize energy. The medium and long-term benefits to the system are well documented.

Properly designed, TOU tariffs are intended to be revenue neutral to the utility, provide a price signal to customers during the period of higher electricity cost of production, usually defined as the Peak, as well as we provide customers, having modified their consumption patterns to realize savings on their electricity bills.

To prevent revenue leakage, JPS is proposing that a thorough review of the rate be conducted by the OUR, supported by an analysis of updated or new customer information, behavioural patterns and assumptions, especially those brought on by the pandemic.

PROPOSED TARGETS FOR 2021

JPS' regulatory regime is characterized by performance targets for a number of key variables that affect the costs, quality and reliability of service received by customers. In proposing adjusted targets for 2021, JPS is requesting clarification from the OUR on the Q-Factor baseline derivation methodology applied in the establishment of the targets, which are required by Paragraph 37, Schedule 3 of the Licence to be reasonable and achievable. JPS proposes that in line with international utility best practices, the definition of "Major System Failure" should be consistent, and at minimum, include the requirement that "at least 100,000 customers or approximately 15% of the customer base is affected". Proposed adjusted targets for the other performance factors are as follows:

Heat Rate

JPS has identified three major contributing factors that are most likely to negatively impact heat rate performance outlook for 2021/22. These are:

- 1) The effects of current pandemic on the load demand;
- 2) The 40 days planned outage of JPS' most efficient unit (Bogue ST14); and
- 3) The Rockfort units heat rate deterioration.

Given these factors and in keeping with the principle of Fuel Cost Adjustment Mechanism (FCAM), JPS is proposing that the July 2021 –June 2022 thermal heat rate target be revised from 9,667kJ/kWh outlined in the Final Determination to **9,927kJ/kWh**. JPS also strongly believes that in setting a reasonable and achievable target for the period, an acceptable buffer should be established to alleviate the impact that higher than planned forced outages on the IPP units have on JPS' fuel recovery, due to the running of less efficient units (peakers) to maintain system reliability and stave off load shedding. The buffer will also alleviate the negative impact from unplanned events not already in the forecast.

System Losses

JPS has not revised its mechanism for determining responsibility proposed in its 2019-2024 Rate Review application. NTL is split into aspects deemed fully within the control of JPS and aspects not fully within the control of JPS according to the level of smart meter coverage. Consequently, JPS proposes the following targets for 2021 system loss as detailed in Chapter 6:

System Loss Component	Target(%)
Technical loss	7.90
Non-technical loss fully within the control of JPS	6.61
Non-technical loss not fully within the control of JPS	12.90
Total	27.41%

RATE ADJUSTMENT AND BILL IMPACTS

Recovery of the proposed 2021 ART in the 2021/22 period requires an overall non-fuel tariff increase adjustment of 12.3%. This required tariff increase is derived by applying across-the-board equal percentage increase to the current tariffs based on the 2020 actual billing determinants.

While the non-fuel tariff increase is requested at 12.3%, the associated total bill impact will be significantly smaller for all rate classes. This is because JPS non-fuel revenue requirement makes up only about $1/3^{rd}$ of the total revenue requirement, which also includes Fuel and IPP flow-through charges. JPS does not forecast any change to the Fuel and IPP charge components at this time.

Assuming no change in the current fuel prices, the total bill impact (including Fuel and IPP charges) will be an increase of approximately 3.5% for all customers.

Considering that JPS is requesting an equal percentage increase to the current non-fuel tariffs, the average bill impact by customer class will only differ depending on the weight of Fuel and IPP charges in those customers' bills and is expected to be in a similar range of 2.2%-4.3%. The table below highlights the average monthly bill impact per category.

		Current			Proposed	Non-Fuel	Bill	
Category	Non-Fuel	Fuel & IPP	Total	Non-Fuel	Fuel & IPP	Total	Tariff Variation	Impact
Rate 10 - Residential	17.60	38.72	56.32	19.76	38.72	58.49	12.3%	3.8%
Rate 20 - Small Commercial	10.62	48.28	58.90	11.92	48.28	60.20	12.3%	2.2%
Rate 60 - Streetlight	12.62	42.65	55.27	14.15	42.65	56.80	12.1%	2.8%
Rate 40 - Large Commercial	15.97	29.70	45.67	17.93	29.70	47.63	12.3%	4.3%
Rate 40 - Large Commercial TOU	12.18	29.50	41.68	13.68	29.50	43.18	12.3%	3.6%
Rate 50 - Industrial	11.04	35.65	46.69	12.40	35.65	48.05	12.3%	2.9%
Rate 50 - Industrial TOU	12.37	31.63	44.00	13.89	31.63	45.52	12.3%	3.5%
Rate 70 - MV Power Service	14.46	26.41	40.87	16.23	26.41	42.64	12.3%	4.3%
Rate 70 - MV Power Service TOU	12.81	32.28	45.08	14.38	32.28	46.66	12.3%	3.5%
Total	14.89	37.26	52.15	16.72	37.26	53.99	12.3%	3.5%

Bill Impact per Rate Category

When system losses target true-up is not applied for 2020, the total bill impact (including Fuel and IPP charges) will be an increase of approximately 4.0% for all customers as compared to 3.5%.

CONCLUSION

In summary, the 2021 AAF submission reflects a balance between customer interests, and fair treatment for the utility allowing JPS to meet its mandate to provide affordable and reliable service, convenience, security, improve its overall efficiency and enhance customer service delivery. The current AAF submission has been developed reflecting challenges and opportunities including the following:

- Delay in the Final Determination which resulted in shorter revenue collection period under the adjusted rates.
- Inability of JPS to achieve targets that were set retrospectively.
- Impact of the COVID-19 on investment in the capital infrastructure, which have been brought forward to help improve services to customers, increase reliability, and support Jamaica's economic growth and expansion.
- Cost pressures attributable to uncontrollable factors, such as foreign exchange movements.

In order to mitigate the impact of these drivers on the revenue requirement and to reduce the costs that influence pricing to its customers, JPS continues to modernize the grid by investing in smart devices on the network, upgrades and expansion of the transmission and distribution network.

1. PBRM Annual Adjustment

1.1 Introduction

The Electricity Licence 2016 dated January 27, 2016 was gazetted in February, 2016. The Licence shall hereafter be cited as the "Electricity Licence".

Paragraphs 1 and 2 of Condition 15 of the Electricity Licence which governs Price Controls, states that:

- 1. "The Licensee is subject to the conditions in Schedule 3.
- 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 of the Electricity Licence prescribes that "the basis of rate setting shall be the revenue cap principle which looks forward at five (5) year intervals and involves the de-coupling of kilowatt hour sales and the approved revenue requirement."

Paragraphs 1 to 5 of Schedule 3 states as follows:

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

Outlined below are paragraphs 42 to 46 of Schedule 3, which prescribes the methodology to be used in making an Annual Performance-Based Rate-Making Filing for Rates under the mechanism. Paragraphs 42 to 46 provides as follows:

42. The methodology to be utilised by the Office in computing the PBRM is set out in detail in *Exhibit 1*.

- 43. The Licensee shall make annual filings to the Office at least sixty (60) days prior to the Adjustment Date. These filings shall include the support for the performance indices, the inflation, and the proposed non-fuel rates for electricity and other information as may be necessary to support such filings.
- 44. These filings shall also propose the non-fuel rates scheduled to take effect on the Adjustment Date for each of the rate categories. These rates shall be set to recover the annual revenue requirement for the same year in which the proposed rates take effect, given the target billing determinants.
- 45. The target billing determinants shall be based on the actual billing determinants for the immediately preceding calendar year. The Office is empowered to adjust the target billing determinants for known and measurable changes anticipated in relation to the following year.
- 46. The Office shall apply the following adjustment factors to the non-fuel rate at each PBRM:
 - a. The <u>**O-Factor**</u>, which is the annual allowed price adjustment to reflect changes in the quality of service provided by the Licensee to its customers. The Office shall measure the quality of service versus the annual target set in the 5 year rate review determination.
 - b. The <u>*H-Factor*</u>, 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.
 - c. The <u>Y-Factor</u> reflects the achieved results versus the long-term overall system losses target.
 - *d.* The <u>*Z*-Factor</u> 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.
 - (ii) where the Licensee's rate of return with respect to the Licensed Business is one (1) percentage point higher or three (3) percentage points lower than the approved regulatory target (after taking into consideration the allowed true-up annual adjustments, special purpose funds included in the Revenue Requirement, awards of the Tribunal (sic) and determinations (sic) of the Office and adjustments related to prior accounting periods). This adjustment may be requested by the Licensee or the Minister or may be applied by the Office;

- (iii) where the Licensee's capital & special program expenditure are delayed and such delay results in a variation of 5% or more of the annual expenditure, the Z-factor adjustment will take into consideration the over-recovery of such expenditures plus a surcharge at the WACC;
- (iv) Government Imposed Actions;
- (v) where the Licensee demonstrates and the Office agrees that an extra-ordinary level of capital expenditure or a special programme is required (i.e. greater than 10% for any given year relative to the previously agreed five year Business Plan); or
- (vi) where the Licensee is required to make a change to the Guaranteed Standards in Condition 17(5) and such change will have a financial impact on the Licensee in an amount greater than Fifty Million Jamaican dollars (J\$50,000,000.00) during any rate review period.

1.2 Computation of Exhibit 1 Parameters

The annual adjustment in the Electricity Licence allows JPS to adjust its revenue target to reflect general movements in inflation, changes in service quality, changes in the base foreign exchange rate, and where applicable an adjustment for unforeseen occurrences beyond management control not captured in the other elements of the PBRM. The mechanism also allows for a revenue surcharge which includes a true up for revenues, a system losses incentive mechanism and a FX surcharge, offset by net interest income received from customers.

The Annual Revenue Target parameters in this filing are consistent with the OUR's Determinations as published in the 2019-2024 Rate Review Determination.

1.2.1 The Revenue Cap for 2021 (RC₂₀₂₁)

The Electricity Licence describes the parameter RC_y as the revenue cap for year "y" which should be established in the most recent Rate Review. The Electricity Licence contemplates that for each year of the Rate Review period, the parameter RC_y will be established without factoring inflation. In making annual adjustments to the Revenue Cap, the inflation between the Base Year and the current adjustment period would be factored into the dI parameter.

Determination #29 of the 2019-2024 Rate Review Determination ("Final Determination") approved RC of J\$37,857M for 2021 subject to Z-Factor conditions set out in Schedule 3 of the Licence and the Final Criteria.

Based on this determination and in the absence of an order from the Tribunal under Condition 32(1)(iii) of the Electricity Licence to stay this determination and certain other determinations in the Final Determination until the outcome of the Licensees appeal, the revenue cap for 2021 is J\$37,857M.

1.2.2 The Rate of Change of Revenue Cap (dPCI)

The annual PBRM filing will follow the general framework where the rate of change in the Revenue Cap will be determined through the following formula:

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

where:

dI	=	the growth rate in the inflation and JMD to USD exchange rate measures;
Q	=	the allowed price adjustment to reflect changes in the quality of service provided to the customers versus the target for the prior year;
Ζ	=	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.

The growth rate (dI) represents the changes in the value of the JMD against the USD and the inflation in the cost of providing electricity products and services. Its calculation requires parameters for the US portion of the total non-fuel expenses and the US debt service portion of the non-fuel expenses.

In the 2019-2024 Rate Review Determination the OUR calculated approved RC for 2020 adjusted for dPCI where the OUR used the following parameters for these factors which are consistent with the parameters used in the previous Annual Adjustment Filings since 2016:

- $USP_b = 80\%$; and
- $USDS_b = 6.88\%$;

The base exchange rate approved in the 2019-2024 Rate Review Determination is EX_b =J\$128:US\$1.

The application of the adjustment factor dI will result in an increase of 18.51% to the base nonfuel Revenue Requirement in Jamaica dollar terms, derived using the following factors:

- Jamaican point-to-point inflation (INF_J) between March 2021 and March 2018 of 14.0%, derived from the CPI data¹ published by STATIN (see Appendix A);
- U.S. point-to-point inflation rate (INF_{US}) between March 2021 and March 2018 of 6.1%, derived from the U.S. Department of Labor statistical data² (see Appendix B);

¹ Obtained from the Statistical Institute of Jamaica.

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

• The 13.3% increase in the Base Exchange Rate $\left(\frac{EX_n - EX_b}{EX_b}\right)$ from J\$128: US\$1 to J\$145: US\$1;

JPS' 2019-2024 Rate Review application was expressed in 2018 values (for both Jamaican and US denominated costs). Paragraph 18.129 of the Final Determination states that the approved revenue caps are "based on real 2018 prices". For this reason, and considering that JPS' 2019-2024 Rate Review application was expressed in 2018 values, adjusting these real 2018 values to 2021 dollars in this adjustment must include the changes in CPI between March 2018 and March 2021.

The full adjustment to be made to the approved Revenue Cap (the dPCI) 27.02%, calculated by adding the Q-factor and Z-factor adjustments to the dI.

- The Q-factor should be based on three quality indices until revised by the Office and agreed between the Office and the Licensee. The Q-factor adjustment factor is 0% and is detailed in Chapter 3; and
- The computed value of the Z-factor is 8.51% for the tariff implementation delay and 2020 rate of return (ROR) result discussed in Chapter 4.

Table 1-1 below sets out the details of the computation of the growth rate, dPCI. and *Table 1-2* shows the 2021 revenue cap adjustment for dPCI escalation factor.

Annual Adjustment Clause Calculation										
	ESCALATION FACTOR (dl) based on point to point data as at March 2021									
Line	Description	Formula	Value							
L1	Base Exchange Rate		128.00							
L2	Proposed Exchange Rate		145.00							
L3	Jamaican Inflation Index									
L4	CPI @ Mar 2021		108.30							
L5	CPI @ March 2018		95.00							
L6	US Inflation Index									
L7	CPI @ Mar 2021		264.88							
L8	CPI @ March 2018		249.55							
L9	Exchange Rate Factor	(L2-L1)/L1	13.28%							
L10	Jamaican Inflation Factor	(L4-L5)/L5	14.00%							
L11	US Inflation Factor	(L7-L8)/L8	6.14%							
L12	Escalation Factor (dl)	+(0.8-0.0688)*L11}+(0.8-0.0688)*L11+(1-0	18.51%							
L13	Q Factor		0.00%							
L14	Z Factor		8.51%							
L13	Escalation Factor net of Q and Z	dl + Q + Z	27.02%							

Table 1-1: Escalation Factor

Computation of Revenue Cap for 2021								
L1	2021 Revenue Cap (as in Determination)		37,856,804,905					
L2	dPCI (dI + Q + Z)		27.02%					
L3	Adjusted RC2021	L1 * (1+L2)	48,086,093,051					

Table 1-2: 2021 Revenue Cap Adjustment

1.2.3 Foreign Exchange and Interest Surcharges

Paragraphs 31 and 53 of Schedule 3 of the Electricity Licence provide for the inclusion of foreign exchange (FX) losses and net interest expense/(income) in the revenue requirement to be set at the time of a Rate Review. The annual adjustment mechanism described in Exhibit 1, includes a true-up for FX losses (FX surcharge) which is offset by interest surcharge on customer arrears, such that:

$$SFX_{y-1} = AFX_{y-1} - TFX$$

 $SIC_{y-1} = AIC_{y-1} - TIC$

where:

- SFX_{y-1} = Annual foreign exchange result loss/(gain) surcharge for year "y-1". This represents the annual true-up adjustment for variations between the foreign exchange result loss/(gain) included in the Base Year revenue requirement and the foreign exchange result loss/(gain) incurred in a subsequent year during the rate review period.
- AFX_{y-1} = Foreign exchange result loss/(gain) incurred in year "y-1".
- *TFX* = The amount of foreign exchange result loss/(gain) included in the revenue requirement of the Base Year
- SIC_{y-1} = Annual net interest expense/(income) surcharge for year "y-1".

This represents the annual true-up adjustment for variations between the net interest expense/(income) included in the Base Year revenue requirement and the net interest expense/(income) incurred in a subsequent year during the rate review period. The net interest income shall be deducted from the revenue requirement while net interest expense shall be added to the revenue requirement.

- AIC_{y-1} = Actual net interest expense/(income) in relation to interest charged to customers and late payments per paragraph 49 to 52 of Schedule 3 in year "y-1".
- TIC = The amount of net interest expense/(income) in relation to interest charged to customers and late payments included in the revenue requirement of the Base Year as per Schedule 3 Exhibit 1

At the time of an annual adjustment, the FX surcharge is computed as the actual FX loss incurred during the previous year less the target for FX loss set at the last Rate Review. Similarly, the interest surcharge is calculated as the actual interest income (including net late payment fee) less the provisions made for interest income in the revenue requirement.

This annual adjustment mechanism is also referenced in the Final Criteria paragraph 3.7.3, which notes that random events, such as storms, foreign exchange losses/gains and changes in tax policy, that impact JPS' costs are provided through the Annual Revenue Target Mechanism; the Z-Factor component of the Revenue Cap Mechanism; and the Electricity Disaster Fund.

Schedule 3 Exhibit 1 of the Licence defines target net interest income (TIC) as the amount of net interest expense/(income) in relation to interest charged to customers and late payments included in the revenue requirement of the Base Year.

Further, Criterion 1 of the Final Criteria sets out that prudently incurred costs associated with the issuance of debt such as commitment fees, arrangement fees, due diligence fees, breakage costs and refinancing fees should be included in the non-fuel operating costs/expenses.

Paragraph 31 of Schedule 3 of the Licence also includes interest and other financial costs on other borrowings; working capital requirements not associated with capital investment; and foreign exchange result loss/(gain) in non-fuel operating costs of JPS' revenue requirement. Consistent with Criterion 1 of the Final Criteria, financial costs on the borrowing includes debt issuance cost.

In accordance with Criterion 1 of the Final Criteria, JPS' financing costs included in the revenue requirement is comprised mainly of interest costs associated with short-term debt, the amortization of debt issuance costs, and interest on customer deposits, which are offset by interest (finance) income earned as discussed in Section 13.4 of the 2019-2024 Rate Review application.

The Final Determination approved the following provisions in the 2020 revenue requirement for FX losses and interest income:

- **FX Losses (TFX):** J\$280M (paragraph 11.290). When adjusted for the 2020 growth rate (dI) of 13% as computed in the Final Determination Table 18.18, the approved FX losses provision for 2020 is J\$316.4M.
- Net interest expense (TIC): J\$52.986M of Interest on Customer Deposits and J\$212.114M of Debt Issuance Costs (US\$0.414M and US\$1.657M respectively as per Table 11.12 of the Final Determination) offset by J\$317.696M of Interest Income (US\$2.482M as per Table 11.34 of the Final Determination). When adjusted for the 2020 growth rate (dI) of 13% as computed in the Final Determination Table 18.18, the approved TIC provision for 2020 is J\$59.4M.

Schedule 3, Paragraph 53 of the Licence stipulates that "[t]here shall be an annual true-up adjustment in relation to the actual net interest expense/(income) paid/(earned) by the Licensee in any year compared to the amount included in the Base Year."

Schedule 3, Paragraph 55 of the Licence stipulates that "[t]he 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."

Accordingly, the actual net interest expense in relation to interest charged to customers in 2020 reflects the realised interest income consistent with requirement in Schedule 3, Paragraph 53 of the Electricity Licence that the true-up adjustment shall be in relation to actual net interest expense paid / net interest income earned. The realised income is based on the distribution of the payments made and credit balances applied to the interest charge for commercial and government accounts created in Customer Suite.

Similarly, in accordance with the requirement in paragraph 55, Schedule 3 of the Electricity Licence, the FX loss incurred during 2020 reflect actual (realised) FX loss based on the incurred currency loss and gains.

Actual realized 2020 interest income in relation to interest charged to commercial and government accounts was J\$316.4M offset by actual realized interest expense of J\$149.1M paid on customer deposits, short-term loans and debt issuance costs. Actual late payment fees in 2020 were J\$163.4M. FX losses in 2020 reflect realised currency losses of J\$2,294.2M.

The AFX is computed as actual recorded FX losses at the average exchange rate for 2020 of J\$142.84:US\$1. Similarly, the actual net interest income (AIC) is computed as actual net interest income at the same exchange rate. Based on these assumptions, the foreign exchange and interest surcharges for 2020 are computed as illustrated in *Table 1-3*.

	FX and Interest Surcharge for 2020 (SFX2020 - SIC2020)								
Line	Description	Formula	Value						
	FX Surcharge								
L1	TFX2020		316,400,000						
L2	AFX2020		2,294,206,476						
L3	SFX2020	L2-L1	1,977,806,476						
	Interest Surcharge								
L4	Actual net interest expense/(income) for 2020		167,054,824						
L5	Actual Net Late Payment fees for 2020		163,423,740						
L6	AIC2020	L4+L5	330,478,564						
L7	TIC2020		59,447,040						
L8	SIC2020	L6-L7	271,031,524						
L9	SFX2020 - SIC2020	L3-L8	1,706,774,952						

 Table 1-3: Computation of FX and Interest Surcharges

The foreign exchange and interest surcharges result in J\$1,706.8M increase in the 2021 ART

1.2.4 Revenue Surcharge

The revenue surcharge is comprised of: (1) the true-up for volume adjustments; and (2) the trueup for system losses, the targets of which are required to be reasonable and achievable pursuant to paragraph 37 of Schedule 3 of the Electricity Licence. These true-ups reconcile JPS' actual performance during 2020 against the targets set for that year, and result in a J\$773 Million reduction to the Annual Revenue Target (ART) for 2021. The calculation for the volume adjustment and system losses true-ups is detailed in Section 2.1.4.1 and 2.1.4.2.

1.2.4.1 True Up for Volumetric Adjustments

In accordance with the methodology outlined in Paragraphs 42 to 56 of Schedule 3 of the Electricity Licence, the volumetric adjustment for any year is dependent on the variance between the target billing determinants and those that were actually achieved during that year.

Billing determinants for 2020 were approved in Determination #24 of the Final Determination as shown below:

- Energy sales: 3,068 GWh
- Billing demand: 4,700,980 kVa
- Customer forecast: 690,051

The total revenue that would be generated by the tariffs approved in the Final Determination multiplied by the approved billing determinants is J\$41.016B as shown in *Table 1-4*.

				E nergy F	levenue		Demand (KVA) revenue				
Class		Customer Revenue	Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak	Total Revenue
Rate 10	LV <100	3,911,942,515	5,394,440,435	•							9,306,382,950
Rate 10	LV >100		8,676,996,305	-	-						8,676,996,305
Rate 20	LV	909,018,471	5,236,320,580	-	-						6,145,339,050
Rate 40	LV - Std	167,195,089	3,951,240,841	-	-	-	5,929,802,836				10,048,238,766
Rate 40	LV - TOU	10,861,449		251,801,939	236,716,559	66,553,217		94,321,893	318,369,613	345,410,239	1,324,034,909
Rate 50	MV - Std	11,681,073	1,022,042,038				1,022,184,423				2,055,907,534
Rate 50	MV - TOU	2,159,061	-	95,148,130	101,887,224	30,048,559		48,266,583	125,069,734	124,118,160	526,697,451
Rate 70	MV -STD	1,798,743	771,374,566	-	-	-	1,156,007,033				1,929,180,342
Rate 70	MV -TOU	381,552	-	75,908,526	64,824,405	21,650,554		30,912,267	85,324,640	111,948,851	390,950,795
Rate 60	LV	19,212,061	592,897,202	-	-	-					612,109,263
TOTAL		5,034,250,013	25,645,311,966	422,858,595	403,428,188	118,252,330	8,107,994,291	173,500,743	528,763,986	581,477,251	41,015,837,364

 Table 1-4: Expected Revenue Target (J\$): 2020
 Part (J\$): 2020

This is not exactly equal to the approved revenue cap for 2020 of J\$41.211B as stated in Table 18.15 of the Determination. To calculate the revenue targets to be used in the surcharge, the revenues as shown in *Table 1-4* are scaled so that the total will be the approved revenue cap (shown in *Table 1-5* below).

				Demand (KVA) revenue							
(Class	Customer Revenue	Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak	Total Revenue
Rate 10	LV <100	3,930,558,270	5,420,110,951	-	-	•					9,350,669,220
Rate 10	LV >100	-	8,718,287,514	-	-						8,718,287,514
Rate 20	LV	913,344,216	5,261,238,651	-	-	-					6,174,582,866
		-		-	-						-
Rate 40	LV - Std	167,990,720	3,970,043,605	-	-		5,958,020,980		-		10,096,055,305
Rate 40	LV - TOU	10,913,135	-	253,000,189	237,843,022	66,869,924	-	94,770,742	319,884,638	347,053,942	1,330,335,592
Rate 50	MV - Std	11,736,660	1,026,905,628				1,027,048,690				2,065,690,978
Rate 50	MV - TOU	2,169,335	-	95,600,911	102,372,075	30,191,551	-	48,496,269	125,664,903	124,708,801	529,203,845
Rate 70	MV -STD	1,807,303	775,045,305	-	-	-	1,161,508,122	-	-	-	1,938,360,730
Rate 70	MV -TOU	383,367		76,269,752	65,132,885	21,753,583	-	31,059,369	85,730,674	112,481,582	392,811,212
Rate 60	LV	19,303,486	595,718,621	-	-						615,022,107
TOTAL		5,058,206,492	25,767,350,274	424,870,852	405,347,981	118,815,057	8,146,577,792	174,326,381	531,280,215	584,244,326	41,211,019,369

 Table 1-5: Corrected Approved Revenue Target: 2020

Using these adjusted revenues as the basis, the Non-fuel Energy, Customer Charge and Demand revenues targets used in the volumetric true-up for 2020 are calculated as shown in *Table 1-6* below:

Table 1-6: Approved Revenue Target: 2020

Component of Target	J\$M
Revenue Target for Energy	26,716
Revenue Target for Demand	9,436
Revenue Target for Customer Charges	5,058
2020 Approved Revenue Cap (as in Determination)	41,211

As illustrated in *Table 1-7*, TUVol₂₀₂₀ is determined by substituting the values computed in *Table 1-6* above. The 2020 volumetric adjustment is a J\$38.2M reduction in the ART before WACC adjustment.
	Volumetric Adjustment	t TUVol 2020	
Line	Description	Formula	Value
	Energy Surcharge		
L1	kWh Target ₂₀₂₀		3,067,885,952
L2	kWh Sold ₂₀₂₀		2,937,892,548
L3	Revenue Target for Energy		26,716,384,165
L4	kWh Surcharge	(L1-L2)/L1*L3	1,132,034,820
	Demand Surcharge		
L5	kVA Target ₂₀₂₀		4,700,980
L6	kVA Sold ₂₀₂₀		5,312,587
L7	Revenue Target for Demand		9,436,428,713
L8	kVA Surcharge	(L5-L6)/L5*L7	(1,227,697,645)
	Customer Count Surcharge		
L9	#Customer Charges Target ₂₀₂₀		690,051
L10	#Customer Charges Billed ₂₀₂₀		682,206
L11	Revenue Target for Customer Charges		5,058,206,492
L12	Customer Charges Surcharge	(L9-L10)/L9*L11	57,503,020
L13	TUVol ₂₀₂₀	L4+L8+L12	(38,159,806)

Table 1-7: Computation of Volumetric Adjustment

1.2.4.2 System Losses Adjustment

As stated in the Electricity Licence, the annual non-fuel adjustment factor includes the system losses incentive mechanism. The system losses true-up, represented in the formulaic representations as TULos is computed by first disaggregating system losses into three (3) components: TL, JNTL and GNTL where:

TL = Technical Losses

JNTL = Portion of Non-technical losses which is completely within JPS' control

GNTL = Portion of Non-technical losses which is not completely within JPS' control

Each component of system loss is then measured against a target that would be set 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 $\%_{y-1}$

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

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

Schedule 3, Exhibit 1 of the Electricity Licence stipulates that the responsibility factor is to be "determined by the Office, in consultation with the Licensee, having regard to the (i) nature and root cause of losses; (ii) roles of the Licensee and Government to reduce losses; (iii) actions that were supposed to be taken and resources that were allocated in the Business Plan; (iv) actual actions undertaken and resources spent by the Licensee; (v) actual cooperation by the Government; and (vi) change in the external environment that affected losses".

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

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

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

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

In order to complete the calculations for the losses true-up, $TULos_{2020}$, the actual system losses for the year must be disaggregated into the respective three (3) components stipulated in the Electricity Licence to enable the comparison against the targets set by the OUR in the Final Determination. Once disaggregated, the three (3) components will be computed separately and re-aggregated to derive the losses penalty.

Determination #21 of the Final Determination approved system losses targets for the Rate Review period, which are as follows for 2020:

- a. Technical Losses (TL) Target: 7.78%
- b. Non-Technical Losses within the control of JPS (JNTL) Target: 4.71%
- c. Non-Technical Losses not fully within the control of JPS (GNTL) Target: 11.58%
- d. Responsibility Factor (RF) for Non-Technical Losses to JPS' NTL that are not totally within its control: **20%**

Based on the allocation as outlined Table 14.26 of the Final Determination and the absence of a stay by the Tribunal under Condition 32(1(iii) of the Electricity Licence, these targets remain as the approved targets from the OUR until an award of the Tribunal is issued giving rise to the contrary.

Detailed discussion of the system losses performance in 2020 and JPS' position and proposal with respect to the system losses targets adjustment is provided in Chapter 8. This chapter also includes JPS' response to Determination #21, which requires JPS to submit with reasonable accuracy, the specific sources and distribution of the energy losses for all the NTL categories, supported by the associated reports and details of the field investigations and analyses.

Using these targets and the actual system losses performance for 2020, the system losses penalty is \$735.2M as shown in *Table 1-8*.

While JPS included system losses penalty in the 2021 ART in this application, JPS believes that the target true-up for system losses should not be applicable for 2020 based on the following grounds:

- 1. The subject targets are applicable to periods prior to the effective date of the Final Determination and targets cannot be applied retroactively.
- 2. In any event, the system losses targets were set at the height of COVID-19 pandemic, are not reasonable and achievable, and therefore inconsistent with the requirements of paragraph 37 of Schedule 3 of the Electricity Licence.

When the system losses target true-up is not applied, the 2020 system losses adjustment results in J\$0 revision to the 2021 ART, which is also shown in *Table 1-8*.

	System Losses Adjustment TULos ₂₀₂₀					
			OUR Approved	JPS Proposed		
Line	Description	Formula	Targets	Targets		
L1	Actual TL ₂₀₂₀		7.91%	7.78%		
L2	Target TL ₂₀₂₀		7.78%	7.78%		
L3	Ya ₂₀₂₀	(L2-L1)	-0.13%	0.00%		
L4	Actual JNTL ₂₀₂₀		5.82%	4.71%		
L5	Target JNTL ₂₀₂₀		4.71%	4.71%		
L6	Yb ₂₀₂₀	(L5-L4)	-1.11%	0.00%		
L7	Actual GNTL ₂₀₂₀		14.30%	11.58%		
L8	Target GNTL ₂₀₂₀		11.58%	11.58%		
L9	RF		20.00%	10.00%		
L10	Yc ₂₀₂₀	(L8-L7)*L9	-0.5440%	0.00%		
L11	Y ₂₀₂₀	L3 + L6 + L10	-1.78%	0.00%		
L12	ART ₂₀₂₀		41,211,019,369	41,211,019,369		
L13	TULos ₂₀₂₀	L11*L12	(735,204,586)	0		

 Table 1-8: Computation of TULos2020

2. Q-Factor Adjustment

2.1 Introduction

The Q-factor mechanism is included in the annual revenue adjustment formula as a component of dPCI i.e., the allowed price adjustment to reflect changes in the quality of service provided to customers. Specifically:

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

Criterion 11 of the Final Criteria provides that in the 2019-2024 Rate Review application, JPS shall include its proposed Q-Factor Baseline, projected annual quality of service performance, and proposed annual Q-Factor targets for each of the 12-month adjustment periods, during the Rate Review Period".

In accordance with Criterion 11, JPS in its Rate Review application proposed the Q-Factor Baseline, for which the Company utilized the most recent three-year average of the actual outage dataset adjusted to exclude Non-Reportable forced outages and outages caused by Independent Power Producers (IPPs).

As previously stated in the 2019-2024 Final Determination, to establish the baseline values for the quality indices (SAIDI, SAIFI and CAIDI) to implement the Q-Factor adjustment mechanism, the 2016-2018 outage data as proposed by JPS, was comprehensively vetted and utilized by the OUR based on the fact that they considered the data to be fairly suitable for the reliability calculations, within tolerable limits of error. The OUR methodology included sustained, reportable, forced outages along with outages attributed to IPPs.

The OUR presented two statistical methodologies in deriving the quality indices however it was not clear how the OUR arrived at the final baseline based on the statistical indices presented. JPS requires clarity on the completeness of the methodology in arriving at the established Q-Factor baseline from the statistical values presented.

Notwithstanding, the 2021 Annual Review is the first year for the application of the Q-Factor mechanism in the 2019-2024 Rate Review period, since it was set to zero for the 2020 Annual Review. The OUR approved 2020 Annual Targets, against which JPS performance will be measured, are highlighted in Table 2-1 below:

Table 2-1: OUR Appr	oved Q-Factor Ani	nual Targets for 201	19-2024 Rate R	Review Period
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Outage Data	Description	Target SAIDI	Target SAIFI	Target CAIDI
2016-2018	BASELINE	SAIDI _{Base} (1,582)	SAIFI _{Base} (12.9)	CAIDI _{Base} (122.7)
2019	2020 -2021 Annual Review	No8 Pre-set Target	No Pre-set Target	No Pre-set Target
2020	2021 -2022 Annual Review	SAIDI _{Base} *(1- 0.05)	SAIFI _{Base} *(1- 0.04)	CAIDI _{Base} *(1- 0.01)
2021	2022-2023 Annual Review	SAIDI _{Base} *(1- 0.11)	SAIFI _{Base} *(1- 0.09)	CAIDI _{Base} *(1-0.02)
2022	2023-2024 Annual Review	SAIDI _{Base} *(1- 0.15)	SAIFI _{Base} *(1- 0.13)	CAIDI _{Base} *(1-0.02)
2023	2024 PBRM Adjustment	SAIDI _{Base} *(1- 0.17)	SAIFI _{Base} *(1- 0.15)	CAIDI _{Base} *(1-0.02)

Based on Determination # 22 as outlined in the 2019-2024 Rate Review Determination Notice, other OUR determinations on the Q-Factor are as follows:

- i. For each Annual review application during the Rate Review period, JPS shall include an outage cause analysis to support its Q-Factor proposal.
- ii. JPS shall put measures in place to ensure that Non-Reportable forced outages shall not exceed 5% of total forced outages reported for each year.
- iii. JPS shall report to the OUR all momentary interruptions that occurred on the system, which it is able to capture along with the related MAIFI calculations.
- iv. JPS shall submit to the OUR, a detailed Reliability Report on a quarterly basis, which shall include all the data requirements applicable to the Annual Outage Data Report.
- v. The Status/progress of reliability projects being implemented.

The OUR approved Q-Factor targets for the 2021-2022 Annual Review as per Determination #22 to be applied to the outage data for 2020 is as follows:

- SAIDI: 1502.9 Minutes
- SAIFI: 12.4 interruptions/customer
- CAIDI: 121.5 Minutes

The current application is the first time there will be a Q-Factor adjustment to JPS' annual revenue target since the 2016 Licence amendment.

2.2 JPS' Reliability Performance 2020

JPS' 2020 outage data constitutes forced, sustained, reportable outages and excluded outages which attributed to IPPs. JPS' performance versus Q-Factor targets are presented in Table 2-2:

SAIDI			SAIFI (interruptions/customer)			CAIDI		
(min/customer)						(min/customer)		
OUR Q-factor Target	JPS' Actual	Variance (%)	OUR Q-factor Target	JPS' Actual	Variance (%)	OUR Q-factor Target	JPS' Actual	Variance (%)
1502.9	1486.8	1%	12.4	8.6	31%	121.5	173.2	-43%

Table 2-2: JPS 2020 Performance versus Q-factor targets

Based on the above 2020 performance, JPS has performed 1% and 31% better for SAIDI and SAIFI respectively, and 43% worse for CAIDI when compared to the established Q-Factor targets.

JPS' customers would have experienced a reduction in the frequency of outages (SAIFI) moving from an average of approximately twelve (12) times in 2019 to nine (9) times in 2020. JPS' SAIFI performance is attributed to the benefits realized from its reliability improvement programmes outlined in Table 7. However, customers would have seen an increase in outage durations, as restoration efforts were severely hampered by crews contracting the virus and the restrictions on movement imposed due to the Covid-19 pandemic. Additionally, JPS was impacted by the effects of three (3) major tropical storms, namely: Laura, Zeta and Eta which resulting in flooding, landslides and impassable roads. These three tropical storms had an enormous impact on JPS' reliability indices.

2.2.1 SAIDI Performance

Figure 2-1, provides SAIDI reliability performance for 2020 broken out by month against the baseline.



Figure 2-1: SAIDI Performance in 2020 (include Generation, Transmission and Distribution)

The 2020 monthly performance was generally better than the performance for 2016-2018 but slightly worse than that of 2019. The reliability performance in October was the worst JPS has experienced over the past five (5) years. This was due to the impact of Tropical Storm Zeta which resulted in impassable roads, landslides and flooding severely inhibiting JPS' ability to respond to power outages hence affecting outage duration.

2.2.2 SAIFI Performance

Figure 2-2, provides SAIFI reliability performance for 2020 broken out by month against the baseline.



Figure 2-2: SAIFI Performance in 2020 (include Generation, Transmission and Distribution)

Figure 2-2 shows that the 2020 monthly performance was generally better than the previous four (4) years except in the months of October and April. As previously explained JPS battled with the impact of Tropical Storm Zeta in October which resulted in several power outages across the island due to damaged network infrastructure. In April, there was also a major transmission incident as a result of a bush fire.

2.2.3 CAIDI Performance

CAIDI is derived from SAIDI and SAIFI indices. Figure 2-3, provides CAIDI reliability performance for 2020 broken out by month against the baseline.

Figure 2-3: CAIDI Performance in 2020 (include Generation, Transmission and Distribution)



Figure 2-3 shows that the CAIDI performance was generally worse than the previous four (4) years. When compared with same months over previous years, the performance worsened in March 2020 with the outbreak of the Covid-19 pandemic which triggered a series of COVID-19 containment measures including restrictions on movement. Coupled with the COVID-19 containment measures, the performance progressively worsened in August as a result of delayed response time owing to the impact of Tropical Storm Laura. Notwithstanding these challenges, there was a slight improvement in September. However, the performance again deteriorated with the impact of Tropical Storms Zeta and Eta in October and November respectively.

2.2.4 dPCI Q-Factor Adjustment

Exhibit 1 to Schedule 3 of the Licence sets out calculation of a Q-factor adjustment based on cumulative quality points scores. 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%

JPS' proposed Q-factor adjustment for the 2021-2022 Annual review is summarized in Table 2-3 below:

SAIDI (min/customer)		SAIFI (interruptions/customer)		C (min/e		
Variance	Quality Points	Variance	Quality Points	Variance Quali Point		Total Quality Points
1%	0	31%	3	43%	-3	0

 Table 2-3: Q-factor Adjustment for 2020 Performance

Table 2-3 illustrates that JPS would be awarded total quality points of zero for its 2020 performance. Hence, JPS proposes a Q-Factor adjustment of zero for the 2021 annual rate review.

2.2.5 Non- Reportable Forced Outages

As indicated in the 2017 Annual Tariff Adjustment Filing, event verification and calibration are generally considered an important part of the reliability reporting. With the acquisition of an Outage Management System in 2013, consistent with other utilities in the industry, inherent limitations in the application were discovered, which resulted in the establishment of daily processes for outage validations and adjustments. Additionally, data calibration is done when outage characteristics are abnormal. This resulted in the establishment of a Rule-Base Data Dictionary, agreed upon between OUR and JPS. These rules constitute:

- i. Excessive customer count & OMS/GIS Glitches
- ii. Non-Utility related outages
- iii. Incorrect customer to device mapping
- iv. Operator error

Though JPS has implemented various measures to reduce the number of Non-Reportable outages, our progress is inhibited by the limitation of the current OMS. An upgraded OMS is being proposed for 2022.

From 2016 to 2020, JPS Non-Reportable outages averaged approximately 6.9%, as indicated in Table 2-4 below:

YEAR	Total # of Forced Outages	# of Non- Reportable Outages	% Non- Reportable of Total Outages
2016	70,034	5,431	7.8%
2017	81,478	5,436	6.7%
2018	57,944	3,040	5.2%
2019	49,243	4,854	9.9%
2020	56,405	2,942	5.2%
Average	63,021	4341	6.9%

 Table 2-4: Non-Reportable Outages (2016-2020)

With the introduction of the 5% cap on Non-Reportable outages, JPS will therefore intensify its efforts to achieve this target for the 2022 Annual Rate Review Filing.

Table 2-5 shows the breakdown of Non-Reportable outages by modality and the percentage contribution:

Rule	Rule 1 – Excessive Customer Count	Rule 1 – GIS Glitch	Rule 1 – OMS Glitch	Rule 2 – Non-Utility Related Outage	Rule 3 – Incorrect Customer to Device Mapping	Rule 4 – Operator Error
# of Outages	835	1	378	1602	35	91
% of Total Non- Reportable Outages	28%	0.03%	13%	54%	1%	3%

Table 2-5: Breakdown of Non-Reportable forced outages

As illustrated in the table above the main drivers are Non-Utility related outages accounting for 54% of all Non-Reportable forced outages followed by outages with Excessive Customer Count accounting for 28%.

Initiative to reduce the number of Non-Reportable Forced Outages

JPS aims to improve the accuracy of customer to transformer mapping in the GIS and OMS system to progressively reduce the number of Non-reportable outages due to excessive customer count. This will be achieved through greater availability of up-to-date data as the implementation of smart meters progress.

2.2.6 Outage Cause Analysis

As stated in item c) of Determination# 22, in each Annual Review application during the Rate Review period, JPS shall submit an outage cause analysis to support its Q-Factor Proposal. This was submitted as "Annex E – Outage Drivers 2020" in its submission. Table 2-6 shows the reliability outage drivers and their respective contributions to SAIFI and SAIDI:

Primary Cause	% Contribution to SAIFI	% Contribution to	
		SAIDI	
Equipment Failure	30%	28%	
Unknown	22%	17%	
Vegetation	19%	30%	
Public Error	10%	9%	
Lightning	7%	10%	
Power Supply	7%	1%	
Other	3%	3%	
Wild Life	1%	1%	
Contamination	1%	1%	

Table 2-6: Outage Driver Contribution to SAIFI and SAIDI

Table 2-6 shows that Equipment Failure, Unknown and Vegetation were the main outage drivers for 2020. Equipment failure is largely due to the impact of the three major tropical storms as highlighted earlier. Through the Structural Integrity programme, JPS will target the assets in worst condition for replacement and rehabilitation.

In paragraph, 15.74 of the Final Determination, the OUR highlights that due to the significant number of outages caused by "Unknown" drivers, this should be addressed. JPS' acknowledges the OUR's concerns and would like to highlight that efforts are being intensified to reduce "Unknown" related outages.

2.2.7 Momentary Interruptions

Momentary interruptions are currently captured at the feeder circuit breaker level. These events are included in the Annual Outage Dataset. The derivation of this metric is consistent with calculations in the IEEE 1366-2012 Standards for reliability reporting.

2.2.8 Quarterly Report during Reporting Year

Determination 22 (f) which requires JPS to provide a detailed Reliability Report will be implemented for the 2021 Tariff Adjustment year. The Final 2019-2024 Rate Review Determination was received on December 24, 2020. Hence, no quarterly reports were submitted in 2020.

2.2.9 2020 Reliability Projects

The table below lists the Capital Investment Reliability projects that were approved in the 2019-2024 Rate Review Process. The completion status of the projects is outlined:

Reliability Impacting Projects	OU CA 000	R approved PEX (US\$')	Project Completion Status
Voltage Standardization Programme	\$	3,434	Completed
Grid Modernization Programme	\$	1,645	Completed
Distribution Structural Integrity	\$	4,489	Completed
Distribution Line Re-Conductoring and Relocation	\$	1,314	Deferred due to Covid-19 measures
Transmission Structural Integrity	\$	1,770	Completed
Substation Structural Integrity	\$	1,670	Completed
Distribution Transformer Replacement/Upgrade Program	\$	2,798	Completed
Grand Total	\$	17,120	

Table 2-7: Project completion status for reliability projects

The COVID-19 pandemic represents not just a global health crisis but has changed the way in which we operate as a utility. However, despite the challenges experienced by JPS due to various COVID-19 protocols and restrictions on movement which in many instances curtailed planned work activities, JPS has been tactical in implementing all but one project which was deferred to 2021 due to Covid-19 impact on Supply Chains. Please refer to the Capital Investment Chapter for further details on the scope and benefits realized for these projects as well as comments relating to

the Distribution Line Re-Conductoring and Relocation Programme. The completion of routine maintenance, such as integrated vegetation management and other diagnostic activities have also complemented these reliability improvement projects.

2.2.10 Challenges in 2020

• Covid-19 Pandemic

During the above-mentioned period, the enforcement orders issued by the Government of Jamaica under the Disaster Risk Management Act resulted in restrictions on movement, lockdowns and quarantine of sections of the island. These include all of St. Catherine; 7 Miles and 8 Miles Bull Bay in St. Andrew; Corn Piece, Sandy Bay and adjoining communities in Clarendon; Bamboo River, Church Corner, Lower Summit, Albion and Seaforth Communities in St. Thomas; Norwood, St. James; Kingston; Annotto Bay, Dover and Enfield in St. Mary. These restrictions resulted in delayed response time to power supply outages impacting JPS' Customer Average Interruption Duration Index (CAIDI) performance. The impact was a thirty-five percent (35%) worsening of CAIDI performance over the period.

Condition 11.2 of the Licence outlines Force Majeure conditions as follows:

"On application to the Minister, which has been granted, the Licensee shall be excused from any non-compliance with this Licence caused by Force Majeure."

JPS submitted a Force Majeure application to the Minister in line with the Licence provision to be excused from any non-compliance with the Licence due to Force Majeure circumstances affecting JPS' operations as result of the Covid-19 pandemic.In any event we believe the OUR will have no objection to the exclusion of sustained, forced outages caused by Covid-19 protocols and restrictions, which hampered the JPS's ability to respond to outages within a timely manner.

• Tropical Storms Laura, Zeta and Eta

Tropical Storms Laura, Zeta and Eta experienced August 23rd-24th, October 24th-26th and November 6th-8th respectively, had a major impact on JPS' electrical network resulting in numerous power outages across the island. The severity of weather conditions also hindered restoration efforts which were vastly impacted by flooding, landslides and impassable roadways. These storms had a combined impact of 208.5 minutes and 0.7 times contributing 14% to SAIDI and 8% to SAIFI 2020 Performance.

2.3 Retroactive Application of Targets and Concerns

Despite JPS' proposal of a 0% adjustment for the Q-Factor, we are of the view that there should be no retroactive target setting as the 2019-2024 Rate Review Determination was published by the OUR on December 24, 2020 and the setting of retroactive targets is not provided for in the Licence nor is it a prudent regulatory practice.

2.4 Reliability Performance Outlook for 2021 (Initiatives)

The accessibility of reliable electricity supply plays a pivotal role in ensuring the continuity of domestic and commercial activities within the energy landscape in Jamaica. To achieve JPS' strategic objectives, ongoing and sustained investment in the electricity system is required to deliver greater efficiency and service quality to our customers, which is one of our foremost objectives. In addition to grid investments, JPS wishes to improve communication to its customers and to offer additional choices and control. Along those lines, JPS will continue to expand its digital platforms to ensure ease of doing business across its customer base. In 2020, JPS launched its mobile application allowing customers to access features such as paying bills via their mobile device, tracking their energy usage, reporting outages and getting updates relating to planned outages.

Some of our over-arching objectives for 2021 are to:

- Reduce the average duration of unplanned power outages by 5%.
- Expand automated outage detection and reporting capabilities.
- Introduce innovative grid maintenance and improvement initiatives.
- Increase the use of JPS' digital platforms for fast and convenient service
- Provide more options so customers can choose the type of services they want.
- Empower customers to make the right decisions through the provision of energy usage data right on their mobile devices.

Table 2-8 summarizes the capital investment for reliability projects JPS will be undertaking in 2021:

Reliability Projects	OUR Approved CAPEX (\$US' 000)
Voltage Standardization Programme	3,196
Grid Modernization Programme	2,299
Distribution Structural Integrity Programme	4,564
Distribution Line Reconditioning and Relocation	2,124
Transmission Structural Integrity Programme	1,870
Substation Structural Integrity Programme	1,722
Grand Total	15,775

Table 2-8: Capital Investment for 2021 Reliability Projects

New Outage Management System

The current ABB/Ventyx OMS commissioned in 2013, has reached the end of its useful life both in terms of the OMS application and in terms of the Hardware platform. This poses serious cyber security risks as well as maintenance risks due to the likelihood of system failure. The current OMS also has limited integration with other critical operational and enterprise systems such as the SCADA and Advanced Metering Infrastructure/Meter Data Management System (AMI/MDMS), both of which will allow us to have improved outage prediction within the OMS. Also, based on industry trends, stand-alone OMS are also becoming obsolete with more utilities implementing an Advanced Distribution Management System (ADMS) solution. To achieve this JPS will have to migrate to a fully integrated OMS solution on a common platform with the existing SCADA/DMS system. As a key enabler, the new OMS will allow JPS to integrate all of our individual smart grid initiatives geared for the outage management process.

2.5 2019-2024 Rate Determination Request and Concerns

Daily System Customer Count

At paragraph 15.40 of the 2019-2024 Rate Review Determination, the OUR noted that the data illustrated an increase in over 6,000 customers from December 31, 2018 to January 1, 2019. However, the system customer count used for the OMS only considers active customers. Based on JPS' investigation, it appears that the system count data for January 1, 2019 was pulled looking at active customers on the system, taking into account customers disconnected for that day. This issue has since been corrected.

Major Events Days

In Paragraphs 15.112 of the 2019-2024 Rate Review Determination, the OUR essentially states that JPS changed its position on the exclusion of MEDs. However, as outlined in section 7.4.3 of JPS' 2019-2024 Rate Review application, JPS adopts industry standards to allow for proper benchmarking, thus while JPS observes the OUR's position, it still holds the view that the Institute of Electrical and Electronics Engineers (IEEE) standards should be applied.

In line with the aforementioned, JPS will have dialogue with the Ministry to establish a framework to properly adopt industry practices for uniformity in the computation of the reliability indices.

Reliability Indicators across Service Areas

JPS notes the OUR's concerns regarding the wide variation in the quality of service across service areas. The Company's ongoing strategy is to minimize variations in the quality of service across parishes, through the monitoring of reliability at the feeder level (Bottom-up approach to reliability improvements). However, it must be noted that the feeders highlighted by the OUR are among the worst performing, serving some of the most remote areas on the distribution network and are characterized as some of the longest feeders. Extensive capital and extra-ordinary O&M

investment will be required to realize and sustain a step change in reliability performance for these feeders.

Major System Failures

According to Siemens Power Academy TD, some utilities have a 'storm' definition for major system events. This definition is typically characterized by the following:

- At least 10% of the customer base being interrupted.
- All customers being out of supply for at least 24 hours
- Damage exceeds design limits
- State of emergency declared

JPS has adopted the practice of Force Majeure and Major System Failures as mandated by The *Electricity Act*, 2015 (the Act) and in line with industry standards. These practices may be analogous to the utility-based definition of a storm event, however, the current definition for major system failure, as captured in the Act is far more restrictive than industry standards. Section 45 of the Act defines a major system failure as a system failure that has not been planned by the System Operator, affects at least one thousand customers, and has a duration of at least two hours. JPS believes that the standards currently in use by major utility companies in North America are most appropriate and that we should adopt similar standards.

Transparency in OUR methodologies

As described in the 2019-2024 Rate Review Determination, the methodology used by the OUR to determine the Q-Factor baseline involved two main steps:

1) Construction of a reliability assessment model integrated with statistical distribution functions to derive indicative baseline values for SAIDI, SAIFI and CAIDI; and

2) Analysis of the indicative results, and making adjustments (of values) as necessary to reflect current system capabilities to determine the required Q-Factor baseline.

The methodology used by the OUR to determine the baseline values seems arbitrary as no evidence was provided that the methodology applied is in line with utility best practices. It also does not provide a basis for JPS or an independent entity to evaluate and arrive at a similar conclusion. JPS requires clarity on the completeness of the OUR methodology in arriving at the established Q-Factor baseline from the statistical values presented.

2.6 Conclusion

- We believe there should be no retroactive target setting as the 2019-2024 Rate Review Determination was not published until December 24, 2020. Hence, there should be no retroactive application of targets for 2020.
- JPS seeks clarification from the OUR on the Q-Factor baseline derivation methodology to establish targets which are reasonable and achievable.
- JPS proposes that in line with international utility best practices, the definition of "Major System Failure" should be consistent.

3. Z-Factor Adjustment

3.1 Tariff Implementation Delay Adjustment (Revenue Gap)

JPS submitted a Rate Review application for the period 2019-2024 on July 31, 2019 which was rejected by OUR as it was deemed deficient to the extent that it would not allow for a complete evaluation. On December 30, 2019, JPS submitted a revised application which was accepted by the OUR.

There were several issues with the review process and the OUR issued the 2019-2024 Rate Review Determination Notice on December 24, 2020 (Final Determination). The new rates were effective as of December 28, 2020. An addendum with revised rates was issued on January 29, 2021. JPS implemented these new rates for the February 2021 billing period.

Based on the approved revenue requirement (costs) and approved demand forecast, the OUR should determine rates over the period (2019-2024) which allows the utility to collect revenues to cover its approved costs. Since the revenues JPS can collect are dependent on the rates, for the approved revenue requirement (2019 to 2024) to be collected, the associated approved rates must be in place over the entire rate review period (2019 to 2024).

The rates approved by the OUR for 2020 became effective only in February 2021. The delay in the Determination, together with the Addendum, resulted in JPS collecting revenue up to January 2021 using the rates approved prior to December 28, 2020. JPS, therefore, was denied the opportunity to utilize the rates approved for 2020 to recover the revenue cap approved for 2020. Consequently, the delay created a price variance and a resulting shortfall (gap) in revenues due to the lower rates which were in effect. The OUR has not provided a mechanism to account for this resulting shortfall in revenues. It should be noted that pursuant to Condition 32 of the Licence, JPS has appealed against the decisions of the OUR which gave rise to the 2020 revenue gap.

As set out in paragraph 46(d)(i) of Schedule 3 of the Licence allows for a Z-factor percentage increase in the revenue cap, among others, due to:

Any special circumstances that satisfy all of the following:

- e) affect the Licensee's costs or the recovery of such costs, including asset impairment adjustments;
- *f)* are not due to the Licensee's managerial decisions;
- g) have an aggregate impact on the Licensed Business of more than \$50 million in any given year; and
- *h*) *are not captured by the other elements of the revenue cap mechanism.*

The 2020 revenue gap arising from the delay in the implementation rates satisfies the above conditions and as such JPS' 2021 revenue cap ought to be adjusted to compensate JPS for the subject 2020 revenue shortfall. In order to determine the Z-factor adjustment, the revenue gap must be determined.

3.1.1 Computation of 2020 Revenue Gap – Initial Method

The 2020 revenue gap is an element of JPS' appeal against the Final Determination. In the appeal process, JPS outlined its calculations of the 2020 revenue gap which amounted to J\$4.1B. This method is described below.

To calculate the revenue shortfall for 2020 due to the price variance, the revenue cap which was effectively in place was calculated using the OUR approved billing determinants for 2020 and the rates which were in effect in 2020, excluding the embedded independent power producer (IPP) rate. The calculated effective revenue cap was J\$33.1B.

This calculated effective revenue cap and the 2020 revenue cap stated in Table 18.15 of the Final Determination were converted to US dollars using exchange rates J\$128:US\$1 and J\$145:US\$1, respectively. The resulting revenue gap was US\$25.3M. This was then converted to JMD using the exchange rate J\$145:US\$1 and then adjusted by the WACC of 11.87% to result in a revenue gap of J\$4.1B as shown in *Table 3-1* below.

	Block/	12 months			Demand (KV	A) revenue		
Class	Rate	Customer	Energy Revenue	Std.	Off-Peak	Part Peak	On-Peak	Total Revenue
	Option	Revenue						
Rate 10	LV <100	3,313,378,485	7,197,554,503					10,510,932,988
Rate 10	LV >100	-	9,386,515,002					9,386,515,002
Rate 20	LV	804,441,985	10,877,239,278	-	-	-	-	11,681,681,263
Rate 40	LV - Std	147,960,168	3,787,152,766	3,922,878,956	-	-	-	7,857,991,890
Rate 40	LV - TOU	9,611,896	616,513,241	-	22,023,320	225,126,775	230,807,515	1,104,082,747
Rate 50	MV - Std	10,337,227	1,333,202,377	874,324,628	-	-	-	2,217,864,232
Rate 50	MV - TOU	1,910,672	292,654,180	-	11,216,871	101,203,556	95,485,353	502,470,633
Rate 70	MV -STD	1,591,807	671,783,953	710,045,568	-	-	-	1,383,421,329
Rate 70	MV -TOU	337,656	127,958,848	-	6,837,262	66,700,802	73,380,871	275,215,439
Rate 60	LV	17,001,848	1,170,790,475	-	-	-	-	1,187,792,322
TOTAL		4,306,571,745	35,461,364,624	5,507,249,152	40,077,453	393,031,133	399,673,739	46,107,967,845
							Total Embedded IPF	12,967,470,686
							Total w/o IPP	33,140,497,159
					Revenue Cap @ old	tariffs	USD	258,910,134
					Approved Revenue	Сар	JMD	41,211,000,000
					Approved Revenue	Сар	USD	284,213,793
					2020 Revenue Gap)	USD	25,303,659
				2020 Revenue Gap (@145) JMD		JMD	3,669,030,562	
				Pre-tax WACC		11.87%		
					WACC Adj 2019 Re	evenue Gap		4,104,544,489

Table 3-1: Calculation of 2020 Revenue Stated in Appeal Process

While the method employed is proper for determining the effective revenue gap, the resulting revenue cap (J\$33.1B) is lower than when compared to actual revenues collected annually between 2018 and 2020 using the same rates. Further analysis revealed that the lower than expected revenue cap is attributable to the differences between the sales mix in the approved demand forecast (Determination #24 of the Final Determination) and that typical of actual sales.

Even though an effective revenue cap which is too low would overstate the revenue gap, a proper volumetric true-up mechanism would compensate by refunding excess amounts to prevent a net over-recovery. The volumetric true-up mechanism specified in Exhibit 1, Schedule 3 of the Licence, however, only considers overall volumes for energy, demand, and number of customers and does not account for sales mix variances. Considering this fact, JPS reviewed its approach for computing the revenue shortfall for 2020, which is described below.

3.1.2 Computation of 2020 Revenue Gap – Alternative Method

The approved revenue cap for 2020 as stated in Table 18.15 of the Final Determination is J36,470M. This value is expressed at constant prices in 2018 dollars, reflecting the values of JPS' costs used for the revenue requirement determination. To be comparable with the actual revenues, the 2020 revenue cap is corrected by the 2018-2020 inflation and the difference in exchange rate, as shown in *Table 3-2*.

Exchange	Rate	Jamaican Inflatio	on Index	US Inflation In	ndex
FX 2018	128	Mar-18	95.0	Mar-18	249.6
FX 2020	145	Mar-20	103.6	Mar-20	258.1
F/X Factor	13.28%	J CPI Factor	9.05%	US CPI Factor	3.43%
F/X Effect	10.96%	J's CPI Effect	1.81%	US's CPI Effect	2.51%

Table 3-2: Inflation and Foreign Exchange Rate Adjustments

The overall inflation adjustment was calculated using the method outlined for calculating the dI as stated in Chapter 2 and is equal to 4.32% while the FX effect is 10.96%. The revenue cap adjusted for only inflation and both inflation and FX is shown in *Table 3-3* below:

Table 3-3: Revenue Caps adjusted for Inflation and FX

Year	Approved Revenue Cap	Approved Revenue Cap Adjusted for Inflation	Approved Revenue Cap Adjusted for Inflation and F/X
2020 (J\$)	36,470,000,000	38,045,111,063	42,041,547,047

JPS' actual revenues for 2020, based on the actual billing determinants and the tariffs that were in effect, are shown in the *Table 3-4*. The tariffs in effect had embedded IPP charges in the energy rates while the rates approved in the Final Determination had the IPP and non-fuel charges decoupled (as indicated in section 11.287 of the Final Determination). Therefore, to compare the revenues collected for 2020 with the 2019-2024 approved revenue cap, the IPP charges based on the average embedded IPP rate of J\$4.23 were removed from the actual revenues as shown below.

Table 3-4: Actual Revenues

Year	Real Revenue w/ IPPs	IPP Revenues	Real Revenue w/o IPPs
2020 (J\$)	47,894,409,464	12,418,009,043	35,476,400,421

Subtracting real revenues without IPP from the revenue cap approved by the OUR (adjusted for inflation) the resulting revenue gap obtained is J2,568.7B. This amount is based at an exchange rate of J128:US and must be rebased to the current base exchange rate of J145:US. It should be noted that the revenue gap captures the difference in sales volumes, which is already accounted for in the volumetric surcharge. To ensure that JPS is not doubly compensated/penalized, the volumetric surcharge of -J388.2M was subtracted from the revenue gap. Both these adjustments lead to a total revenue gap of J2.88B. Finally, the total revenue gap was adjusted by the WACC of 11.87% as shown in *Table 3-5* below.

2020 Revenue Gap Computation	
Approved Revenue Cap Adjusted for Inflation @128	38,045,111,063
Real Revenue w/o IPPs @128	35,476,400,421
Revenue Gap @128	2,568,710,642
Fx Adj Factor (1.10625)	272,925,506
Revenue Gap @145	2,841,636,148
Volumetric @145	(38,159,806)
Total 2020 Revenue Gap @145	2,879,795,953
WACC (11.87%)	341,831,780
WACC Adj Total Gap @145	3,221,627,733

Table 3-5	: 2020	Revenue	Gap
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Utilising this alternative methodology results in the total revenue gap of J\$3.22B arising from the delayed implementation of the 2019-2024 approved rates. JPS is therefore, requesting that this be included in the Z-factor adjustment for the current annual adjustment. Inclusion in the Z-Factor leads to an incremental 8.51% adjustments to the 2021 revenue cap.

3.2 2020 Rate of Return Adjustment

In addition to the special circumstances under paragraph 46 (d) (i) of Schedule 3 of the Licence which are highlighted in the foregoing section, paragraph 46 of Schedule 3 of the Licence specifies other special circumstances by which the Z-Factor adjustment may be initiated namely:

- *ii)* where the Licensee's rate of return with respect to the Licensed Business is one (1) percentage point higher or three (3) percentage points lower than the approved regulatory target (after taking into consideration the allowed true-up annual adjustments, special purpose funds included in the Revenue Requirement, awards of the Tribunal and determinations of the Office and adjustments related to prior accounting periods). This adjustment may be requested by the Licensee or Minister or may be applied by the Office;
- *iii)* where the Licensee's capital & special program expenditure are delayed and such delay results in a variation of 5% or more of the annual expenditure, the Z-factor adjustment will take into consideration the over-recovery of such expenditure plus a surcharge at the WACC;
- *iv)* Government Imposed Actions;

- v) where the Licensee demonstrates and the Office agrees that an extra-ordinary level of capital expenditure or a special programme is required (i.e. greater than 10% for any given year relative to the previously agreed five-year Business Plan); or
- vi) where the Licensee is required to make a change to the Guaranteed Standards in Condition17(5) and such change will have a financial impact on the Licensee in an amount greater than Fifty Million Jamaican dollars (J\$50,000,000.00) during any rate review period.

Paragraph 46 (ii) establishes a revenue adjustment associated to JPS' rate of return. In particular, it sets a band of +1% -3% beyond which a Z-Factor adjustment can be requested by the Licensee or the Minister. JPS notes the interpretation of the paragraph 46(d)(ii) which is captured in Determination #3(c) of the Final Determination and has appealed against this decision of the OUR to apply this interpretation to Z-Factor requests under paragraph 46(d)(ii). JPS, however, observes that Exhibit 1, Schedule 3 of the Licence specifically provides for the ROE (Return on Equity) to be applied when calculating the Z-Factor adjustment.

At paragraph 1.46 of the Final Determination the OUR defines a ROE of 10.78% as follows:

Consistent with the methodology outlined in the Final Criteria and Addendum to the Final Criteria, the Office approves a pre-tax WACC and a post-tax WACC of 11.87% and 7.91% respectively for the Rate Review period. The approved WACC is based on the CAPM methodology and is predicated on the following parameters:

<i>(i)</i>	<i>Cost of debt: 7.57%;</i>
(ii)	Gearing ratio is 50%;
(iii)	<i>The CRP is 2.53%;</i>
(iv)	The return on equity is 10.78%.

This means that, in applying paragraph 46(d)(ii) of Schedule 3 of the Licence, if in any given year ROE falls below 7.78% (approved target less 3%) or above 11.78% (approved target plus 1%) JPS, the OUR or the Minister can require an adjustment to JPS' revenues in the following year.

3.2.1 Computation of Z-Factor Adjustment for ROE Catch-Up

In an assessing the applicability of the ROE Z-Factor adjustment in a given year, the Regulated ROE must first be calculated. As stated in paragraph 46(d)(ii) of Schedule 3 of the Licence, this adjustment must account for the allowed true-up annual adjustments, special purpose funds included in the Revenue Requirement, awards of the Tribunal and determinations of the Office and adjustments related to prior accounting periods.

The ROE Catch-Up is defined as the USD amount required to return the Regulated ROE within the prescribed allowed band (-3pp to +1pp). The related Z-Factor adjustment is the minimum USD amount, that when added to the Regulated Revenues, ensures that the Regulated ROE returns to the prescribed band. The Regulatory ROE is defined as:

Regulatory ROE = Regulatory Net Income / Average Regulated Shareholder Equity

The formula for the Z-Factor Adjustment is:

$$Z - Factor Adjustment = \frac{ROE \ CatchUp}{(1-\tau)}$$

where τ is the Corporate Tax Rate.

The Z-Factor Adjustment must be adjusted with the Cost of Equity to account for the opportunity cost of capital.

The proposed methodology ensures that if the realized values of the Regulatory Net Income and the Shareholder Equity (based on 50% gearing ratio of Regulatory Rate Base) are exactly as those defined in the Final Determination, then the Regulatory ROE will be equal to the Allowed Return on Equity (10.78%). However, if the realized values deviate from those in the Final Determination then the Regulatory ROE will also deviate from the approved ROE.

In the subsequent sections of this Chapter, the calculation of the Regulated ROE is shown and the need for a Z- Factor adjustment is determined. All calculations are in current USD as the main source of information are JPS's Audited Financial Statements. For JMD values originating in the Final Determination, an exchange rate of 128 JMD/USD was used to convert to USD. Also, all values from the Final Determination were corrected by inflation using US and Jamaica's CPI variation.

Regulatory Net Income

The Regulatory Net Income is defined as:

Regulatory Net Income = Regulatory Revenues – Power Purchase Costs (excl. Fuel) – Net Expenses – Depreciation & Amortization – Return on Debt – Regulated Income Tax

- 1. **Regulatory Revenues** Starting with the total revenue from the 2019 and 2020 audited financial statements, fuel sales, IPP surcharge, revenues from unregulated activities, unbilled revenues, and Cement Company revenues as reported in the financial statements were all subtracted. Additionally, Special Purpose Funds included in the Revenue Requirement, adjusted for inflation, were subtracted as well while the OUR approved Incremental Depreciation and ROI figures were used. *Table 3-6* shows the Regulatory Revenue calculation as described above.
 - i. As stated, the Licence requires taking into consideration, among other things, the trueups, of the period. This includes true-ups approved in the previous year which are implemented in the year under analysis and true-ups requested in the year under analysis which are to be implemented in the following year.
 - ii. Regarding the former, in this case, due to the delay in the implementation of the new tariffs there were no specific true-ups implemented affecting 2020 revenues or costs.
 - iii. JPS is requesting a series of true-ups related to 2020 performance. Once the OUR makes its determination, the approved values should be incorporated and the Regulated ROE

recomputed. This ROE should be used to assess against the band and, where it falls outside the prescribed limits, the Z-Factor adjustment should be recomputed.

Regulated Revenues (USD'M)	2020
Operating Revenues	882.90
Fuel Sales	(418.11)
Revenues from Unregulated Activities	(7.14)
Reconnection Fees	(1.95)
Magotty	(4.61)
Munroe Wind Farm	(0.13)
E Store Sales	(0.45)
Special Purpose Funds included in the RR	(3.15)
Awards of the Tribunal and OUR Determination	-
Revenue adjustments related to prior accounting periods	0.52
Unbilled Non-Fuel Revenues	0.52
Incremental Depreciation & ROI (2016-2018)	-
Cement Company Revenues	(5.73)
Allowed True-up annual adjustments from Y-1	-
Allowed True-up annual adjustments for Y+1	-
Regulated Revenues	449.30

Table 3-6: Regulatory Revenue Calculation

2. Net Expenses - As reflected in Table 11.40 of the Final Determination, Net Expenses include Operating and Maintenance Costs, Interest Expense and Related Income, FX Losses and Other Income/Expense, and Other Offsets. *Table 3-7* below shows the computation of Regulatory Net Expenses which amounted to USD146.4M in 2020. The details for each line item follows this table.

Table 3-7:	Regulatory	Net Expenses
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Regulated Net Expenses (USD'M)	2020
Operating & Maintenance Cost	(138.69)
Interest Expenses & Related Income	(2.56)
FX Losses & Other	(24.42)
Other Offsets	19.31
Regulated Net Expenses	(146.36)

i. *Table 3-8* shows the breakdown of the Operating & Maintenance Costs. These are the Operating & Maintenance costs from the 2020 Audited Financial Statements less the OUR approved Unregulated Business Costs, which were adjusted for inflation. In addition, the O&M costs were corrected for Pension and Lease adjustments.

Regulated Operating & Maintenance Costs (USD'M)	2020
Payroll, Benefits & Training	(55.82)
Third Pary Services	(19.57)
Material & Equipment	(3.90)
Bill Dellivery & Meter Reading	(8.45)
Technology & Telecoms	(7.46)
Office & Other Expense	(7.25)
Transport	(6.71)
Insurance Expense	(5.44)
Bad Debt Expense	(17.99)
O&M Costs	(132.59)
Less Unregulated Business Costs	2.92
Pension Adjustments	(7.17)
Lease Adjustments	(1.86)
Transport	(1.02)
Building	(0.76)
Technology & Telecoms	(0.08)
Regulated O&M Costs	(138.69)

Table 3-8: Operating & Maintenance Costs

ii. *Table 3-9* shows the breakdown of Interest Expenses & Related Income. Interest expense items are as reported in the 2020 Audited Financial Statements.

Table 3-9: Interest Expen	se & Related Income
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Regulated Interest Expense & Related Income (USD'M)	2020
Interest on Short Term Loans	(0.05)
Interest on Customer Deposit	(0.51)
Interest Bank Overdraft and Late Payment	(0.47)
Debt Issuance Costs and Expenses	(1.53)
Regulated Interest Expense & Related Income	(2.56)

iii. The Foreign Exchange (FX) Result and the Separation Costs were taken from 2020 Audited Financial Statements. The FX Result was adjusted to exclude unrealized FX gains. SI/EDF Contribution was excluded since it was already included in Regulatory Revenues under Special Purpose Funds included in the Revenue Requirement. Net Stranded Assets were excluded since they are already included in Depreciation & Amortization. The 2016-2018 Incremental Depreciation and ROI figures are the OUR approved values in the Final Determination, adjusted for inflation. *Table 3-10* shows the breakdown of FX Losses and Other Income/Expense

Regulated FX Losses and Other Income/Expense (USD'M)	2020
Foreign Exchange Result Loss/(Gain) (TFX)	(16.20)
SI/EDF Contribution	-
Separation Costs	(4.37)
Net Stranded Assets	-
2016-2018 Increm Depreciation	-
2016-2018 Increm Depreciation (Smart Streetlights)	-
2016-2018 Increm ROI	-
2016-2018 Increm ROI (Smart Streetlights)	-
Decommissioning Cost	(3.85)
Regulated FX Losses and Other Income/Expense	(24.42)

Table 3-10: FX Losses and Other Income/Expense

iv. *Table 3-11* shows the breakdown of Other Offsets. Other Income, Bond Refinancing Cost, JPS Managed IPP/Unregulated Expense, SBF Settlement, Net Interest Expense/(Income)-Annual Adjustment are the OUR approved figures, adjusted for inflation. Finance income and Cement Contract Revenues are as reported in 2020 Audited Financial Statements.

Table 3-11: Other Offsets

Other Offsets (USD'M)	2020
Other Income	1.36
Finance Income (excl. IDC)	5.33
Bond Refinancing Cost	-
Cement Contract Revenues	5.73
JPS Managed IPP / Unregulated Expense	0.28
SBF Settlement	6.20
Net Interest Expense/(Income)-Annual Adjustment	0.41
Other Offsets	19.31

3. Depreciation & Amortization is the Total Depreciation & Amortization in JPS's Financial Statements, less Depreciation on Leases and Depreciation Decommission. The OUR approved figures for Depreciation from Customer Funded Assets and assets which are offset from the Rate Base (adjusted for inflation) were also subtracted.

Regulated Depreciation & Amortization (USD'M)	2020
D&A	(114.11)
Depreciation Leases	38.83
Depreciation from Customer Funded Assets & Offsets	8.15
Regulated D&A	(67.14)

Table 3-12: Depreciation & Amortization

4. Return on Debt is the Average Rate Base * Cost of Debt. The calculation is detailed in *Table 3-13*. The Gearing Ratio and the Cost of Debt are as defined in the Final Determination. The Average Rate Base is calculated in a later section.

Table 3-13: 1	Return on Debt
---------------	----------------

Return on Debt (USD'M)	2020
Average Rate Base	667.25
Gearing Ratio (%)	0.50
Implied Average Regulated Debt	333.63
Cost of Debt (%)	0.08
Return on Debt	25.26

5. The Regulated Income Tax is the Regulated Earnings Before Tax * Corporate Tax Rate. The Regulated Earnings Before Tax (EBT) are Regulated Revenues, less Power Purchase Costs (excl. Fuel), Net Expenses, Regulated D&A, and Return on Debt. The calculation is detailed in *Table 3-14*.

Table 3-14	4: Regulatory	Income Tax
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Regulated Income Tax (USD'M)	2020
Regulated Revenues	449.30
Purchased Power Costs (Excl. Fuel)	(180.72)
NetExpenses	(146.36)
Depreciation & Amortization	(67.14)
Return on Debt	(25.26)
Regulated EBT	29.82
Corporate Tax Rate	33.33%
Regulated Income Tax	(9.94)

6. Based on the computations shown above, the Regulatory Net Income calculation is summarized in *Table 3-15*. The Regulatory Net Income in 2020 is USD19.9M.

 Table 3-15: Regulatory Net Income

Regulated Net Income (USD'M)	2020
Regulated Revenues	449.30
Purchased Power Costs (Excl. Fuel)	(180.72)
Regulated Net Expenses	(146.36)
Regulated Depreciation & Amortization	(67.14)
Return on Debt	(25.26)
Regulated EBT	29.82
Regulated Income Tax	(9.94)
Regulated Net Income	19.88

3.2.2 Average Rate Base and Regulated Shareholder Equity

The Average Rate Base is the average of the opening and closing balance of the updated Rate Base in each fiscal year. The Rate Base is comprised of Net Fixed Assets (including Intangibles) plus Working Capital, and offset by the items included in the OUR determination (see Table 8.24).

1. The calculations to determine the Net Fixed Assets Closing Balance (Incl. Intangibles) are detailed in *Table 3-16*. All figures were taken from the Audited Financial Statements.

Net Fixed Assets (USD'M)	2019	2020
Gross Plant (Intangibles incl.) BoP	2,330.34	2,425.51
Capital Investment	107.16	82.12
Other (Capital Spares)	(11.47)	(21.73)
Disposal / Retirement / Change in CWIP	(0.52)	(32.40)
Gross Plant in Service EoP	2,425.51	2,453.51
Accumulated Depreciation (Opening Balance)	1,553.83	1,631.76
Addition	78.42	75.28
Retirement	(0.49)	(45.26)
Accelerated Depreciation (OH and HB)	-	-
Accelerated Depreciation (Bogue, Rockfort, and HB)	-	-
Accumulated Depreciation (Closing Balance)	1,631.76	1,661.78
Net Fixed Assets (Closing Balance)	793.75	791.73

Table 3-16: Net Fixed Assets Closing Balance (Incl. Intangibles)

2. The calculations to determine the Working Capital are detailed in *Table 3-17*.

Table 3-17: Working Capital

Regulated Working Capital (USD'M)	2019	2020
Cash Working Capital	37.04	54.35
Supplies Inventory	28.44	34.97
Inventory Adj-Decomm. Cost	(0.19)	(3.98)
Fuel Inventory	13.40	4.32
Less: Customer Deposit	(31.64)	(29.16)
Less: Short-term Loan	(14.00)	-
Regulated Working Capital	33.05	60.50

3. After updating the relevant items, the closing balance of the Rate Base for 2019 and 2020 were determined. The calculations are detailed in *Table 3-18*.

Rate Base (USD'M)	2019	2020
Net Fixed Assets Closing Balance (Incl. Intangibles)	793.75	791.73
Working Capital	33.05	60.50
Other Offsets (ALRIM Tax Allowance)	(1.23)	(0.63)
Offsets	(170.88)	(171.79)
Bogue Conversion Assets	8.61	8.21
Smart Streetlight Program	20.44	19.03
ALRIM	47.99	41.56
System Benefit Fund	-	-
EEIF	47.98	44.37
Capital Reserve	4.76	19.29
Estore	0.31	0.29
Munro	6.27	5.75
Maggotty	34.52	33.28
CB Hill Run DG Project	-	-
Rate Base	654.70	679.81

Table 3-18: Rate Base

4. The Average Rate Base in 2020 was determined to be USD667.3M. The calculations to determine the Average Rate Base are detailed in *Table 3-19*.

Table 3-19: Average Rate Base

Average Rate Base (USD'M)	2020
Rate Base (Opening Balance)	654.70
Rate Base (Closing Balance)	679.81
Average Rate Base	667.25

5. The Average Regulated Shareholder Equity in 2020 computed was USD333.6M. *Table 3-20*summarizes the Average Regulated Shareholder Equity calculation.

Average Regulated Shareholder Equity	2020
Average Rate Base (USD'M)	667.25
1 - Gearing Ratio (%)	50%
Average Regulated Shareholder Equity (USD'M)	333.63

3.2.3 Regulated ROE and Z-Factor Adjustment

The Regulated ROE is the Regulated Net Income divided by the Average Regulated Shareholder Equity. The calculations are detailed in *Table 3-21*.

Table 3-21: Regulated ROE

Regulated ROE	2020
Regulated Net Income (USD'M)	19.88
Average Regulated Shareholder Equity (USD'M)	333.63
Regulated ROE	5.96%

The resulting Regulated ROE in 2020 is 5.96%, which falls below the lower threshold of 7.78%. According to paragraph 46(d)(ii) of Schedule 3 of the Licence, a positive Z-Factor adjustment is warranted. However, it is important to point out that the Regulated ROE must be re-estimated in the future to take into account awards from the Tribunal in relation to JPS's appeal and the OUR's determination regarding the requested True-ups (see paragraphs 16-18). This re-estimated Regulated ROE should be used to assess against the band, and in case that it falls outside the prescribed limits, the Z-Factor adjustment should be recomputed. The calculations are detailed in *Table 3-22*.

ROE Catch-UP & Z-Factor Adjustment	2020
Allowed Return on Equity	10.78%
ROE Upper Band (+1 p.p.)	11.78%
ROE Lower Band (-3 p.p.)	7.78%
Regulated ROE	5.96%
ROE Catch-up (%)	1.82%
ROE Catch-up (USD'M)	6.07
Z-Factor Adjustment (USD'M)	9.11
Cost of Equity	10.78%
Z-Factor Adjustment - Including Cost of Capital (USD'M)	10.09

Table 3-22: ROE Catch-Up & Z-Factor Adjustment

The ROE Catch-up, as defined before, is the USD amount required for the Regulated ROE to be within the prescribed limits. The related Z-Factor adjustment is the minimum USD amount, that when added to the Regulated Revenues, ensures that the Regulated ROE returns to the prescribed limit. Recall that the formula for the Z-factor Adjustment is:

$$Z Factor Adjustment = \frac{ROE CatchUp}{(1-\tau)}$$

where τ is the Corporate Tax Rate (33.33%).

Based on these definitions, a ROE Catch-up and Z-Factor Adjustment of USD6.1M and USD9.1M were determined respectively. Accounting for the opportunity cost of capital (equity), the total Z-factor adjustment determined was USD10.1M.

3.3 Total Z Factor Adjustment

To determine the Z factor adjustments, each of the claims are stated as a percentage of the approved 2021 revenue cap as shown in *Table 3-23* below.

Z-Factor Adjustments					
	Amount (J\$)	Adjustment			
2021 Revenue Cap	37,856,804,905				
Revenue Gap w/ WACC	3,221,627,733	8.51%			
ROR Adjustment	1,463,655,707	3.87%			
Total Z-Factor	4,685,283,440	12.38%			

Table 3-23: Total Z-Factor Adjustment

However, the ROR adjustment factor has not been included in the calculation of the 2021 ART. This adjustment must be recomputed by the OUR based on the approved true-ups for this annual adjustment and then included. Therefore, the Z factor used in the dPCI calculation is 8.51%.

4. 2021 Annual Revenue Target

Exhibit 1 of the Electricity Licence provides that the Annual Revenue Target is to be calculated using the formula:

$$ART_{y} = RCy(1 + dPCI) + (RS_{y-1} + SFX_{y-1} - SIC_{y-1}) \times (1 + WACC)$$

The approved pre-tax WACC as stated in Determination #11 of the 2019-2024 Rate Review Determination is 11.87%.

Using the formula and the values as discussed in Chapter 2, the 2021 annual revenue target is J\$49.13B as shown in *Table 4-1*. This translates to average non-fuel tariff impact of 12.3% as detailed in Chapter 8 (Tariff Design).

2021 Annual Revenue Target (J\$M)				
Description	Formula	Value		
Approved Revenue Cap	RC ₂₀₂₁	37,857		
Annual Rate of Change	dPCI	27.02%		
Adjusted Revenue Cap	RC ₂₀₂₁ * (1 + dPCI)	48,086		
Revenue Surcharge	RS ₂₀₂₀	(773)		
FX Surcharge	SFX ₂₀₂₀	1,978		
Interest Surcharge	-SIC ₂₀₂₀	(271)		
WACC		11.87%		
2020 Adjustments	(RS ₂₀₂₀ + SFX ₂₀₂₀ - SIC ₂₀₂₀) * (1 + WACC)	1,044		
2021 Annual Revenue Target	ART ₂₀₂₁	49,130		

Table 4-1: 2021 Annual Revenue Target Calculation

Note that the 2021 ART in *Table 4-1* reflects system losses true-up at the OUR-approved targets. As noted in Section 1.2.4.2, JPS believes that the target true-up for system losses should not be applicable for 2020. If there is no system losses true-up for the 2020 actuals, then the 2021 ART will be J\$49.95B. Associated average non-fuel tariff impact in this alternative case will be 14.18%, as presented in Appendix D: ART without Losses Surcharge.

Additionally, the dPCI factor of 27.02% does not include the Z-factor adjustment computed based on the return on equity being outside of the approved band. In the Z-factor section/chapter above, a Z-factor adjustment of J\$1.46B or a 3.87% adjustment to the 2021 revenue cap was computed. This Z-factor adjustment must be recomputed to include the true-ups approved by the OUR and included in the approved dPCI factor which is to be used to compute the approved annual revenue target for 2021.

5. Capital Plan Adjustment

5.1 Introduction

The 2019-2024 Rate Review application was the first filing proposing a five-year revenue requirement on a forward-looking basis. This filing included approving JPS capital investment plan on a forecast basis, which is subject to Z-Factor adjustment in accordance with paragraph 46(d) of the Licence and Criterion 13 of the Final Criteria. Accordingly, this annual review application is the first time Z-factor adjustment for JPS capital investment performance will be contemplated.

In accordance with the Final Criteria, determination #3 of the 2019-2024 Rate Review Determination approved JPS' capital investment projects categorized as follows:

- Major Projects
- Extraordinary Maintenance Projects
- Minor Projects

The 2019-2024 Rate Review Determination notes (paragraph 5.30) that consistent with the Final Criteria, the variations in capital investment projects that trigger the Z-Factor are categorized and deemed to be as follows:

1. Project Delays

The delays in a Major Project or Extraordinary Maintenance Project can trigger the Z-Factor adjustment, if there is at least 5% variation in the annual expenditure for each of the various projects, in the prior year. Similarly, if the same variation occurs in the annual expenditure for Minor Projects as a whole there will be a corresponding Z-Factor adjustment.

2. Unimplemented Projects

For the removal of projects that should be implemented within a given Rate Review period, JPS should provide justification for this action. If the justification is deemed reasonable by the OUR, the Z-Factor adjustment will be utilized to remove the expenditure which was associated with that project from the Revenue Requirement.

3. Unplanned Projects

Where there arises a need for a project that is categorized as being either a Major Project or Extraordinary Maintenance Project, and this project was not included in the approved Business Plan, it will be classified as an unplanned project. Unplanned projects require a justification from JPS, and should be approved by the OUR prior to implementation. Where the project will result in an increase in the capital expenditure for that year by at least 10%, a Z-Factor adjustment will be applied.

4. Changes in Project Scope

A change in the scope of a project that is classified as a Major Project or Extraordinary Maintenance Project, will require the prior approval of the OUR. In a given year, if the change in the scope of either of these types of projects results in a reduction in the project cost by at least 10% of the projected capital expenditure, a Z-Factor adjustment will be applied that will result in 50% of the savings being passed on to customers for the remainder of the Rate Review period. expenditure, a Z-Factor adjustment will be applied that will result in 50% of the savings being passed on to customers for the remainder of the savings being passed on to customers for the Rate Review period.

The 2019-2024 Rate Review Determination gave JPS approval to invest US\$78.06M in 2020 on 51 Capital Projects/Programs. Of these 51 Projects/Programs, 12 were classified Major or Extra-Ordinary Projects while 39 were classified Minor projects. For the Year 2020 JPS spent US\$59.7M on the projects approved by the OUR; US\$39.5M was spent on Major and Extra Ordinary Maintenance projects while US\$20.2M was spent on Minor projects. In the category of Major and Extra-Ordinary Maintenance Projects, seven (7) projects had delayed implementations, one (1) project was executed as planned while four (4) projects saw higher levels of investment than was approved by the OUR for 2020. The total variance in this category of projects is 5%. In the category of Minor projects, thirty-one (31) projects were delayed, three (3) were completed as planned and five (5) projects overspent the approved 2020 budget. The total variance in this category of projects is 44%.

JPS proposes that no Z Factor adjustment is implemented for approved 2020 projects which may have experienced any of the four conditions that would normally trigger a Z-Factor adjustment. JPS also makes no claim at this time for costs related to projects which overspent the approved 2020 budgets.

This position is based on the fact that the final approval of capital projects for 2020 was provided to JPS in December 2020 which means the company would have been implementing projects without certain knowledge of the final approved budget and scope.

The Covid-19 pandemic disrupted the global supply chain of goods and services leading to significant limitations to JPS' ability to implement project in a timely manner.

The late approval of the new tariff by the OUR meant JPS could not benefit from the intended cash flows uplift that the new tariffs should bring. Cash flows were also supressed by the reduction in economic activity in Jamaica that was brought on by restriction imposed to combat the spread of the Covid-19 virus.

In 2021 JPS intends to execute the projects approved for 2021 implementation as well as to complete all projects deferred from 2020. Where there was overspend on projects in 2020 this will be offset against the 2021 approved amounts. Therefore, by the end of 2021 the approved expenditure for 2020 and 2021 will be expensed in total and all approved scope of work will be achieved.

The 2021 Investment outlook is constrained by JPS being able to benefit from the new tariffs that should lead to improved cashflow. JPS also assumes global supply chains will return to normal as nations ease their travel restrictions and production levels return to pre pandemic levels.

5.1 Capital Projects Performance for 2020

While the Final Criteria and the 2019-2024 Rate Review Determination set out categories of the variations that trigger Z-Factor adjustment, the current application presents the first practical application of the capital investment Z-Factor adjustment and establishment of a treatment for project implementation variance from the approved investment plan.

The Final Criteria paragraph 7.1.5 outlines that JPS shall provide adequate information in its Annual Review filling to allow the OUR to accurately assess the capital expenditure, the degree of project implementation and the cost, time and design deviations from the original plan. In keeping with this requirement JPS will provide individual project updates on Major and extra ordinary maintenance projects in order to enable the regulator to understand any material deviations in cost, time and scope from the approved projects.

It is worth noting that JPS is currently challenging the approach of evaluating Major and Minor Projects individually as the company believes the intent of the licence is that all projects be evaluate collectively.

The major and extra-ordinary maintenance projects to be reviewed for 2020 are as outlined below: The 2019-2024 Rate Review Determination approved the following major capital projects:

- Smart Meter Program:
- Old Harbour Hunts Bay 138 kV Line:
- Voltage Standardization Program:
- RAMI Projects:
- Grid Modernization Program:
- Combine Cycle Plant:
- Critical Spares Generation:
- Distribution Line Structural Integrity:
- Distribution Line Upgrade Rehab and Reconditioning
- Customer Growth (CCMA):
- Distribution Transformers:
- Meters & Service Wires:

Minor projects will be reviewed collectively in keeping with the framework established in the final criteria.

While each project faced different circumstances during 2020, there were some common challenges that negatively impacted JPS' ability to implement such as late approval of the investment plan, the effect of the covid-19 global pandemic on the supply chains of goods and services and JPS cashflow challenges from not having a timely approved tariff during a period of falling sales volumes.
JPS received approval for its 2020 investment plan on December 24th 2020, just one week before the end of its 2020 financial year. The late approval of the investment plan means that if the Z-Factor is applied in this annual review it would amount to retroactive regulation, which is not a best practice and is opposed by the utility. The Z-factor mechanism is designed to ensure the utility does not unfairly collect revenue to execute capex projects and then not implement these projects. Given that the new tariff was not implemented until after 2020 it means JPS could not have benefited in this manner.

JPS is a capital intensive business that requires annual investments to keep customers connected within regulated standards of service and productivity. Breaching these standards such as, losses, heat rate, reliability and productivity may result in penalties to the utility. In order to fulfil its mandate and reduce the risk of penalties, JPS sought to implement the 2020 capital plan that was submitted to the OUR for approval as part of the 2019-2024 JPS medium term investment plan. Preliminary feedback from the OUR provided in August 2020 gave some indication that all 2020 projects would not be approved as requested. JPS therefore went through 2020 with great uncertainty about the approval status of its investment projects and tried to manage its investment activities as best as it could to minimize variations from what it expected would be approved, while seeking to remain compliant with its responsibilities under the licence. The final approval saw the OUR rejecting US\$12.08M of funding requested by JPS for 2020 project activity with three (3) projects not approved and five (5) projects with 2020 costs reduced. The fact that the approved plan was not available early enough in the year to properly guide project activity created an uncertain operating environment that was beyond the control of JPS' management.

The pandemic caused by the Covid-19 virus led to major disruptions in global supply chains that severely impaired the timing of JPS procurement activities and adversely impacted JPS cash collections. The forced lockdowns and travel restrictions implemented around the world aimed at slowing the spread of the covid-19 virus lead to multiple factory closures and prevented key service providers from traveling to the locations they needed to. Contracted suppliers shuttered factories and were unable to deliver major equipment in a timely manner. This adversely impacted JPS ability to implement projects as planned as key suppliers were unable to achieve committed timelines. Cost increases beyond contingency amounts were detected for several inputs as supplies grew scarce and production slowed. These realities were outside the control of JPS' management and impaired its ability to execute 2020 projects in a timely manner. Some projects that are now being deferred to 2021 currently have contractual agreements in place for service delivery in be completed in short order

JPS also faced cash flow restriction that created financial risks; initiatives to slow cash outflow were required to ensure the company could meet all its cash obligations. These initiatives such as slowing and deferring of planned investments to 2021 were required to ensure JPS remained a going concern.

As the Pandemic hit Jamaica, economic activity slowed, the government imposed work from home and school from home orders on businesses and schools while daily curfews forced other businesses to close earlier than normal. This lead to a reduction in sales volumes as well as revenue collected. With increased residential consumption as work places and schools closed, electricity consumption shifted from the more reliable paying commercial rate classes to the less reliable residential rate class. JPS also experience increases in electricity theft that further eroded the availability of cash to carry out investment activities.

The late approval of the tariff meant JPS could not benefit from the intended improved cash flows in 2020. The forward looking rate mechanism which should have generated cash flow to implement capex projects in 2020 was not in place and as such JPS revenues should not be curtailed at this time due to slower than planned implementation of 2020 projects. Cash flows were also suppressed by the reduction in economic activity in Jamaica that was brought on by restriction imposed to combat the spread of the Covid-19 virus.

Below we discuss the variances in individual projects that make up the Major and Extra-Ordinary Maintenance category as well the collective minor projects. Appendix 1 provides more information on the 2020 implementation of these projects.

Smart Meter Program

JPS submitted for approval in its 2019-2023 Medium Term Investment Plan, a budget of US\$17.9M to install 100,000 smart meters in 2020 and started the process of executing this scope in January 2020. The OUR approved in the 2019-2024 Rate Review Determination, US\$8.67M equates to approximately 48,000 meter installations in 2020. By the end of 2020 JPS had installed 69,700 Smart meters at a cost of US\$13.3M.

JPS overspent the OUR approved budget for 2020 by US\$4.5M and installed ~22,000 more meters than approved. The reason for this is the late approval of the Investment plan by the OUR. JPS had the necessary inputs to carry out the project on hand as some procurement activities commenced in late 2019 to facilitate installations commencing in the first quarter of 2020. In August 2020 when JPS received the first indication that the approval would be lower than requested a pull back of the implementation was implemented; however, JPS had already overspent on the amount of US\$8.67 that was eventually approved for 2020.

Old Harbour-Hunts Bay 138kV Transmission line:

This critical project which will be executed over a 5-year period had an OUR approved budget of US\$1.34M in 2020. JPS spent US\$0.41M on the project in 2020; this represents a US\$0.93M delay in expenditure for 2020. The main item delayed is the acquisition of easement for the line route between Old Harbour and Hunts Bay. This activity is currently advanced and will be completed in 2021.

JPS' uncertainty about the approval of the project was an important factor in the delay as it would be imprudent to enter major contracts without a clear indication of project approval. The curtailment of movement and social distancing requirements imposed by government in 2020 in order to combat the covid-19 pandemic were a contributing factor to the delay in this activity.

Voltage Standardization Program:

The Voltage Standardization Program (VSP) was approved by the OUR for US\$3.34M in 2020 to complete upgrade of the Upper White River 110 and 210 feeders from 12kV to 24Kv and to commence Highgate 110 and 210 as well as Blackstonedge 110 feeder upgrades which were to be

completed in 2021. JPS spent US\$2.0M in 2020 and completed the upgrade of the Upper White River feeders. The commencement of the Highgate and Blackstonedge feeders was delayed to 2021 due mainly to the impact of Covid-19 on the project rollout.

The project faced difficulties in procuring key inputs such as conductors, insulators, poles and transformers as global supply chains were impacted by the pandemic. Social distancing rules also impacted the speed at which teams could work as there were restrictions on the number of persons in one location at a time. Approved planned outages which were required to carry-out critical work were also reduced in 2020 to minimize the inconvenience to customers who had to stay home as schools and work places were closed in response to the pandemic.

RAMI Projects:

The RAMI program was approved to spend US\$3.02M in 2020 to upgrade the metering infrastructure in four (4) communities across Jamaica to make them theft resistant. In 2020 JPS completed the upgrade of one (1) community in St Andrew at a cost of US\$0.67M. The Stand Pipe community was upgraded resulting in the conversion of the planned 350 existing customer metering solutions and 252 new customers added to the grid vs a targeted addition of 125. Losses in the community was reduced from 57% to 12% by the end of 2020.

The roll out of the project in 2020 was hampered by the covid-19 pandemic which disrupted the supply of key inputs such as poles, conductors and insulators and has resulted in the other three community upgrades being deferred to 2021.

Grid Modernization Program:

The Grid Modernization Program was approved to spend US\$1.65M in 2020 to install 200 24 kV@100 A TripSavers; 20 Distribution Automation Sectionalizes (DA Switches), 4 Pole Mounted Reclosers and 70 Fault Circuit Indicators across the distribution network.

In 2020, 307 TripSavers and 70 Fault Circuit indicators were installed at a cost of US\$1.4M. The intended benefit was 17.6 minutes' reduction in SAIDI and 15.5 MWH reduction in unserved energy. For the period December 2020 and March 2021 JPS has measured 5.87 minutes' savings in SAIDI in the areas where the installations were done and expects this to grow to 17.6 minutes by the end of 2021.

The adjustments to the installations were done due to the impact of covid-19 on supply chains. While JPS could source Trip savers in the market, the production of DA switches was severely impacted and will be deferred to 2021. The implementation of TripSavers in 2021 will be reduced to ensure alignment to the approved Grid modernization 5-year program.

Distribution Line Structural Integrity:

The distribution Structural Integrity Program was approved to spend US\$4.4M in 2020, JPS spent US\$5.1M on the program for the year. The 2020 planned scope was to replace 2,200 distribution poles at an advances stage of deterioration and rehabilitate 5,165 poles that were in a less advanced stage of decay. The program also sought to replace ~ 10,900 insulators and 845 switches. At the end of 2021 JPS replaced 4,000 degraded distribution poles, rehabilitate 5,385 poles and replaced 11,200 insulators and 872 switches.

This represents an over spend of US\$0.65M for 2020. In 2021 JPS intends to reduce the approved budget by the equivalent amount to ensure the overall envelope is not increased. The additional work to sure up distribution structures in 2020 was required as Jamaica was exposed to major tropical storms Laura, Zeta and Eta, these caused flooding and landslides across several parishes and resulted in broken poles and other structures which JPS needed to replace to ensure customers were reconnected in a timely manner after forced outages.

Distribution Line Upgrade Rehab and Reconditioning:

The Distribution Line Rehabilitation and Reconditioning program was approved for US\$1.3M in 2020, JPS spent US\$0.26M on the program during the year.

The planned scope was to rehabilitate 13 KM of aged primary line sections. Installation of 228KM of 2/0 AA MV Covered Conductors, Secondary rehabilitation of 129 circuits and commencement of a 15KM of line reconstruction along Hope 410 in the Mona community.

The scope achieved in 2020 was installation of 15KM of covored conductors and Secondary rehabilitation of 15 circuits. These activities were completed in December 2020 and benefits will be evaluated during 2021.

The scope and budget not executed in 2020 has been moved to 2021, to be completed along with the previously approved 2021 scope. The roll out of this project was impacted by the covid-19 pandemic as the supply of key materials such as poles and insulators was reduced globally. The granting of planned outages particularly in residential areas was also limited to prevent disruptions during school from home and work from home orders.

Customer Growth (CCMA):

The Customer Growth or complex connection program was approved to spend US\$4.5M in 2020, JPS spent US\$5.3M on the program resulting in a 19% overspend. It is noteworthy that in the 2019-2023 Medium Term Investment Plan submitted by JPS the budget requested in 2020 under this program was US\$5.9M. The CCMA program is used to build infrastructure to enable complex connections to the distribution network and is done at the request of customers. Condition 13 of the JPS electricity licence 2016 mandates JPS with a duty to connect customers under specified conditions, this program allows JPS to fulfil its mandate under the licence.

In 2020 JPS actioned five hundred and eighty (580) requests for new connections valued at US\$7.5M with three hundred and thirty (330) completed in 2020 and the others carried over to 2021. Based on aggregated transformer capacity JPS estimates ~33,000KVA of new capacity was added through these 330 completed projects in 2020 which is projected to add ~81,087 MWH of new demand annually going forward. There has been a notable increase in the requests for connections particularly in the corporate area, North Coast and St Catherine. This is related to the expansion of the Business Process Outsourcing (BPO) and housing sectors with apartment complexes and sub divisions being the main drivers.

Distribution Transformers:

The Substation Distribution Transformers program was approved to spend US\$2.8M in 2020, by the end of the year JPS spent US\$1.5M on the program representing a 48% variance on budget. The 2020 scope included the completion of the additional 25/33MVA transformer at the Tredegar substation and expansion of the 24kV and 69kV buses along with a new 69kV circuit breaker, new protection panels and construction of a new feeder including new feeder reclose, this project was started in 2019. It also included the replacement of the 15MVA T1 Transformer at the Rose Hall Substation with a new 25/33MVA unit and the commencement of the T3 Transformer Replacement & Upgrade to 25/33 MVA at the Parnassus substation.

The program saw the completion of the replacement of the 15MVA T1 Transformer at the Rose Hall Substation with a new 25/33MVA unit in December 2020 at a cost of US\$0.84M. The Tredegar substation project maintained the same scope and design however its completion was delayed to August 2021 due to factory closures on the part of key suppliers of steel structures, circuit breakers and reclosers due to the covid-19 pandemic. The Tredegar Transformer project incurred costs of US\$0.7M in 2020. The Parnassus Transformer project was delayed to 2021 due to supply chain constraints from the covid-19 pandemic.

Meters & Service Wires:

The meters and service wires project was approved to spend US\$2.3M in 2020, the project actually spent US\$2.6M during the 2020 budget year representing an overspend of 13%. The project executed the installation of 9,800 customer meters and build out of 420KM of service wires across all 14 parishes. This program is also mandated by condition 13 of the JPS electricity licence 2016 which requires JPS to connect all customers seeking to connect to the distribution grid. The program also replaces defective customer meters, if these meters are not replaced JPS would be forced to estimate customer's monthly consumption. JPS faces a guaranteed standard penalty if it provides customers with multiple estimated bills.

Combine Cycle Plant:

The Bogue Combine Cycle Plant was approved to spend US\$5.5M in 2020 to complete the planned major overhaul of GT13. The 2020 expenditure was US\$5.7M and the project was completed in April 2020. The Maintenance cycle for GT 13 has now been extended from 3 years to 4 years due to the upgrade of hot section parts and combustion parts which was executed during the project. This project does not have a Z-Factor variance risk the variance does not exceed 5%.

<u>Critical Spares – Generation:</u>

The program to replace critical capital spare parts at power plants was approved to spend US\$2.7M in 2020, JPS spent US\$1.3M on the program during the budget year. Some of the planned replacements under this program was deferred to 2021 due to the late approval of the new tariff by the OUR. JPS managed this risk of not making the interventions mainly due to the reduced dispatch of power plants as a result of lower net demand from customers in 2020.

Minor Projects

The Final Criteria defines Minor Projects as non-routine capital projects valued at less than US\$10

million. Each Minor Project shall be clearly identified in JPS' capital investment plan, but shall be assessed for Z-Factor adjustments collectively (i.e. based on the performance of all projects in the Minor Project category as a whole).

The minor project category, as outlined by in Table 2 of the appendix, collectively has a 44% net underspend of the approved budget. Of the 39 projects approved in this category, thirty-one (31) either had some scope deferred to 2021 or the entire project was deferred to 2021; Three (3) were completed as planned and five (5) projects overspent the approved 2020 budget. The total variance in this category of projects is 44%. The approved budget for 2020 was US\$36.3M and a total spent by JPS was US\$20.2M

The challenges with late approval of the investment plan as well as supply chain challenges due to the covid-19 pandemic were the main factors that lead to JPS not executing all the minor projects as approved.

Proposed Treatment of Variances

JPS proposes that <u>no Z Factor adjustment</u> is implemented for approved 2020 projects which may have experienced any of the four conditions that trigger a Z-Factor adjustment; namely project delays, unimplemented projects, unplanned projects and changes in project scope. JPS also makes no claim at this time for costs related to projects which overspent the approved 2020 budgets.

JPS has not cancelled the implementation of any approved 2020 project and does not intend to delay any of the projects beyond 2021. The approved project scopes that were not executed in 2020 face a timing variance due to the factors outlined in this chapter with some projects having made contractual commitments for the supply of inputs and services to be delivered in 2021. The activities not completed in 2020 will be fully caught up in 2021 and will not adversely affect 2021 planned implementations.

For JPS 2021 capex activities to be successful it is important that no Z factor adjustment is made to the tariffs. If a reduction is implemented JPS ability to generate enough cash to execute its planned investments would be put at risk.

5.2 Capital Projects Performance Outlook for 2021

In 2021 JPS intends to execute the projects approved in the 2019-2024 Rate Review Determination for 2021 implementation as well as the projects and scope deferred from 2020. Where there was overspend on projects in 2020 this will be offset against the 2021 approved amounts. Therefore, by the end of 2021 the approved expenditure for 2020 and 2021 will be expensed in total and the planned project activities will be completed.

This assumes global supply chains return to normal as nations ease their travel restrictions and lockdown rules.

2021 will see JPS carry out fifty-one (51) approved projects, eleven (11) of these projects are in the Major and Extra-Ordinary Maintenance category while forty (40) are minor projects.

Table 3 in the appendix illustrates the budget by project for 2021 including the carry-over amounts deferred from 2020. This shows that at the end of 2021 JPS will expend all funding approved for 2020 and 2021. In 2021 JPS intends to execute two projects which were not submitted in the 2019-2023 Medium term investment plan. These projects are 40 MVARS Bulk Capacitor Banks and GT 10 Major Overhaul. Both projects became necessary after the retirement of the B6 power plant at Hunts Bay. They provide grid stability and will alleviate the need for a non-economic dispatch due to generation short fall in the corporate area.

In December 2020 JPS provided business cases demonstrating the technical and economic benefits of both project and expects a positive response from the office in April 2021. The implementation phase of the projects will begin as soon as this approval is received and is expected to be completed in December 2021.

JPS does not request an incremental change to the revenue requirement to facilitate these two projects at this time, however will submit for their addition to the revenue requirement at the next annual review.

5.3 2019-2024 Rate Determination (Requests and/or Concerns)

JPS 2022 North East Coast Voltage Security Improvement Project

In reviewing the Proposed 15KM Bellevue-Roaring Rive 69kV Transmission line project proposed by JPS, the 2019-2023 Rate determination section 7.184-7.196 concluded that:

"Load flow analysis results have confirmed low voltage conditions in the general areas as indicated by JPS.

Load Flow simulations taking into account the implementation of the proposed Bellevue to Roaring River 69 kV lines has shown that the proposed line will not be able to address an outage of the Bellevue substation Interbus transformer, which is the worst outage contingency in that area.

The OUR's assessment of the JPS' proposal indicated that the installation of a second transformer at Bellevue will correct the contingency problem identified, and most likely will be a cheaper option. The disadvantage of this option is that the system losses will increase at 0.15 GWh annually when compared with the JPS proposal, over the ten years. However, it will significantly improve the static and dynamic voltage stability of the network in that area. It should also be noted that with adequate reactive support on the system, that by adjusting the tap position on the Interbus transformers at Bellevue, the transmission system losses in that area can be reduced. Table 31 shows the loss comparison with the proposed project and OUR proposed alternative.

Based on its analyses and the relative ineffectiveness of the JPS proposed solution, the Bellevue to Roaring River 69 kV line is not approved. As indicated the installation of a second 40/60 MVA transformer at Bellevue will address the contingency problem identified and is recommended by the OUR. The alternate project cost is estimated at US\$2,600,000. The OUR will offer JPS the opportunity to explore the OUR proposed alternative and submit a capital plan for this in the next Annual Rate Review Adjustment."

JPS welcomed the OUR's acceptance of the voltage problems in the service area and after greater analysis of the problem including consideration of the OUR's analysis, now submits the following alternative project this is believed to be the optimal solution, providing the most economic benefit to customers. The alternative project is North East Coast Voltage Security Improvement Project which includes a New 60/80 MVA Interbus transformer at Bellevue and 30 MVAR of capacitor banks at Roaring River and Ocho Rios Substations. The proposed timeline is 15 months between January 2022- March 2023 and the cost estimate is US\$6.1M. The business case with cost estimates as well as relevant system studies is included in the "JPS 2022 North East Coast Voltage Security Improvement Project" folder that is included.

6. System Losses Performance Review

6.1 Introduction

Energy is one of the essential factors of production, along with land, labour, capital and material. In most countries, including Jamaica, electricity is the primary means by which the energy that drives economic production is distributed from producers to consumers. The electricity network therefore plays a critical role in achieving economic progress. Given the network's critical role in sustaining progress in the modern economy, anything that affects it has national implications. Protecting Jamaica's energy means protecting Jamaica's electricity network. Doing this requires partnerships and coordination, especially with the Government.

Unfortunately, high levels of system loss continues to plague Jamaica's energy sector. System losses represented 28.03% of the electricity generated in 2020. These high levels of loss result in the increased cost of electricity, higher fuel imports, increased carbon footprint, and other issues which affect the country. Electricity theft accounts for the majority of the non-technical losses in Jamaica. These illegal activities not only increase the cost of electricity but also undermine the reliability and safety of electricity supply. Ultimately, high levels of system loss undermines commercial and industrial activities, lowers the quality of life for residents and makes the economy less competitive.

Managing system loss, especially the electricity theft component, is a very challenging problem. The drivers of theft are socioeconomic in nature, and so high levels of theft are associated with developing countries. The License recognizes that the drivers are not entirely within the control of JPS, and promotes Government involvement. Other developing countries have effectively reduced system losses by combining and coordinating technical solutions with legislative, judicial and other institutional reforms to change public behaviour. Unless there is focus on the nation's and not just JPS' response to theft, this issue will continue to wreak havoc on Jamaica's energy sector.

The COVID-19 pandemic ("the pandemic") has made managing this difficult problem much harder and as a result the Company has seen the deterioration in system losses for 2020. In the 4 years prior to the pandemic system losses was on a downward trajectory, reducing by about 0.3 percentage points annually. System losses has increased from 26.05% in 2019 to 28.03% in 2020 reversing the downward trend. The pandemic has impaired operations and has affected public behaviour, particularly as it relates to electricity theft, but also relating to the distribution of consumption shifting away from commercial and industrial users towards residential users. Both have had a significant impact on system losses.

In its 2019 – 2024 Rate Review application ("the 2019 application"), JPS proposed system loss targets and a target-setting mechanism that focused on the aspects of system loss that it had some level of control over. The aspects were the likelihood of discovery and to a lesser extent the means of theft. JPS presented a number of initiatives, such as smart meters and Residential Automated Metering Infrastructure (RAMI) that were focused on those aspects. The Office eventually approved a number of the initiatives proposed by JPS but this approval was greatly delayed due to the delay in the 2019 Rate Case Determination ("the 2019 Determination"). Additionally, there was great contention with regards to the targets as well as the context in which they are set.

Ultimately a great deal of regulatory uncertainty existed in 2020 which impaired the implementation of a number of these initiatives.

Paragraph 37 of the Schedule 3 to the Licence mandates that the targets for system losses be reasonable and achievable taking into consideration, amongst other matters, historical performance and agreed resources, corrected for extraordinary events. JPS maintains that the targets pronounced by the Office at Determination #21 of the 2019-2024 Rate Review Determination Notice are not reasonable and achievable. In the absence of a stay against this decision in accordance with Condition 32(1)(ii) of the Licence, JPS is filing for this adjustment without prejudice to its appeal before the Tribunal in this regard.

Despite the challenges and delays, the reduction of system loss remains a high priority for JPS as the benefits for our customers and the economy are clear. JPS has largely managed to do what it planned to do in 2020; it has exceeded its targets for recovered energy through its initiatives. Improved performance notwithstanding, the fact that system losses still increased significantly highlights the strength of the factors external to JPS and the need for a national response to manage the problem. Notwithstanding this, JPS continues to play its part and seek new opportunities to reduce system losses. JPS is confident that with strong national partnerships it can sustainably reduce system losses and recover from the effects of the pandemic.

6.2 System Loss Context

JPS' approach to managing system losses involves developing an understanding of the fundamental driving factors, determining which factors are controllable by JPS and then crafting plans that seek to maximize impact given available resources. This is the prudent approach that allows JPS to focus on areas that it can meaningfully change, while avoiding wasting resources on areas that JPS has limited to no control. This strategy of maximizing system loss benefits and minimizing wasted costs ultimately benefits our customers.

6.2.1 Technical Loss

Technical loss depends on the topology and specifications of network components as well as the loads placed on the network. JPS consistently invests in improving the design of the network to improve reliability, safety and reduce technical losses. The improvements to technical loss exhibit diminishing returns with reduced benefits for the same spend. Due to this effect and the high labour and material costs involved in improving the network, there is an optimal level of technical loss which balances the level of loss with the costs of improving it. Increasingly, technical losses alone are not sufficient to justify the cost of many initiatives. Solutions like voltage standardization must provide other benefits besides technical loss reduction in order to be financially feasible.

The other aspect of technical loss is the level and distribution of loads. The further a conductor must carry current and the larger the current, the more technical losses exist. JPS has little control over the sizes and distribution of loads. Instead, the prevailing solution for alleviating the pressure from loads is distributed generation. Here generating assets are smaller and more distributed which brings them closer to their loads. There are, of course trade-offs, but this is a tool being explored by JPS that can be used to reduce technical loss.

6.2.2 Non-Technical Loss

Theft accounts for the overwhelming majority of non-technical losses (internally estimated conservatively at over 75%) and any attempt to control non-technical loss must address this issue. The energy that is lost due to electricity theft is the result of aggregating the impact of individual behaviours; persons choose to steal electricity. These kinds of losses can be reduced by either altering behaviour or seeking remedies after the fact. JPS considers both avenues in developing its understanding of electricity theft and then in crafting our plans to reduce electricity losses due to theft.

In understanding the driving factors behind the behaviour of stealing electricity, JPS employs the rational choice theory. This is a foundational theory used to understand and model human behaviours and is widely used in criminology, economics, sociology and political science. It posits that an individual is a reasoning actor who evaluates the costs and benefits among options and chooses the option that best achieves their own goals. The theory is quite general and can and has been adapted to several subject areas where an understanding of human behaviour is required.

In using this theory to understand the driving factors behind electricity theft, the Company borrows heavily from the theory's application in criminology. The theory is built on the following assumptions:

- 1. Individuals will generally seek to eliminate their electricity bill
- 2. Individuals consider several options to achieve this goal. These options fall into two categories:
 - a. Legitimate (e.g. lowering consumption or replacing supply with legal alternatives)
 - b. Illegal
- 3. Individuals are rational
 - a. They always rank their options in terms of preference using a perceived cost-benefit analysis
 - b. They always choose the most preferred option

Here, individuals evaluate the costs of each option which can be formal (e.g. financial cost, arrest, prison, fines) and informal (e.g. social rejection) sanctions for deviant behaviour. The individual evaluates the benefits of theft which can be tangible (e.g. money) or intangible (e.g. psychological thrill, respect of peers) (Vito, Maahs, & Holmes, 2006). There is evidence to suggest that these models are useful in modelling non-violent crimes (Steele, 2016) and empirical studies tend to affirm the qualitative predictions made by the rational choice theory (Levin & Milgrom, 2004).

JPS believes this model is appropriate because there is evidence of rationality: theft is usually an ongoing activity; it is a non-violent crime; and otherwise law-abiding people abstract electricity. These characteristics suggest that offenders engage in premeditative rather than impulsive and emotional behaviour, and there is some selectivity in law breaking which shows that internal costbenefit analysis in other areas have yielded legal behaviours.

Aspects of Non-Technical Loss

JPS has identified the following aspects which are the basis of each individual's cost-benefit analysis. These aspects were borrowed from work looking at criminal behaviour (Vito, Maahs, & Holmes, 2006) and validated by internal interviews and surveys conducted among both legitimate as well as illegitimate users of electricity.

JPS believes that these factors are fundamental, are good qualitative predictors of changes in nontechnical losses and constitute the aspects of non-technical losses prescribed by the Licence, which may or may not be controllable by JPS.

Social Attitudes

Social attitudes can have a significant positive or negative impact on an individual's preferences regarding legitimate or illegitimate electricity supply. Individuals face considerable pressure to conform to prevailing behaviours lest they suffer social ridicule, isolation, rejection and other negative social outcomes for divergent behaviour. Conversely, individuals are rewarded socially for convergent behaviour, enjoying the respect, praise and acceptance of their peers.

Local attitudes can vary widely in this regard and consequently whether an individual views electricity theft as a divergent behaviour depends heavily on the attitudes of neighbours and peers. In some areas theft has been normalized and is sometimes encouraged while legitimate supply is discouraged. The geographic areas associated with these attitudes tend to have high levels of electricity theft and are less inclined to conceal theft. In other areas, attitudes towards electricity theft is far more negative and consequently the levels are comparatively lower with higher effort expended on preventing discovery.

A public survey commissioned by JPS shows mixed attitudes towards theft. These attitudes are contextual with social responses to electricity theft depending on the circumstances. For example, people view theft more favourably in groups considered disadvantaged. Such groups include the elderly, sick or unemployed. Some persons view theft as a justified response to perceived ills perpetrated by JPS. Overall, Jamaicans tend to view electricity theft informally; illegal but not necessarily morally wrong.

JPS has and continues to undertake initiatives aimed at altering the social narratives. These include communication campaigns and community renewal initiatives. However, there remains significant social inertia as unproductive attitudes persist.

Consequently, the sociology of electricity theft is an aspect over which JPS does not have full control.

Economics

One study looking at 53 utility companies in 7 countries found that the proportion of income devoted to electricity was a strong predictor of system losses (Quantum America, 2013). Individuals evaluate the financial costs and benefits of their options. Another paper that compares the levels of loss between developed and developing countries cited the ability to afford electricity as a primary factor (Antmann, 2009).

Individuals consider their financial means relative to the costs of their options in achieving their goals. The average residential customer registers about 1,900 KWh consumption per year. This results in an annual cost of roughly \$102,000 using March 2021 rates³. The cost to wire and certify a house in preparation for legitimate supply ranges from \$80,000 upwards. Solar panels are another option but require large up-front costs for equipment and installation.

Electricity theft looks like a strong alternative given all of the avoided costs associated with legitimate means of securing electricity. The equipment needed to steal electricity can be relatively cheap to obtain depending on sophistication. The techniques and equipment can range from simply inverting the meter to complex and expensive electronic switches. The costs to steal electricity are largely up-front, requiring little if any operating costs. Thus expensive and sophisticated forms of theft still enjoy long term financial pay-offs.

JPS does not have control over incomes or the costs of equipment needed to steal electricity. JPS has limited control over the cost of electricity. Most of the customers' bill (about 70%) is attributable to basic operating costs like fuel, IPP charges and taxes which are outside JPS' control. The remaining costs, which are included in our rate base, are subject to regulatory constraints and financial realities that restrict the types of actions that can be taken.

Consequently, the economics of electricity theft is an aspect over which JPS does not have full control.

Availability of Means

An individual must have the means to translate intention into action for both legitimate and illegitimate electricity supply. Availability of equipment, expertise and access to the electricity network is a prerequisite in either case. The individual evaluates the availability of means when determining preferences among options.

Equipment and expertise is widely available for both legitimate and illegitimate supply. Since the equipment like wires and contactors have legitimate uses, their access is not regulated and they are available in hardware and other stores. Depending on the level of sophistication in stealing electricity, the layman may be sufficient or an electrician may be required. In either case, the expertise is not hard to come by.

The network infrastructure is easily accessed as it is mostly in publicly accessible areas and is unsecured. Metering infrastructure is typically on customers' property and is equally if not more accessible. This situation is not unique to Jamaica and is a feature of modern electricity grids. There do exist technical solutions to limit the access to the network for illegitimate uses but these require significant revisions to infrastructure. The costs are prohibitive except in areas where there is very high concentration of theft. Even in these areas, there are external challenges limiting

³ Excludes GCT, FX and Tariff Adjustments. Rates - Fuel: 25.853, IPP: 12.87, Energy: 7.24 and 20.79

implementation such as threat of violence, and political interference. In areas where theft is less concentrated, there are very limited solutions.

In some areas, especially rural, access to legitimate supply is an issue. This is usually due to the financial realities of very expensive infrastructure and the low number of potential customers. These cases strongly motivate persons to seek illegitimate supply, which they do by illegally connecting to the nearest accessible point of the network. Since it is difficult for the utility to justify these expenses the Government has assumed the responsibility for electrification in rural areas through the Ministry of Local Government and Rural Development (MLG).

Ultimately, JPS is not in control of the availability of the equipment and expertise needed to steal electricity. JPS largely has control over the design of its network but extremely high costs and other external factors limit the financial feasibility of redesign.

Consequently, the availability of the means of theft is an aspect over which JPS does not have full control.

Perceived Severity of Formal Punishment

The perceived severity of formal punishment is considered when deciding between legitimate and illegitimate forms of supply. Formal punishments include fines, imprisonment and loss of legitimate supply. Indeed the threat of arrest has been observed to improve the likelihood of regularization in persons discovered stealing electricity. Interestingly, Quantum (2013) found that the level of crime was a very good predictor for non-technical losses. They reasoned that an ineffective police force and justice system favoured the occurrence of theft along with other crimes.

Electricity theft is a crime, and as with all criminal offences, is only punishable once the course of justice is exhausted. This ultimately requires the prosecution to prove that the accused committed the offence through reliable evidence. As such, although not the direct benefactor of any ensuing fines, the Company is typically required to dedicate human capital and time to lengthy criminal proceedings, regardless of the complexity of the theft. This results in the redirection of critical resources away from loss reduction investigation activities. In 2020, technicians participated in only 92 such criminal proceedings, albeit that the Company conservatively estimates about 180,000 illegal consumers of electricity. Given the potential volume of matters which could have been pursued, it is questionable whether or not the current judicial system has the capacity to efficiently dispose of these matters. In these circumstances, the present penal framework does not act as a deterrent for future offenders. JPS has advocated for a court dedicated to hear such matters but gained no traction.

The Company assesses the amount of energy stolen as part of its investigation. As previously indicated, fines and imprisonment are imposed by the courts, and so are the result of a judicial process that requires agents of JPS to give witness accounts. JPS does not financially benefit from that process. However, where the law permits, such as where a contract for supply was in existence with the offender, JPS is capable of recognizing the debt payable by the offender and pursuing the collection of same. At all times, JPS operates so as to ensure that the theft of electricity does not give rise to further deterioration of its financial health. In so doing, JPS must arrive at a delicate

balance between the level of bad debt and the ability to recover assessed sums from offending customers. Often times this results in the recognition of sums valued less than the originally assessed amount. From an offending customer's perspective, the worst case scenario is that they pay for the energy that they used illegitimately. This cannot be viewed as punishment and is not a deterrent and is only an attempt to correct the symptoms but does not address the underlying problem. Consequently, JPS does not consider this to be a sustainable solution to electricity theft.

The final form of formal punishment is disconnecting an offender's legitimate service. In JPS' experience, the threat of disconnection has a limited impact and only on specific demographics. Instead, lack of access to legitimate supply motivates persons to obtain illegitimate supply.

While JPS does its part to educate the public about the consequences of theft, it has little control over the severity of the consequences.

Consequently, the perceived severity of formal punish for theft is an aspect over which JPS does not have full control.

Perceived Likelihood of Discovery

The perceived risk of getting caught is a factor in assessing whether to engage in non-violent crimes (Vito, Maahs, & Holmes, 2006). JPS asserts that this is true of electricity theft and its experience supports this. Customers generally go to great lengths to conceal theft for this reason.

There are many techniques available for persons to minimize this risk. Irregularities are easily concealed using features of the premise or the environment. Some irregularities are built into the structure of the house during construction. Certain types of irregularities can also be easily and quickly installed and removed. Additionally, JPS is aware of neighbourhood watches wherein residents alert each other when JPS is in the area which further conceal theft.

Smart meters are a powerful tool available for detecting theft with high temporal resolution. When a transformer circuit is properly configured with smart meters an energy balance can be performed which directly measures the loss on the circuit. This energy balance does not guarantee discovery for individuals but it greatly narrows the focus to those served by the transformer. Using the energy balance shown in Figure 6-1, the Company has observed a neighbourhood watch in action. JPS team detected high losses on a circuit that vanished when its technicians were approaching the circuit and reappeared sometime after the team left the area. This is shown by areas shaded in blue. Eventually, JPS found the offender who was using a line tap that was easily installed and removed.



Figure 6-1: Loss rate of a transformer circuit in Portmore

This highlights the potential and limitations of smart meter technology. Notwithstanding, JPS is excited about this technology and is aiming to have almost all revenue meters converted to smart meters. Until and to the extent that this transition is complete, the detection of theft in non-smart meters remains a significant challenge.

Consequently, although JPS may have solutions, such as smart meters, that can greatly improve the likelihood of discovery in some cases, the ability to identify and deter the activity is not fully within our control.

6.3 System Loss Performance for 2020

The system loss rate deteriorated in 2020 due to the effects of the pandemic. The increase was the largest seen in over 10 years. This reversed the last four years of sustained loss reduction as illustrated in Figure 6-2.



Figure 6-2: 12-month rolling system loss rate trend from December 2016 to December 2020

This deterioration in the system loss rate was largely due to an increase in the non-technical loss rate as seen in *Table 6-1*. The 1.99 percentage point increase in non-technical loss rate corresponds to an 11% increase in that rate. The 1.98 percentage point increase in the system loss rate corresponded to an increase of 8% in the overall rate.

Table 6-1: Loss rates in 2019 and 2020

	2019 Rate	2020 Rate	Change
Technical Loss	7.92%	7.91%	-0.13%
Non-technical Loss	18.13%	20.12%	10.98%
System Loss	26.05%	28.03%	7.59%

An examination of the actual energy reveals a similar picture. *Table 6-2* shows that the change in non-technical loss was lower at 5.88% and also showed a notable decline in technical losses. Overall system losses increased by 2.67%.

	2019 Energy (MWh)	2020 Energy (MWH)	Change
Technical Loss	350,688	334,307	-4.67%
Non-technical Loss	803,251	850,480	5.88%
System Loss	1,153,940	1,184,787	2.67%

Table 6-2: MWh losses in 2019 and 2020

The pandemic had a significant impact on system losses in numerous ways. The changes in customer and non-customer patterns induced by the various orders issued by the GOJ resulted in the following:

- Several aspects of electricity theft were negatively impacted resulting in an increase in the rate of loss, particularly in residential customers.
- Commercial and industrial customers had reduced activity, as the Company recorded lower sales year-over-year ("YoY").
- Residential customers were at home more often, as they were the only customer class to register increased sales YoY. Since residential customers have a higher propensity to steal this further exacerbated the increase in non-technical loss.
- Overall generation decreased by 4.57% which is the highest rate of decline in the last 20 years. This explains the notable reduction in technical losses.

6.3.1 Status of Loss Reduction, Performance and Results

In its 2019 application, JPS outlined several initiatives for 2019 - 2024 designed to improve system losses. There were two technical loss reducing initiatives in 2020 shown in Table 6-3.

Initiative	Planned Scope	Actual Scope	Planned Impact	Actual Impact
Valtaga	2019 Oracabessa 110 Oracabessa 210	2019 Oracabessa 110 Oracabessa 210	674 MWh (0.015%)	In the process of being evaluated. 2019 projects would have been realized in 2020.
Voltage Standardization	2020 Upper White River 110 Upper White River 210	2 feeders 2020 Upper White River 110 Upper White River 210	132 MWh (0.003%)	TL reduction will be realized during 2021
Distributed Generation	10 MW Plant	To be commissioned in 2021	600 MWh (0.014%)	Determined after plant commissioning
Total			1.406 GWh (0.032%)	

Table 6-3: Summary of technical loss initiative performance in 2020

The non-technical loss initiatives were focused on improving measurement, analytics and processes. The initiatives were designed to enhance the likelihood of discovery of non-technical loss. Importantly, when designing the initiatives it was assumed that demand would continue increasing in keeping with recent trends. However, despite the initiatives exceeding the energy loss reduction targets by almost 100% (Table 6-4), the non-technical loss rate increased by 11% due to significant decrease in generation.

Planned Actual Planned Actual Initiative Scope Scope Impact Impact **Smart Meters** 100,000 69,697 Audits & Investigations 95,806 81,624 12.1 GWh 19.2 GWh 2 tools Analytics Tooling 2 tools Upgrading metering infrastructure 12 points 13 points RAMI 5,000 558 **Community Renewal** 500 713 4.3 GWh 10.8 GWh Strike Force 500 1,395 Total 16.4 GWh 30.0 GWh

Table 6-4: Summary of non-technical loss initiative performance in 2020

The pandemic has helped to highlight what JPS has long maintained; there are aspects of nontechnical loss that are subject to strong factors external to and outside the control of JPS.

Technical Loss

JPS continues to make strides in the reduction of technical losses with major initiatives taking place on the distribution network. These include the continued execution of the Voltage Standardization Program (VSP) as well as the new 10 MW CB Hill Run Distributed Generation Project.

Voltage Standardization

The resistive loss in electrical conductors increases with the square of the current carried. The voltage standardization initiative aims to reduce the current in primary distribution conductors by increasing the voltage to 24 kV. Given that electrical power depends on both voltage and current, higher voltages means that less current is required to deliver the same power. Additionally, the initiative is aimed at getting all primary distribution feeders at the same voltage, which allows increased flexibility in managing outages and maintaining reliability.

In 2019 as part of the initiative, two feeders from the Oracabessa substation were converted from 12 kV to 24 kV for which the technical losses reduction would have been realized in 2020. Also at the end of 2020, two additional feeders from the Upper White River substation (Upper White River 110 & 210 in the parish of St. Mary) were converted from 12 kV to 24 kV for which technical losses reduction will be realized in 2021.

The impact of this initiative is still being assessed and will be submitted to the Office by June 2021 as part of the response to the Office's request for a primary distribution assessment.

Distribution Generation

The resistive loss in electrical conductors is also related to the length of the current path through the conductors, all other things being equal. Thus, the farther that generating assets are from loads is the higher these resistive losses. With distributed generation, smaller more decentralized assets closer to the loads that they serve are favoured over larger centralized generating assets. In distributing generation this way, the average current path length is reduced, which reduces the technical loss.

JPS has partnered with Caribbean Broilers (CB) and New Fortress Energy to commission a 10 MW power plant to supply CB properties in Hill Run, St Catherine. The 10 MW project, which is the first of its kind in Jamaica, is in an advanced stage of installation and commissioning and is slated to be online in 2021. The technical losses benefits to be derived from this project will be effected subsequent to the commissioning of the plant.

Non-Technical Loss

Smart Meters

The smart meter initiative is the foundation of JPS' efforts to improve the likelihood of discovering instances of non-technical loss. The remote telemetry provided by these meters is used as an input to analytical tools, which ultimately guides the audits and investigation process. Smart meters also provide additional benefits to JPS and its customers including:

Higher resolution consumption monitoring

- Remote disconnections and reconnections
- Demand profiling

Due to the significant benefits afforded by the technology JPS has presented a plan to completely transition all of its revenue meters to smart meters by 2024, except in special cases. JPS planned to install 100,000 meters in 2020 but funding and employee safety concerns induced by the pandemic caused the target to be reduced to 69,000. JPS installed a total of 69,679 smart meters in 2020.

Audits and Investigation

Loss investigations are an ongoing activity where a customer's premises is audited to determine if and the extent to which energy has been lost. Investigations conclude the discovery process and are a prerequisite for any corrective action taken by JPS. Investigations can be prompted by anything that gives reason to suspect loss, including customer complaints, consumption patterns and analytics. Rate 40, 50 and 70 customers are audited at least once per year.

A total of 81,623 investigations were completed in 2020 with 8,430 irregularities discovered and approximately 19 GWh of lost energy recovered as shown in Table 6-5. Residential and small commercial investigations amounted to 73,302. The target for the year was 12.1 GWh of recovery supported by smart meters and analytics.

	Investigations	Irregularities	MWH Recovered
Small accounts ⁴	73,302	8,304	14,093
Large accounts	8,321	126	5,105
Total	81,623	8,430	19,198

Table 6-5: Loss investigations in 2020

The circumstances surrounding the pandemic impacted operations especially in the early part of 2020. Several teams had to quarantine following contact tracing or positive COVID-19 case confirmation. Updated work protocols had to be developed, safety equipment had to be procured and deployed to ensure the safety of employees. Work had to be scaled back or curtailed as employees tried to work as safely as possible. There were also mobility issues due to the increased vehicular traffic caused by persons rushing to comply with island wide curfews. Specific restrictions included lockdowns in sections of St. Thomas (March and August 2020), Clarendon (August 2020) and St. Catherine (April 2020).

Analytics

The value of smart meters lies in the insights that can be gleaned from the data they produce. Analytics transforms data into insights and is thus an essential component of realizing the loss benefits of smart meter and other data. JPS has heavily invested in acquiring and developing the

⁴ Residential customers and small commercial customers using less than 3 MWh monthly

appropriate tools to leverage all of its data to improve its understanding of its customers and operating environment. Figure 6-3 shows a screenshot of a tool that allows JPS to monitor the trends in loss investigation outcomes. It also shows which analytics algorithms are most effective. Information like this is used in developing and monitoring loss reducing initiatives.



Figure 6-3: Summary of Loss Investigations and Recoveries

JPS has a mixture of off-the-shelf and in-house analytics tools to balance time-to-implement and the ability to quickly iterate on analytics techniques in response to feedback from the field teams respectively.

Snooper

SNOOPER is a platform for performing and consuming analyses on smart meters, which focus on detecting instances of non-technical loss and isolating offending customers. Snooper was motivated by our experience with off-the-shelf solutions which were not tailored to an environment like Jamaica's. Importantly, snooper will allow JPS to test and refine different methods of analysis over time and with feedback from the field. Snooper is designed as an audit initiation tool and answers the question: "Am I experiencing non-technical loss at this premises?" It does so using the energy balance as its foundation to filter candidates for investigations, before applying other analysis to pinpoint specific accounts. The vision of snooper is a top-to-bottom monitoring of system losses that incorporates telemetry from substations all the way down to individual customers.



Figure 6-4: Screenshot of an energy balance from the Snooper tool

The tool is currently in the pre-production stage as its initial functionality is tested and improved.

Easy Account Selection Interface (EASI)

EASI is a tool designed to automate the account selection process for audit and investigation purposes. EASI enables workforce managers and analysts to segment the customer base by demographics, metrics such as average energy consumption, frequency of exceptions, investigation history, and other granular profiling methods. EASI integrates datasets, that were previously in different siloes, into a single platform that has made the process of customer analysis twelve (12) times faster than before.



Meter Infrastructure

Metering Infrastructure projects for 2020 included the rehabilitation of eight substations, two Net Generation and two sub-feeder metering points. Of the twelve points, eleven were completed as planned while the remaining was not completed due to challenges obtaining an outage to effect work required on the asset.

In addition, two substations and two sub-feeder metering points were rehabilitated due to defects and damages that occurred during the year. These metering are listed in the tables below.

Location	Planned	Actual
Rehabilitation of metering point at the Upper White River Hydro	1	1
Rehabilitation of metering point at the Highgate substation	1	0
Rehabilitation of metering point at the Tredegar substation	1	2
Rehabilitation of metering point at the Greenwood substation	3	0
Rehabilitation of metering point at the Cane River substation	1	1
Rehabilitation of metering point at the Good Year substation	1	1
Rehabilitation of metering point at the Lyssons substation	1	1
Rehabilitation of metering point at the Grange lane	1	1
Entrance to Flankers – sub-feeder	1	1
Providence Main Road – sub-feeder	1	1
Total	12	9

Table 6-6: Planned vs Actual metering points in 2020

Table 6-7: Unplanned metering points completed in 2020

Location	Actual
Martha Brae substation	1
Old Harbour Road by Lieba Gardens	1
Porus substation	1
Sub-feeder meter Granville	1
Total	4

Residential Automated Metering Infrastructure

RAMI as this initiative is known, reduces the level of access that customers have to their meters by relocating them in an enclosure mounted on the transformer or pole. This is accompanied by the removal of external secondary distribution conductors altogether. This makes it extremely difficult for person to steal electricity because the energy is already metered upon leaving the transformer/RAMI enclosure, limiting the means. Additionally, these RAMI meters have remote telemetry and administration features with similar benefits as smart meters.

Unfortunately, RAMI solutions are very expensive and are only financially feasible in areas with very high levels of theft. JPS planned to undertake three projects in 2020, however the pandemic negatively impacted the funding for these projects. As a result, only one project in "Stand Pipe" was funded and executed. Pole Line construction began in March 2020 and involved the upgrading of the existing electrical infrastructure throughout the target area from a design which allowed relatively easy access to conductors transmitting electricity at low voltage, to a more robust Anti-theft design with AMI and Prepaid Metering capabilities which can facilitate the connection of up to 1,100 customers.

The project was successfully executed and with the aid of the Community Renewal Department a total of 252 new customers were connected to the grid exceeding our target of 125. This is currently yielding an average 30MWh of monthly billed sales predominantly via Prepaid Metering. Additionally, losses in the target area have been reduced from 57% to an average 12% yielding a monthly recovery of approximately 125MWh. Table 6-8 shows the comparison between proposed and actualized benefits.

Benefits Proposed	Benefits Actualized
Reduce Losses in the target area from 57% to no more than 15%	Losses in the target area reduced from 57% to an average 12%
121 MWh monthly loss reduction	125 MWh monthly loss reduction
Improve customer service, specifically the timeliness and accuracy of customer bills.	Improved Customer service and community relations, improved accuracy of customer bills.
Provide remote on demand readings to facilitate customer query response.	Remote on demand readings readily available to facilitate customer query and troubleshooting.
Improve offerings to customers by implementing a system that facilitates Prepaid Electricity, which enables customers to have better control over their consumption and electricity expenditure.	Upgraded infrastructure facilitates Prepaid Metering and allows customers to monitor and better manage their electricity usage via their Customer Information Units.

Table 6-8: Proposed and actual benefits of Stand Pipe RAMI project

Community Renewal

Community renewal is an umbrella term used for initiatives that are focused on addressing socioeconomic issues that drive non-technical loss at the community level. These initiatives heavily rely on partnering with public and private agencies and community representatives to administer social programs. Community renewal typically operates in high loss areas with predominantly illegal users, often alongside other initiatives like RAMI. The main goal is to convert illegal users to legitimate customers, a process called regularization, through social programs. Wherever possible, however, community renewal tries to reduce the consumption of illegal users.

The original target of the community renewal initiatives was 500 regularized customers and a 4.28 GWh reduction in lost energy (a target shared with RAMI and Strike Force). The effects of the pandemic resulted in the target being revised to 400 regularized customers and a 288 MWh reduction in lost energy. A total of 713 customers were regularized with sales of 489 MWh.

Community renewal primarily operated in Standpipe, the only RAMI project area, and maintained a presence in an existing community renewal project area. Examples of the initiatives employed include:

- Issuing 1,005 LED bulbs and 178 fridge timers to illegal users in order to help reduce the energy stolen.
- Energy management sessions where over 500 households were engaged for handling queries and providing information about safe and legitimate supply.
- A back-to-school supply initiative that provided back-to-school supplies to 300 students held in partnership with the US embassy
- A Race to Save Energy competition where customers competed in saving energy and practicing good energy management practices resulting in consumption reduction of average 80kWh to 50 kWh
- Facilitating the regularization of forty (40) households that benefited from house wiring through the Ministry of Science, Energy and Technology (MSET).

Table 6-9 highlights the salient outcomes in the project areas.

Project Area	
Standpipe, St Andrew	 304 customers were transferred 254 – New customers (30 post-paid customers and 224 prepaid customer) 40 customers benefitted from house wiring assistance through MSET Average top-up rate for the area is over 90%
Homestead and Williams Lane	 304 new customers were added, Prepaid Average top-up rate is 82%
Granville, Montego Bay	 In 2020 we made some progress and were we able to transfer over 450 existing customers to the AMI 18 new customers were added to the grid Prepaid average top-up rate is 35% Due to contractor challenges, JSIF was unable to complete the recertification process, the Company is anticipating that same will be completed in 2021.

Table 6-9: Summary of Community Renewal Project areas

Strike Force

Strike force is a special unit of technicians that are trained and equipped to operate in high-risk areas, typically alongside the police. These areas, called red-zones, are characterized by high levels of theft, significant risk of violence and depressed socioeconomic conditions. The strike force provides support to other teams, like community renewal, with operations in these areas but also operates autonomously to investigate, remove illegal connections and regularize customers.

The restrictions, curfews and unavailability of the police due to circumstances surrounding the pandemic caused the Strike Force to operate at partial capacity. A total of 1,395 customers were regularized, 156,000 illegal throw-ups removed and 92 arrests made in 2020. The primary areas of operation were red zones in Kingston, St. Andrew, St. James, Westmoreland, Clarendon and St. Catherine. Notably, operations were suspended from April to June and only 50% of planned activities were executed for the remainder of the year.

6.3.2 Performance Drivers and Challenges

System loss continues to be driven mostly by users' behaviour, which in turn, is driven by the aspects of theft described in section 6.2.2 ('Aspects of Non-Technical Loss'). These aspects are the social attitudes, economics, means of theft, severity of formal punishment, and likelihood of discovery. However, the biggest challenge impeding sustained reduction in system loss was and continues to be that JPS largely faces this national issue alone. The resources and authority of the Government must be brought to bear in addressing some of the factors driving unwanted behaviour if there is to be meaningful and lasting success. Whilst there has been some progress, there is still much more that could be done.

The coronavirus has resulted in a sweeping shift in public behaviour as a result of measures implemented to contain its spread. The distribution of demand shifted towards residential users because persons were staying home more and there was reduced commercial and industrial activity. This behaviour is explained by mandatory and voluntary work-from-home orders, higher unemployment rates, island wide curfews and industry specific restrictions. Indeed, the economy had contracted in every quarter since the beginning of measures implemented to control the pandemic. Those residential users, who already have a higher propensity to steal, faces increased socioeconomic pressures to steal electricity.

Social attitudes have also become more forgiving because of the pandemic's impact. A JPS commissioned surveys suggests that persons view electricity theft more favourably in groups they consider disadvantaged. Society generally considers unemployed persons as a disadvantaged class and is more forgiving in its view of theft. There was 10.8 percent fewer persons employed as at July 2020 compared to the same month in the previous year, largely attributed to the impact of the pandemic (Statistical Institute of Jamaica, 2020). The higher incidence of unemployed persons has resulted in reduced social pressures against electricity theft which has contributed to the increase seen in 2020.

The economics of electricity theft has also been negatively affected by the pandemic. Work-fromhome orders, curfews and increasing unemployment means that more Jamaicans are at home, which drove up consumption and electricity bills. Indeed, the residential rate class was the only class that had increased consumption in 2020 compared to 2019, as opposed to the decrease seen in every other class. This increase in residential demand, however, coincided with declines in residential incomes related to the pandemic. Nearly 60% of households reported a decrease in income since March 2020 (Statistical Institute of Jamaica, 2020). The increased cost of electricity and declining incomes provided increased motivation for electricity theft.

The worsened economic conditions induced by the pandemic also impacted JPS operations and its ability to address the aspects of electricity theft over which it has some degree of control. Decreased incomes resulted in lower collections rate from customers, which declined by 2.2% compared with 2019, over the same period, March to August. This amounted to a loss of US\$10.4 million and had significant implications for cash flow reserves. The capital, and operation and maintenance (O&M) expenses were cut as a result, which in turn, impacted system loss reduction activities such as the installation of residential anti-theft metering infrastructure. That capital program was reduced from US\$3M to US\$690k based on cash flow restrictions. This reduced efforts to convert illegal users to customer by 80% compared to what was targeted for the year.

Operations were impacted in other ways related to policies and materials necessary to provide safety against transmission of the coronavirus. Additional complicating factors included the community-specific lockdowns, which made access difficult or impossible. These factors limited the throughput of loss investigations. The thoroughness of investigations also suffered because interviews with occupants, which is an essential component of those investigations, were avoided or restricted as much as possible due to concerns for the safety of technicians. Despite this reduction in productivity, recoveries were better than in the previous year because the average recovery increased. Experience from investigations support the notion that electricity theft has risen noticeably due to the pandemic.

There was also an increase in incidents of violence against JPS personnel in 2020. There were 13 recorded incidents in which field technicians were threatened, assaulted, or both by irate persons while carrying out their duties. This not only resulted in abandoning investigations in those specific cases but also contributed to a general sentiment of concern for employee safety, which hampered productivity. Table 6-10 gives details about the recorded incidents.

Date	Parish	Community	Safety Incident
10/22/2020	Westmoreland	Whitehall District	Stone Throwing Incident
7/21/2020	Trelawny	Hague Settlement/ Refuge	Stone Throwing Incident
12/15/2020	Westmoreland	Galloway/ Petersfield District	Stone Throwing Incident
8/12/2020	KSAN	Marverly Community	Stone Throwing Incident
3/6/2020	St. Catherine	Kitson Town	Stone Throwing Incident
9/18/2020	KSAS	Bayshore heights	Stone Throwing Incident
7/28/2020	St. Catherine	Succaba Pen	Stone Throwing Incident
8/13/2020	KSAN	Sterling Castle Heights	Stone Throwing Incident
9/17/2020	St. Catherine	Red Ground	Stone Throwing Incident
2/12/2020	St. Catherine	Island Farm	Stone Throwing Incident
2/14/2020	St. Catherine	Thompson Pen	Stone Throwing Incident
11/13/2020	St. Catherine	Horizon Park	Stone Throwing Incident
7/16/2020	KSAS	63 Mountain View Ave	Shooting incident

Table 6-10: Recorded safety incidents in 2020

6.4 System Loss Performance Outlook for 2021

6.4.1 Objectives and Strategies

Technical Loss

For 2021, JPS plans to convert three (3) additional feeders from 12 kV to 24 kV namely Highgate 110 & 210 and Blackstonedge 110 feeders in St. Mary. The target technical loss reduction of 635 MWh is to be realized in 2022. The 10 MW CB Hill Run Project is also expected to be completed in 2021 with a target technical loss reduction of 600 MWh.

Table 6-11 shows a summary of the expected impact for the 2021 technical loss reduction initiatives.

Table 6-11: Summary of technical loss reduction initiatives for 2021

Initiative	MWh Loss Reduction
Voltage Standardization	635
Distributed Generation	600
Total	1,235

Non-Technical Loss

JPS continues to focus predominantly on improving the likelihood of discovery and eliminating unauthorized access to the network where feasible. There are opportunities to contribute to the improvement of other aspects of electricity theft, like social attitudes, and JPS has several pilot initiatives planned for 2021 onwards. JPS has revised its strategy considering the drastic increase in system losses caused by the pandemic. Going forward JPS plans to:

- 1. Improve and expand existing initiatives
- 2. Pilot novel initiatives
- 3. Increased focus on social reform and incentives
- 4. Prioritize engaging key partners
- 5. Accelerate the digitization of the business

Table 6-12 shows a summary of the expected impact for the 2021 non-technical loss reduction initiatives.

Table 6-12: Summary of non-technical loss reduction initiatives for 2021

Initiative	MWh Loss Reduction
RAMI	17,600
Audits, Recoveries, and Smart Meters	21,000
Social Initiatives	6,900
Total	45,500

RAMI

There are ten (10) communities that have been identified for RAMI installations in 2021. These communities all have the very-high levels of electricity theft and illegal users needed to justify the expense of RAMI. Over 17.6 GWh of energy is estimated to be lost to theft annually from over 7,000 illegal users in these communities. JPS intends to convert 7,000 of these illegal users to customers and avoid 17.6 GWh in losses. This avoided loss is assumed to manifest in reduced demand and increased sales along a 1 to 1 ratio.

Community Renewal

In addition to the regular community renewal initiatives, there are several new social programs in various stages of development planned for piloting in 2021 to 2022. These programs are aimed at offering incentives for regularizing as well as altering Government policies to facilitate legitimate supply. Table 6-13 shows a summary of these initiatives.

Initiative	Status	2021 Loss Reduction	Customers Regularized
Ambassador Engaging local representatives to incentivize illegal users to regularize	Internal Approval	3,371 MWh	5,000
JPS Powers Education Offering tablets with pre-loaded education material to regularized customers with qualifying children	Internal Approval	835 MWh	500
Health Care for Children Offering health incentives to regularized customers with qualifying children	Internal Approval	813 MWh	500
Health Care for Seniors Offering health incentives to regularized customers who qualify as senior citizens	Internal Approval	781 MWh	500
House Wiring Partnership to align JSIF's house wiring program with system loss reduction and regularization objectives.	Active	1,093 MWh	1,500
Build-with-Us Incorporating JPS supply in construction permits	Awaiting Government Approval	Assessment Pending	Assessment Pending
Permit-To-Party Incorporating JPS in event permit applications	Awaiting Government Approval	Assessment Pending	Assessment Pending

Table 6-13: Summary of new Community Renewal initiatives

House Wiring

Legitimate supply requires that a house is wired by an authorized electrician and certified by the Government Electrical Inspectorate. The cost to wire a house is significant and is prohibitive to many Jamaican's, particularly those in red-zone areas. The economics of legitimate supply is less appealing than the alternative and this is a major factor why some persons choose to steal electricity, despite expressing a willingness to regularize. The Jamaica Social Investment Fund (JSIF) has undertaken a project to wire 1,500 houses annually and JPS has partnered with them to suggest project areas which overlap with Community Renewal project areas. Once households are

afforded the means for legitimate supply, JPS is able to follow up with its social programs to encourage legitimate supply.

Build with Us and Permit to Party

JPS' experience has shown that electricity theft often occurs at social events and construction sites. This is despite there being options available for temporary supply for these types of activities. JPS has proposed to the Ministry of Local Government, that building and event permits must require proof of legitimate supply as a condition of approval. This supply is not required to be from JPS so long as it satisfies the stipulations of the Licence. Should these proposals be approved and implemented, it would encourage persons to seek alternative means of supply or establish a JPS account, which JPS could then monitor. Impact assessment of these initiatives are pending approval and further information from the MLG.

Incentive Initiatives

Surveys and general feedback from Community Renewal project areas has caused JPS to consider several incentive initiatives aimed at motivating persons to regularize. The initiatives are the Ambassador program, JPS Power Education, Health Care for Children and Health Care for Seniors. The initiatives all follow the same principle of offering some health, educational, or other benefit in exchange for regularization and consistent bill payments. They are being piloted on a small scale to quantitatively measure impact, sustainability and the ability to scale.

1. Smart Meters

JPS continues the planned rollout of smart meters with about 42,000 revenue meters and 3,000 transformer meters to be installed in St James and sections of KSAS. There will be approximately 360,000 total meters installed by the end of 2021.

The vendor for the smart meters has provided programming which will allow the meters to display certain information, like the instantaneous amperage, that will streamline loss investigation. This updated programming will be rolled out over the air for all supported meters.

2. Audits and Recoveries

Given the ongoing pandemic and the desire to manage contact exposure as much as possible, JPS has not sought to significantly increase the number of audits conducted in 2021. About 85,000 audits are expected in 2021 with a 10% strike rate and 21 GWh of associated recoveries given the trends in recoveries seen in 2020.

There have been several changes made to improve the effectiveness of audits in finding and correcting loss inducing irregularities. There has been a re-organization of field technicians who now all report to the same director with responsibility for implementing loss reduction initiatives. Previously, only a subset of field technicians reported "into losses". This provides alignment in priorities and additional flexibilities in conducting audits. Other improvements include a revision of the audit process to include additional on-site data provided by smart meters and to leverage insights from remote analysis.

3. Communications Campaign

JPS continues to do its part in improving social attitudes toward safe and legitimate electricity supply. Several marketing campaigns are planned that will use mass media and other channels to help build awareness, mobilize support and build partnerships to get more legal customers on the grid. These campaigns will be supported by surveys that will be conducted throughout to measure the impact on the perceived consequences and the awareness of JPS and the customers' role in electricity theft.

There are three advertising campaigns planned which follow the themes of:

- Highlighting the consequences of theft;
- Using influential persons to encourage legitimate supply; and
- Spotlighting those the facilitate theft.

4. Key Partnerships

The pandemic has made it painfully clear that system losses is a phenomenon subject to strong forces external to JPS, especially so for non-technical losses. It is in customers' and indeed the country's best interests that other stakeholders like the Government be engaged and encouraged to participate in managing non-technical losses. JPS has and continues to advocate for a national response to this problem and consequently has partnered with other organizations to advance this response.

National Electricity Loss Reduction Plan

The Inter-American Development Bank (IDB) is facilitating a consortium including JPS, the Office and the Government with the common goal of crafting a national plan for reducing system losses. This National Electricity Loss Reduction Plan (NELRP) involves a comprehensive audit of the circumstances surrounding system losses. This includes measuring different components of losses, evaluating JPS' systems and processes, and the effectiveness of public institutions like law enforcement, the legislature and the judiciary.

The NELRP will provide a roadmap of activities, investments and targets that will enable the effective reduction system losses. Importantly, it will also define the roles and responsibilities of the various participants. Currently, external consultants are being evaluated for selection and the completed plan is expected in early 2022.

Loss Reduction Working Group

This is a working group hosted and funded by the United States Agency for International Development (USAID) 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 programs. The specific initiatives and their impact are to be determined in 2021.

6.4.2 Key Considerations

There is great uncertainty surrounding the outlook of the socioeconomic conditions that have been severely impacted by the pandemic. The estimates that have been reported by various organizations display high levels of variance, indicative of the unpredictable nature of the social and economic recovery. So far, there seems to be a consensus in the expectation that the economy will contract in the 2020/2021 Government fiscal year before a partial recovery in 2021/2022. Whatever the eventual outcome, JPS believes that the recovery from the spike in system loss is tied to the recovery of socioeconomic conditions.

Given the current national environment, which is focused on economic recovery, JPS does not expect any short-term national focus on the other, non-economic aspects of theft. In 2021, the other drivers of theft will only be addressed by the initiatives and stakeholders described in this document. Thus the short term outlook is for minor improvements. Medium to long-term, JPS is committed to the NELRP to help assess responsibilities and provide a framework for cooperation in addressing all the aspects of theft.

6.4.3 Performance Projections and Suggested Targets

JPS expects its initiatives to avoid about 1 GWh of technical losses and about 55 GWh of nontechnical losses. Factoring these initiatives into its internal models, JPS projects generation of 4,321 GWh and sales of 3,123 GWh. Consequently, the projected loss in 2021 is:

1,198 GWh in energy lost at a rate of 27.71 %

JPS has not revised its mechanism for determining responsibility proposed in its 2019 application. NTL is split into aspects deemed fully within the control of JPS and aspects not fully within the control of JPS according to the level of smart meter coverage. Consequently, JPS proposes the following targets for 2021 system loss:

Table 6-14:	System	loss targets	for 2021
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System Loss Component	Target
Technical loss	7.90%
Non-technical loss fully within the control of	6.61%
Non-technical loss not fully within the control	12.90%
Total	27.41%

6.5 2019-2024 Rate Determination Requests and Concerns

6.5.1 Target Setting Mechanism

Transparency

JPS has developed a theory that it uses to understand the drivers of non-technical losses. JPS evaluated its ability to impact system losses using this understanding and develop plans accordingly. A critical requirement to make effective plans is that the Company must understand what exactly it is trying to change and how it impacts system losses. The Licence establishes a system where the Office evaluates system loss performance, sets targets and then JPS and the Government implement activities necessary to reduce system losses. This system falls apart if there is no shared understanding among the participants.

JPS advocates for the Office to provide detailed evidence, rational and justifications for its positions and targets. 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.

Unreasonable Targets

JPS has repeatedly pointed out 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 of Schedule 3 to the Licence which mandates that targets should be reasonable and achievable. 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. Indeed, the Office participated in a workshop in 2015 hosted by the USAID which revealed that most regulators set targets within 5-10% of actuals, whereas the Office's targets tend upwards of 14% more aggressive than actuals. These were the experiences of utilities in 7 other countries that enjoyed significant social and legal reforms to support loss reduction.

The past 4 years prior to the pandemic were some of the most successful in JPS' history given its operating environment. There was sustained reduction in the rate of system losses while managing bad debt. The reductions averaged 0.90% or 0.20 - 0.30 percentage points each year. There is no historical evidence to support a reduction in the rate of system losses on the order of 14% or 3.68 percentage points in one year. This is what was expected by the OUR in 2019.

Contradictorily, the Office itself presented arguments and projects which questioned the likelihood or ability to achieve those targets in the same document. Item 14.114 of the Final Determination argues that a reduction of 1.49 percentage points would "likely be impractical in the 12-month period" in relation to residential customers in 2017. The residential customers make up 96% of the losses, as reported by the Energy Loss Spectrum, for which the Office has set a target. The Office's 2019 JNTL target of 4.07% would require a reduction of 1.95 percentage points, almost all of which would come from reductions in the residential category.

Further evidence that the Office doubts the achievability of its own targets include the projected system loss performance in table 14.22. These projections show that the Office expects system

loss to remain significantly higher than the targets that it has set. Other inconsistencies include the abnormal first year targets that the Office has been prescribing. In 2019, given an actual system loss of 26.05% and a target of 22.37%, a reduction of 3.68 percentage points is expected. Subsequent years, however, require much lower reductions of between 1.14 to 0.27 percentage points. The Office has not indicated why 2019 is special and should require between 3 to 13 times the reductions expected in the other years.

Retroactive Targets

JPS received the 2019 Determination on December 24, 2020, over one year late. That determination contained the formal targets for the five-year regulatory period, which includes 2019 which had already ended and 2020 which was a week away from concluding. This amounted to retroactive targets for 2019 and 2020. The Licence stipulates that all targets should be reasonable and achievable, but JPS is not aware of any mechanism or action that could be undertaken to impact past events. Consequently, the targets prescribed in the 2019 Determination are impossible to achieve and therefore violate the requirements of the Licence.

Suitability of the Energy Loss Spectrum

JPS communicated the serious concerns about the Energy Loss Spectrum ("ELS" or "the Spectrum") in its 2019 application. These concerns centre on the use of the non-technical losses categories to set targets and measure performance. The loss modelled in the non-technical loss categories are disconnected from reality. It was noted that use of such a report was unusual given the technical challenges involved in creating an accurate report and the questionable benefits it would provide to the target setting process. Instead, JPS has proposed an alternative mechanism in its 2019 application, which uses the coverage of smart meters to characterize the level of control available to JPS. JPS continues to advocate for this or a similar approach which uses verifiable and mutually available variables to set targets.

6.5.2 Concerns Relating to Request for Audits and Studies

In the 2019 Determination, the Office requested several audits and studies to help improve its understanding of the system loss situation. Specifically, the Office determined that:

- The company shall complete a full assessment of the primary distribution network TL, including the total number of feeders and total number of distribution transformers, within six (6) months of the effective date of this Determination Notice, and a copy of the assessment report shall be submitted to the Office.
- The company 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 three (3) months of the effective date of this Determination Notice.
- 3. The company shall conduct an independent study of NTL due Illegal Users, to establish a credible baseline, to facilitate calibration of the reported NTL and regulatory decisions going forward. This study shall be completed within six (6) months of the effective date of this Determination Notice, and a copy of the study report shall be submitted to the Office.

JPS fully supports any request to increase information and transparency. However, the timelines of some of these requests were very aggressive. Additionally, JPS and the Office are already
engaged in the NELRP which contain request three (3) in its scope. In order to reduce wasted resources and duplicate efforts JPS advocates for the consolidation of request three (3) with the NELRP.

6.6 Conclusion: JPS Proposed Target Revisions for 2021

System losses is a significant problem affecting the country. JPS has and continues to make progress on optimizing technical loss but the challenges of non-technical loss continues to make progress slow. Theft is a significant feature of the electricity sector and is driven by:

- Social attitudes
- Economics
- Ease of theft
- Perceptions about getting caught and formally punished

These problems are largely outside of JPS' control but the utility continues to do its part and encourages the participation of relevant stakeholders.

The pandemic has had a profound impact on public behaviour which has negatively impacted the socioeconomic conditions of the country. System losses, particularly non-technical losses, is driven by these conditions and naturally has also deteriorated. Notwithstanding, JPS is planning for and to aid in the recovery of system losses with several initiatives and partnerships with the Government and other organizations.

In order to achieve these worthy goals, it is imperative that the Government, the regulator and JPS are on the same page. This national partnership must value transparency and cooperation as a core tenet. Specifically:

- The Government's role should be clearly articulated and always recognized in discussions and documents related to system losses.
- The derivation of any quantity, whether target or otherwise, should not be secret. Instead, information and insight sharing should be valued.
- An objective and fair mechanism to measure and set targets should be established, replacing the current mechanism which uses the flawed ELS.

JPS believes that these are some of the prerequisite steps of any serious attempt to manage this problem. Otherwise, the lack of coordination and misunderstood or ill-suited roles will result in little to no long term improvements.

Based on the resources, historical trends, and the expected recovery in the economy, JPS proposes the following system loss targets for 2021:

Table 6-15:	System	Loss	Targets	for	<i>2021</i>
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System Loss Component	Target
Technical loss	7.90%
Non-technical loss fully within the control of JPS	6.61%
Non-technical loss not fully within the control of JPS	12.90%
Total	27.41%

Additionally, JPS maintains its proposed 10% responsibility factor for the same reasons outlined in the 2019 application.

7. Heat Rate Target Review

7.1 Introduction

A significant portion of JPS' operating expenses is related to the cost of fuel consumed by our generating plants for the production of electricity. This total monthly fuel cost is however largely dependent on the following factors listed below:

- The price of fuel consumed by JPS thermal plants;
- The fuel conversion efficiencies (Heat Rates) of these plants
- JPS total net generation (MWh) for the month;
- The amount of electricity generated by JPS' generating plants; and
- The Generation dispatch process which is impacted by the availability of generation capacity from the independent power producers

The total fuel cost therefore varies from month to month based on changes in the above factors. The monthly total fuel cost incurred by JPS are used to derive the monthly Fuel Rates (J\$/kWh) in accordance with the Fuel Cost Adjustment Mechanism (FCAM) as defined by the Licence. For a given billing period, the derived Fuel Rate is used to bill customers to allow JPS to recover the total fuel cost (net of efficiency adjustment), incurred for that period.

The Licence therefore provides that JPS' costs will be recovered through two (2) components of rates – the non-fuel rates which are adjusted annually, and the fuel tariffs which are adjusted monthly.

One (1) factor in the adjustment of the fuel tariff is the H-factor, which allows for the efficient pass through of fuel expense. The H-factor is designed to incentivize efficient operation of JPS' generation fleet. The effect of the H-factor is to implement financial penalties if JPS fails to achieve the regulatory determined efficiency targets, or financial rewards to the extent that JPS' generation is more efficient than the target set by the OUR. The fuel tariff is computed each month based on the cost of fuel in the previous month. The Licence, 2016 provides, in Schedule 3, paragraph 40 that "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".

In the 2019 - 2024 Rate Review Determination Notice, the OUR determined that the Heat Rate Factor that shall be used in the Fuel Cost Adjustment Mechanism (FCAM) should be the ratio of JPS Heat Rate target (thermal) to JPS heat rate actual (thermal) which is used in the fuel pass through formula as follows:

Pass Through Cost =
$$\left[IPPs \text{ Fuel Cost} + \left(JPS \text{ Fuel Cost} \times \left(\frac{JPS \text{ Thermal Heat Rate Target}}{JPS \text{ Thermal Heat Rate Actual}} \right) \right] \right]$$

Principles for Implementation of FCAM

The OUR in the 2019-2024 Rate Review Determination Notice outlined that they have adopted the following principles to guide the setting of the Heat Rate targets for JPS:

- The targets should hold JPS accountable for the factors which are under its direct control;
- The targets should encourage optimal generation dispatch of the available generating units to minimize the total cost of electricity generation;
- The targets should take into account legitimate system constraints provided that JPS is taking reasonable action to mitigate these constraints;
- The targets should normally be set at the Rate Review and reviewed at each Annual Review, and adjusted as applicable, to reflect changes in system configuration and ongoing efficiency improvements; and
- The targets should be reasonable and achievable and consistent with the configuration and capability of the system during the target period.

The establishment of reasonable and achievable targets requires that certain factors are weighed heavily in the target setting process. These factors include the current and future state of the assets, operating performance levels, the impact of planned investments on the generation fleet operated by JPS, investments required to improve reliability and fuel conversion efficiency, and projects currently in train and the likely impact they will have on the overall efficiency of JPS's fleet.

Final Determination 2019-2024

The OUR in Determination 20 of the 2019-2024 Rate Review Determination Notice approved the following annual Heat Rate target for the 2020-2024 regulatory period:

- a) 2020–2021 Annual Review: 9,675 kJ/kWh
- b) 2021–2022 Annual Review: 9,667 kJ/kWh
- c) 2022–2023 Annual Review: 9,495 kJ/kWh
- d) 2023–2024 Annual Review: 9,470 kJ/kWh

Determination 20 (2) states that:

"Having regard to the relevant provisions of the Licence and established regulatory precedence, the determined Heat Rate targets shall be reviewed by the Office at each Annual Review to account for efficiency improvements and factors outside the company's control, during each discrete rate adjustment period within the Rate Review period."

This chapter provides the basis for JPS' forecast of Heat Rate performance for the 2021/22 regulatory year relative to the OUR's Determination taking into account significant developments which have and will continue to affect the Heat Rate. It also provides an overview of JPS' Heat Rate performance for 2020; identifying factors outside of JPS' control which affected the fuel efficiency performance of JPS.

7.2 JPS Heat Rate Performance for 2020

The JPS thermal heat rate for 2020 was 10,262kJ/kWh. When compared to 2019 performance of 11321kj/kWh, this performance represents an improvement of 1,059kJ/kWh or 9.4%. The major contributors to this improvement in efficiency was the retirement of 262MW of Steam turbines generators, as well as the prudent maintenance activities that were carried out on JPS' generation assets over the period. The monthly heat rate performance ranged from a high of 11,914kJ/kWh in 2019 to a low of 9,430kJ/kWh in 2020. Table 7-1 summarises the heat rate performance for the period 2019-2020 compared to the OUR target.

Month	JPS Thermal Heat Rate Actual (kJ/kWh)	OUR Heat Rate Target (kJ/kWh)	Variance from Target (kJ/kWh)
Jan-19	11,137	11,450	313
Feb-19	11,579	11,450	-129
Mar-19	11,914	11,450	-464
Apr-19	11,375	11,450	75
May-19	11,173	11,450	277
Jun-19	11,019	11,450	431
Jul-19	11,088	11,450	362
Aug-19	11,897	11,450	-447
Sep-19	11,519	11,450	-69
Oct-19	11,028	11,450	422
Nov-19	11,184	11,450	266
Dec-19	10,823	11,450	627
Jan-20	10,223	11,450	1,227
Feb-20	10,346	11,450	1,104
Mar-20	10,652	11,450	798
Apr-20	10,587	11,450	863
May-20	10,515	11,450	935
Jun-20	10,508	11,450	942
Jul-20	10,561	11,450	889
Aug-20	10,569	11,450	881
Sep-20	9,902	11,450	1,548
Oct-20	9,592	11,450	1,858
Nov-20	9,828	11,450	1,622
Dec-20	9,430	11,450	2,020

Table 7-1: JPS' heat rate performance versus target from Jan 2019 to December 2020.

For the year 2020, the average actual heat rate performance was 10,262 kJ/kWh. Figure 7-1 below is a graphical illustration of JPS Actual 2020 heat rate performance when compared to the OUR's target.



Figure 7-1: Thermal Heat Rate Performance vs Target, Jan-Dec 2020

Of note, there was a delay in the resetting of the heat rate target by the regulator for the 2020/21 regulatory year. Hence the above comparison is somewhat limited and does not demonstrate a true picture of JPS's expected performance when compared to the heat rate targets established by the OUR in the 2019-2024 Rate Review Determination. Figure 7-2 below represents a more comprehensive view of JPS' performance to date, if the target was reset from 11,450kJ/kWh to 9,675kJ/kWh in July 2020.



Figure 7-2: JPS Thermal Heat Rate Performance vs 2020-2021 Target

The Figure above illustrates how JPS performed against the current regulatory target of 9,675kJ/kWh if it was reset in July 2020. It shows that JPS would have failed to meet the regulatory target for five of the nine months referenced. The average heat rate for JPS Thermal from July 2020 to March 2021 is 9,850kJ/kWh, which would be 175kJ/kWh worse when compared to the current regulatory target of 9,675kJ/kWh.

JPS Key Performance Overview 2020

2020 started out on a high, with all operational key performance indicators trending in the right direction. There was also heightened optimism as the system net generation for the first quarter was 2.7% ahead of the forecasted target. highest 1st quarter demand ever recorded. However, with the onset of the Covid 19 pandemic in March, the outlook changed, and what was previously poised for an excellent year's performance started to trend negatively, as the pandemic continued to wreaked havoc across the Jamaican economy and the world at large.

The Jamaican tourism sector, entertainment industry, Business Process Outsourcing (BPO) and other energy intensive services, including the manufacturing sector suffered the greatest impact, largely due to restrictions imposed on movement locally and globally. Consequently, energy consumption for 2020 was negatively impacted, resulting in the year ending with a demand of 4,228 GWh or 3% less than originally planned. The highest peak demand for the year was 638 MW which was recorded in August 2020. When compared to 2019, the 2020 system net generation declined by 4.6% and is the lowest recorded over the last 5 years. When compare to the 2019 peak of 661MW, the 2020 peak demand is 23MW or 3.5% lower and is the lowest Peak demand recorded since 2015. See *Table 7-2* below.

Notwithstanding the challenges brought on by the coronavirus pandemic, JPS was able to achieve a heat rate of 10,262kJ/kWh, which is the lowest heat rate performance on record for the JPS thermal fleet and represents an 9.4% improvement over 2019.

The year 2020 also saw the commissioning of New Fortress 94MWCHP facility in March, followed by the retirement of Hunts Bay B6 (68.5MW) at the end of 2020.

With the focus on reliability and efficiency, there were two (2) major initiatives executed in the year. The Bogue GT#13 and Rockfort Unit #2 major overhaul were both successfully completed.

Table 7-2 below provides the results of the Key Performance Indicators for the JPS Generation Fleet

OPERATING METRICS	2019	2020
JPS Thermal Units (kJ/kWh)	11,321	10,262
Net Generation GWh	4,429	4,228
Peak Demand MW	661	638
JPS EAF	89%	85%
JPS EFOR	5%	11%

 Table 7-2: JPS Key Performance Indicator (KPIs) 2019 – 2020 (Calendar year)

7.3 Factors Impacting JPS Heat Rate Forecast 2021/22

Low Energy Demand due to Covid-19

The ongoing pandemic has significantly disrupted the demand for electricity across the island. This has negatively impacted JPS' optimal use of the thermal generation assets, specifically the Bogue CCGT plant, which is the Company's most efficient generating asset. The demand lost on the Duncan's to Bogue Node (Large hotel load), has resulted in the capacity factor for the plant falling from pre-pandemic level of 80% to a capacity factor below 72%. In addition, the higher than projected production on the renewables assets further compounds the issue. Consequently, despite our efforts in maintaining the CCGT in its most efficient state, the low demand has caused a worsening of the CCGT heat rate by 200kJ/kWh than its pre-pandemic performance of low 9,000kJ/kWh/. The thermal heat rate plant performance are significantly affected by factors outside of JPS' control. See *Table 7-3*.

State of JPS' Key Generating Plants

Another major impactor to JPS thermal heat rate performance is the age of our assets. Of major concern, is the Rockfort Diesel Plant, which is in its 36th year of operation and has major components that are now at, or near their end of life. Of particular concern, are the turbo chargers on both units, which were last upgraded approximately 13 years ago and have exceeded their

guaranteed useful life of 10 years. These turbo chargers are key in keeping the Rockfort units at 20MW MCR. With the expected and ongoing deterioration from the turbos on both units, the efficiency will deteriorate towards retirement, unless they are replaced. Based on the retirement schedule maintained by the Minister pursuant to the Third Schedule of the Electricity Act, 2015, JPS prudently adopted a least cost approach to manage these components until retirement.

Another factor affecting the performance of the Rockfort plants is the fuel oil supplied to JPS consequent on the global shift to low sulphur fuel utilization driven by the MARPOL (International Convention for the Prevention of Pollution from Ships). Low Sulphur (0.50%) regulations took effect on January 1, 2020, and in this regard, Petrojam Limited (Petrojam) also had to switch to the importation and utilization of low sulphur crude in their refinery operations.

As a result of using the low sulphur fuel, the Rockfort engines experienced greater than 60% increase in incidents of Cylinder high wall temperature during 2020, when compared to the previous three-year average.

This anomaly was never initially attributed to the lower Sulphur fuel oil, and our engineers and technicians did extensive troubleshooting and corrective works to resolve this new issue with limited success.

Having reached out to our OEM and user groups, we were informed that this new phenomenon was being observed in the industry. It appears, that the lower lubricity in the fuel oil, as a result of the reduced sulphur content was manifesting itself in higher than normal cylinder liner temperatures.

The combined deterioration of the turbo charges and other components along with the low sulphur fuel oil issue, will cause the heat rate on both units to deteriorate from 9,000kJ/kWh to above 9,100kJ/kWh.

Figure 7-3: Thermal Fleet Actual Heat Rate Performance by Plant 2020 (kJ/kWh)



Figure 7-3 above outlines the actual heat rate performance by each plant in 2020. This graph also provides a more accurate overview on the effects that Covid-19 and equipment deteriorations. have on JPS Key plants heat rate performance

7.4 JPS Heat Rate Performance Forecast for 2021/2022

7.4.1 Forecasting Tool

For the purposes of heat rate forecasting, JPS continues to use the PLEXOS tool to run our model assumptions. PLEXOS is a proven simulation tool that uses cutting-edge data handling, mathematical programming, and stochastic optimization techniques to provide a robust analytical framework for power market analysis. Since its release in 2000, PLEXOS has emerged as the worldwide simulation tool of choice. This technology is in use in most regions of the world by many of the world's largest utilities and system operators. Since the adoption of this performance simulation tool, JPS' performance forecasting and assumptions have improved significantly and are now better able to do more flexible performance simulations. A key output from the modelling process is the heat rate performance for the year under review. In support of the heat rate, the modelling process also provides the following elements: projected maximum capacity rating of each generating unit, forecasted capacity factor and forecasted energy production by each generating unit over period.

7.4.2 Special Considerations

In establishing the heat rate target, proper consideration must be given to the following:

- The 40 day planned major maintenance outage on Bogue CCGT Steam Turbine (ST14) scheduled for February to March 2022.
- The expected effects of the continuing pandemic on the load demand.

• The wear due to age and fuel oil issues affecting the Rockfort units and their impact on the units' performance.

The OUR in the 2019-2024 Rate Review Determination Notice indicated that:

"for 2022 March, JPS projected an average Heat Rate of 12,056 kJ/kWh, which appears to be excessively high and does not reflect economic generation dispatch operation. On close examination of the data, it was found that the main components of the Bogue CCGT unit (GT#12, GT#13, HRSG#12, HRSG#13, and Steam#14), are scheduled to be on major maintenance for almost the entire month, which would have some impact on JPS' Heat Rate performance. However, JPS' 2022 CF projections show that the same CCGT unit, which should be out of service for maintenance, was projected to be utilized at a CF of about 60%, while in the same month, the utilization of efficient IPP generation facilities was significantly restricted."

JPS note the error made by the OUR in the above statement, where it stated that the entire Bogue CCGT plant was scheduled for major maintenance. The fact is only the Steam Turbine and its connected auxiliaries will be undergoing major maintenance for the referenced period. However, while this major maintenance is taking place the GT12 and GT 13 will be made available to the grid for dispatch as Simple Cycle Gas Turbines. Based on historical performance when similar activities are undertaken, it is expected these Gas Turbines will be required to operate to serve demand as well as provide voltage and frequency support on the Transmission Grid based on their location on the north-western end of the island. Our projections at this time are that these Gas Turbines will be utilised collectively at 53% Capacity Factor during this period of major maintenance. The maintenance of this steam plant is critical at this time as it will be operating nine (9) years since it's last major maintenance. The recommended period for major maintenance is normally five (5) years for these equipment, hence to further delay it beyond the scheduled period would be very high risk.

The heat rate target therefore, must consider the effect of this major maintenance outage on the Bogue CCGT Steam Turbine (ST14). Based on the current forecast for this period, JPS Thermal Heat Rate is expected to average 11,497kJ/kWh for the two months the steam plant is offline.

The OUR proposed regulatory Heat Rate targets for those months is 9,667kJ/kWh.

Based on our projections this would cause JPS to under recover on its fuel expense by approximately US\$2.9M for those two months which will not be recovered over the regulatory period.

The Heat Rate target of 9,667 kJ/kWh, set by the regulator in the 2019-2024 Rate Review Determination Notice failed to take into account the impact of this major maintenance as outlined above, that is to say, the dynamic operating characteristic of the plant.

This target was just 13kJ/kWh above the JPS forecasted performance for 2021-2022 in the 2019-2024 rate submission. With the JPS updated forecast for 2021 to 2022, if this target is not reviewed

and reset, the impact would now be forecasted as a negative 56kJ/kWh. This is a projected impact of US \$2.9M on revenues.

As outlined paragraph 37 of the Schedule 3 in the 2016 Licence all targets set by the regulator should be reasonable and achievable. As such the targets should accurately reflect the changes and activities plan for the sector over each target setting period.

Taking in to consideration the criticality of the unit to the entire system the Company believes that special attention should be given to this major planned activity when setting the 2021/22 heat rate target. JPS is proposing that the 2021/2022 heat rate target must be revised to account for this major Maintenance activity on Bogue ST14.

Another key consideration that the OUR should take into account when setting the 2021/22 heat rate target is the current age of our assets, mainly the Rockfort Power Station. The current Rockfort Diesel Engines is in 36th year of operation and have major components that are now obsolete and at their end of life. Of particular concern is the Turbo chargers, which was last upgraded approximately 13 years ago and are way over their guaranteed useful lives. The impact of the low fuel sulphur on the asset performance due to higher cylinder liner wall temperatures must also be taken into account. JPS is proposing that an additional 100kJ/kWh be factored on each unit over the period. With this in mind JPS is proposing that the OUR adjust its JPS Thermal Targets for the period 2021-2022 to reflect this known risk.

The heat rate target setting process for 2021/22 should reflect the impact of the current pandemic on the load demand and JPS's thermal fleet's ability to perform efficiently while integrating renewable energy. These are factors outside of JPS' control. The Bogue CCGT is of particular concern, the demand lost on the Duncan's to Bogue Node (largely hotel load) has seen the CCGT fall from above 80% capacity factor to below 72% capacity factor in the last year. This equates to the CCGT heat rate falling from 9,000kJ/kWh to an over 9,200kJ/kWh. The lower utilization of this asset significantly affects the efficiency of this unit. The Bogue CCGT based on design and operation is most efficient at capacity factors above 85%, hence the lower the capacity factor the worst the efficiency. JPS is proposing a revisit of the demand and heat rate used for Bogue CCGT in the heat rate forecast done by the OUR, to reflect the conditions of the current pandemic Level Demand.

7.4.3 Maximum Capacity Rating (MCR)

Table 7-3 below shows the generation fleet MCR values inputted in the mod	el
Table 7-3: Fleet Maximum Capacity Rating (MCR)	

		2021	2022	
Plant	Unit	MCR (MW)	MCR (MW)	
	1	20.00	20.00	
Rockfort	2	20.00	20.00	
	Subtotal	40.00	40.00	
	GT #5	21.50	21.50	
Hunt's Bay	GT #10	32.50	32.50	
	Subtotal	54.00	54.00	
	GT #3	21.50	21.50	
	GT #6	14.00	14.00	
	GT #7	18.00	18.00	
	GT #9	20.00	20.00	
Bogue	GT #11	20.00	20.00	
	GT #12	40.00	40.00	
	GT #13	40.00	40.00	
	CCGT	40.00	40.00	
	Subtotal	213.50	213.50	
Munro Wind		3.00	3.00	
JPS Hydro	Subtotal	29.59	29.59	
JPSCo's Total		340.09	340.09	
JEP		74.16	74.16	
JEP-50		50.20	50.20	
JPPC		60.00	60.00	
WKPP		65.50	65.50	
SJPC 194		194.00	194.00	
NFE SPH 94MW		94.00	94.00	
JPS DG		10.00	10.00	
Wigton I		20.00	20.00	
Wigton II		18.00	18.00	
Wigton III		24.00	24.00	
Blue Mountain		36.30	36.30	
WRG Solar		20.00	20.00	
Eight Rivers Solar		37.00	37.00	
Import S	Sub Total	703.16	703.16	
Total		1043.25	1043.25	

i. Note: JPS 10MW virtual IPP CHP is expected to be in operation August 2021

7.4.4 Model Results

Forecasted Capacity Factor 2021 to 2022

- i. Rockfort's capacity factor is forecasted to average 73% over the period.
- ii. Hunts Bay's gas turbines capacity factor is forecasted to average 4% during the period.
- iii. Bogue's capacity factor is forecasted to average 37% with the CCGT capacity factor being 69% and the GT capacity factor being 1% for the review period. This is inclusive of a major overhaul on Bogue ST14, which is projected to span over a two-month period.
- iv. JPS Hydro Renewables capacity factor forecasted to average 61% for the 2021 to 2022 rate review period. This is inclusive of a major overhaul on the Lower White River Hydro.
- v. The capacity factor for the wind farms in the system are as follows: Wigton I: 33%; Wigton II: 36%; Wigton III: 26%; JPS Munro: 13% and Blue Mountain Renewables: 39%. With respect to the current two solar farms the capacity factors are as follows: Eight Rivers: 20% and WRG Solar 24%.
- vi. The total IPP's capacity factor forecasted for the rate review period is 57%. The overall system capacity factor forecasted for 2021 to 2022 is 47%.

Forecasted Energy Production

- i. Rockfort's energy production is forecasted at 259GWh for the 2021/22 period.
- ii. Hunts Bay's gas turbines energy production is forecasted at 18GWh for 2021/22.
- iii. Bogue's energy production is forecasted at 725GWh for 2021/22. This is inclusive of a 40 days' major maintenance outage on Bogue Steam Turbine (ST14) in Q1,2022. Energy production for the Bogue peaking units is forecasted at 10GWh for 2021/22.
- iv. JPS Hydro Renewables energy production is forecasted at 141GWh for 2021/22. Energy production for Wind farms: BMR 112GWh, Wigton 165GWh and Munro 3GWh, and the Solar Farms: WRB Solar 42GWh and Eight Rivers Solar 63GWh.
- v. IPP's Thermal energy production is forecasted at 2,732GWh for 2021/22.
- vi. The overall system demand is forecasted to be 4,337GWh.

7.5 Heat Rate Forecast Summary 2021/22

The JPS Thermal heat rate performance over the period will depend on several factors affecting the economic dispatch that include the following:;

- 1) Growth in system demand
- 2) The addition of more renewables
- 3) The addition of new generating units and the installed reserve margin (OUR);
- 4) Heat rate improvements made to existing generating units (JPS);
- 5) Availability and reliability of JPS generators (JPS);

- 6) Availability and reliability of IPP generators (IPPs);
- 7) Absolute and relative fuel prices for JPS and the IPPs and the impact on economic dispatch;
- 8) Spinning reserve policy (JPS & OUR)
- 9) Network constraints and contingencies (JPS).

7.5.1 The forecasted heat rate by plants for the 2021/22 regulatory period:

- i. Rockfort is forecasted at 9,088 kJ/kWh.
- ii. Hunts Bay gas turbines are forecasted at 15,756kJ/kWh which is reflective of their peaking duties.
- iii. Bogue Combined Cycle Plant is forecasted at 9,783kJ/kWh. This is mainly due to the 40 days Major Overhaul that is scheduled on ST14 in Q1 2022. Bogue gas turbine GT#3-GT#11 are forecasted at 15,401kJ/kWh as per their peaking duties.
- iv. IPPs are forecasted at 9,238 kJ/kWh with SPH CHP operating as take as available as well Major maintenance outages to JPPC DG1 and JEP & WKPP engines averaging 18 days per engine.

Proposed Heat Rate Target

 Table 7-4: Results of JPS Forecasted Thermal Heat Rate Model, July 2021 to June 2022

Heat Rate	Jul-	Aug-	Sep-	Oct-	Nov-	Dec-	Jan-	Feb-	Mar-	Apr-	May-	Jun-	AVG
(kJ/kWh)	21	21	21	21	21	21	22	22	22	22	22	22	
JPS Thermal (2021\22)	9,337	9,354	9,348	9,390	9,371	9,358	9,382	10,654	12,341	9,435	9,353	9,356	9,723

Table 7-4 above reflects the heat rate targets obtained from JPS's updated forecast model for the period July 2021 to June 2022, whereby the heat Rate is projected to finish at 9,723kJ/kWh. When compared to the proposed regulatory target of 9,667kJ/kWh for the period, JPS heat rate performance would be 56kJ/kWh worse than the target and this would cause the the Company to under recover on its fuel bill for the period. JPS is therefore proposing that the OUR revise the target of 9,667kJ/kWh set for the July 2021 –June 2022 review period. JPS also strongly believes that in setting a reasonable and achievable target for the period the following must be taken into consideration;

4) The effects of current and ongoing pandemic on the load demand,

- 5) The 40 day planned outage of JPS most efficient unit (Bogue ST14),
- 6) The Rockfort units heat rate deterioration and,
- 7) A reasonable buffer to alleviate the impact that higher than planned forced outages on the IPP units have on JPS fuel recover, due to the running of less efficient units (peakers) to maintain system reliability and keep off load shedding.

In keeping with the principle of FCAM, JPS is therefore proposing that the July 2021 –June 2022 thermal heat rate target be revised from 9,667kJ/kWh outlined in the 2019-2024 Final determination to **9,927kJ/kWh**.

This the Company believes will provide a buffer for unplanned events not already in the forecast, as well as a reasonable incentive for JPS' effort to improve its operational efficiency and minimize generation cost through optimal merit order practices and economic generation dispatch as per the guiding principles of the Fuel Cost Adjustment Mechanism.

8. Tariff Design

8.1 Introduction

This Annual Tariff Adjustment Application comes only three months after receipt by JPS of the 2019-2024 Rate Review Determination Notice ("Final Determination") in December 2020 from the OUR. Also significant, is the fact that this Annual Review is the first application under the forward-looking Revenue Requirement and supporting Medium-Term Business Plan in accordance with the 2016 Licence.

It is important to note that the now concluded, 2019-2024 Rate Review process was filled with challenges as it was the first implementation of the Performance-Based Rate Mechanism Revenue Cap since the 2016 Licence. As some of these issues have remained unresolved, these challenges have carried over to this Annual Review and will have an impact on the derivation of the rate adjustment and tariffs required for the 2021/22 tariff period. Notwithstanding, the Licence requires provides JPS to submit, for review by the Office, an application for a rate adjustment - having factored various targets, incentives, and or penalties.

The following sections outline JPS' proposed non-fuel rate to take effect on the Adjustment Date for each rate class. These rates shall be set to recover the Annual Revenue Target (ART) requirement, given the target billing determinants (customer number, kWh energy sales, and kVA demand) for the year. Pursuant to Exhibit 1 of Schedule 3 of the Licence, the ART shall be adjusted on an annual basis, commencing July 1 of each year.

Consequently, this chapter covers not only a pure rate adjustment but also significant factors and changes that must be considered in the development of the 2021 Tariffs Basket, as well as other regulatory concerns which will impact JPS and its customers.

8.2 2020 Billing Determinant Review and Tariff Performance

The prolonged 2019-2024 Rate Review process resulted in a significant delay in the OUR's Determination, having become effective December 28, 2020, and a subsequent Addendum Notice ("the Addendum") being issued by the OUR on January 29, 2021. As a result of the delay, JPS commenced implementation and billing on the newly approved rates in February 2021 for all rate categories, approximately a year and a half behind the originally scheduled timeline for the rate adjustment.

The 2020 tariffs were established on the basis of the OUR's review of JPS' medium-term business plan; inclusive of expenditures, investments, and demand forecast. That is the tariffs were approved to generate a certain amount of revenue for each year within the 2019-2024 Rate Review Period that would allow JPS to recover its cost as well as to implement strategic capital programmes. However, for the 2019 and 2020 periods, the tariffs in place would have been those approved in the 2018 Annual & Extraordinary Rate Review Determination Notice, and therefore would not have generated the revenue required as approved by the OUR on December 24, 2020, under this forward-looking revenue cap mechanism.

Given the application and mechanics of the adjustment to the Annual Revenue Target (ART), as prescribed in Schedule 3, Exhibit 1 of the Licence, particularly, the Volumetric component of the Revenue Surcharge, it is worth a review and comparison of the tariff performance of JPS' realised sales and revenues for 2020, relative to their corresponding values as approved within the Final Determination.

8.2.1 Billing Determinants

2020 was an unprecedented year with a once-in-a-lifetime global pandemic that ravaged all countries, sparing none, due to the ever-increasing interconnectedness of commerce and economies. Aggregate demand fell dramatically as governments implemented stringent measures to slow the spread of the Novel Coronavirus- Covid-19, effectively grinding economic activity to a halt in key industries.

The falloff in electricity consumption, without exception, was evident across the developed and developing world alike. Key assumptions into business plans, economic outlook, and demand projections were uprooted and required immediate review, monitoring, and an agility in response.

Though the Final Determination, due to the timing of its release had made some allowance for the effect of the pandemic on 2020 energy sales vis-à-vis a discount factor relative to 2019, JPS' actual recorded numbers were relatively weak in comparison to the OUR's outlook, which characterized the billing determinants for the year and is comprised of energy sales (GWh), MVA demand, and customer growth.

JPS recorded 130 GWh in overall electricity sales or approximately 4.2% lower than had been determined by the OUR. A major driver for this variance is attributed to 22% lower than the target for RT50 customers, which primarily represents the large hotels and is indicative of the impact felt within the tourism sector due to flight restrictions and the closure of national borders.

At the end of 2020, the total Rate 10 sales realized was 1,139 GWh, 3.4% above 2019 actuals and 2% below the OUR target of 1,162 GWh. The increase in residential consumption was predominantly evident during Q2 (4.2%) and Q3 (8.3%) of 2020. Total commercial and industrial consumption suffered a steep decline during Q2 (20.6%), Q3 (15.3%), and Q4 (17.5%) of 2020 relative to similar quarters in 2019. Specifically, actual sales realized for Rate 70, Rate 50, Rate 40 and Rate 20 were below 2019 actuals by 21.6% (62 GWh), 16.5% (45GWh), 7.4% (59GWh) and 13.2% (84GWh) respectively. Relative to the OUR's targets for 2020, Rate 50 was below target by 21.9% (64 GWh), Rate 40 below by 3.1% (23GWh), Rate 20 below by 5.5% (32 GWh) whereas Rate 70 was above the target by 4.7% (10 GWh).

Figure 8-1 below displays the total reduction (percentage and GWh) in energy by quarter for each rate class.



Figure 8-1: Sales (MWh) volume comparison by quarter for 2019-2020

Total demand (MVA) realized in 2020 was 1.3% below 2019 actuals while the OUR's target was 13% below 2020 actuals. The OUR forecast for rate 70 demand was more than 50% below 2020 actuals.

Figure 8-2 below displays the total reduction (percentage and MVA) in demand by quarter for each rate class.



Figure 8-2: Sales (MWh) volume comparison by quarter for 2019-2020

Large commercial and industrial customers whose billing determinant is inclusive of an MVA component, on aggregate recorded 612 MVA or approximately 13% above the OUR's forecast for 2020. This variance is primarily attributed to Rate50, and Rate70 customers. Also, there is a notable difference between the 2020 actuals and the OUR targets in the ratio of Time-of-Use (TOU) MVA demand to STD MVA demand for Rate 70. Of note as well, the OUR' MVA forecast does not consider the proposed change in MVA billing methodology as outlined in Determination 29A of the Final Determination.

JPS realised a number of customers being billed lower than the OUR's projection by approximately 1% or 7,827 fewer customers. This is largely attributed to the fall-off in the number of residential customers

Reductions in economic activity during 2020 were chiefly reflected in the Hotels & Restaurants industry (-53%), Other Services (23.4%), Mining & Quarrying (21.7%), and Transport, Storage & Communication (13.5%). The industry segments that account for the largest share of JPS total energy sales and their associated level of decline during 2020 are listed in *Table 8-1* below. Two industry segments, the Hotel and Restaurant, and Manufacturing industry account for a combined total of approximately 40% of JPS' energy sales. The Hotel and Restaurant industry declined by 35.5% while the Manufacturing industry declined by 10% at the end of 2020.

Industry	Share of total energy sales by industry	Growth: 2020 vs. 2019
Hotels and Restaurants	29.4%	-35.5%
Manufacturing*	10.2%	-10.0%
Transport, Storage and Communication	7.7%	-2.7%
Wholesale and Retail Trade	7.0%	-2.5%
Financial Intermediation	5.9%	-8.5%
Medical Dental and Other Health Services	3.0%	-0.9%
Administrative and Support Services	1.6%	-8.7%
Education*	1.2%	-26.5%

Table 8-1: Analysis of energy sales (MWh) by sector between 2019-2020

*Carib Cement was excluded from the Manufacturing Sector and the University of the West Indies was excluded from the Education Sector

A review of JPS' 2020 actual billing determinants relative to its 2019 actual outcome highlights a sharp decline of approximately 7% or a shortfall of 220 GWh in overall electricity sales, which is evidence of the effect of the pandemic. With the exception of residential customers, all other categories experienced contracted kWh sales, most notably in Rate20, Rate50, and Rate70.

MVA demand for large commercial and industrial showed a marginal reduction relative to 2019; a result attributed to the billing ratchet, and not the actual realities where businesses largely operated with reduced output.

Rate 40/50 customers sustained the highest levels of MVA demand reduction in comparison to 2019.

The total customer base at the end of 2020 was 1.9% above 2019 actuals while the OUR's forecast for customers was 1.1% above 2020 actuals.

Table 8-2 below compares JPS' 2020 results and the OUR's approved billing determinants for the year.

	2019 Actual	2020 Actual	2020 OUR	2019 Act. vs 2020 Act.	2020 Act vs. 2020 OUR
Energy (GWH)					
Rate 10	1,101	1,139	1,162	3.4%	-2.0%
Rate 20	638	554	586	-13.2%	-5.5%
Rate 40	798	740	763	-7.4%	-3.1%
Rate 50	273	228	292	-16.5%	-21.9%
Rate 60	59	52	48	-13.3%	6.5%
Rate 70	288	226	216	-21.6%	4.7%
	3,158	2,938	3,068	-7.0%	-4.2%
Demand (MVA)					
Rate 40	3,135	3,060	2,998	-2.4%	2.1%
Rate 50	1,216	1,121	954	-7.8%	17.5%
Rate 70	1,034	1,131	749	9.4%	51.0%
	5,384	5,313	4,701	-1.3%	13.0%
Customer Count (monthly avg)					
Residential	598,555	610,210	619,940	1.9%	-1.6%
Other	71,241	72,014	70,111	1.1%	2.7%
	669,796	682,224	690,051	1.9%	-1.1%
Avg RT10 Cons. (kWh/customer)	153.3	155.5	156.3	1.5%	-0.5%

Table 8-2: JPS 2020 vs. OUR's Projected Demand

8.2.2 Analysis relative to OUR approved 2020 Revenue Cap

The OUR's Final Determination approved J\$41.2 Billion⁵ in non-fuel revenues for 2020 to be collected through its approved tariffs, and forecasted billing determinants.

Table 8-3 below provides a comparative summary of JPS' realized non-fuel revenues relative to the Revenue Cap or Annual Revenue Targets approved by the OUR for 2020.

⁵ Calculated at exchange rate of \$145

Customer Category	JPS 2020 Actual	2020 OUR Projection	2020 Actual vs OUR Projection	2019 JPS Actual	JPS 2020 <i>vs. 2019</i>
Rate 10 - Residential	15,313	18,111	-15.5%	14,783	3.6%
Rate 20 – General Service	7,491	6,228	20.3%	8,495	-11.8%
Rate 40 – Large Commercial	7,437	11,372	-34.6%	7,805	-4.7%
Rate 50- Large Industrial	2,139	2,583	-17.2%	2,397	-10.8%
Rate 60 – Streetlight/Traffic Signals	824	612	34.6%	948	-13.0%
Rate 70 – Large Industrial/ Wholesale	1,920	2,320	-17.2%	1,855	3.5%
	35,125	41,227	-14.8%	36,283	-3.2%

Overall JPS collected J\$35.13B in non-fuel revenues, J\$6.1B or 14.8% less than the amount the OUR had approved for 2020. This stark contrast is explained by a combination of the difference in overall electricity sales volumes and mix, and the difference in tariffs – due to the January 2021 effective date of the OUR's Addendum Notice. In the absence of the Final Determination and new rates, the 2018 tariffs continued to apply for the full calendar year 2020. These rates were lower than those approved in the Addendum Notice (Jan 29, 2021).

With the exception of Rate 20 – General Service Customers and Rate 60 – Street lighting, all categories exhibited large double-digit negative revenue variances relative to projections and is explained in part by the higher Rate 20 and Rate 60 tariffs in 2018.

Conversely, the final tariffs approved in the Addendum were comparatively higher relative to 2018 tariffs for residential, large commercial, and wholesale customers.

A comparison with JPS' 2019 and 2020 realized revenues shows a lower, yet still significant J\$1.2B or approximately 3.2% reduction in non-fuel revenues. The 2018 tariffs were also applicable for the full calendar year 2019 as no separate Annual Adjustment was conducted as a result of the 2019-2024 Rate Review process. The uptick in revenues from residential customers is partially explained by the higher sales volumes in 2020 due to work from home orders especially during the second quarter of the year.

Lower revenues in the other customer categories are largely a result of the reduction in sales volume in 2020.

8.2.3 Average Tariff Analysis

A review and analysis of JPS' average non-fuel tariffs for 2020, relative to what was approved in the OUR's Addendum Notice is also useful in concluding the sections above. The average non-fuel tariff is calculated by dividing the total revenues (projected) by total kWh sold (projected). *Table 8-4* below illustrate the average non-fuel rate by customer class.

Customer Category	JPS 2020 Avg. Non-Fuel rate (J\$/kWh)	2020 OUR Avg. Non-fuel rate (J\$/kWh)	2020 Actual <i>vs</i> OUR Projection	2019 JPS Avg. Non-fuel rate (J\$/KWh)	JPS 2020 <i>vs. 2019</i>
Rate 10 – Residential	13.45	15.58	-13.7%	13.43	0.1%
Rate 20 – General Service	13.52	10.62	27.3%	13.31	1.6%
Rate 40 – Large Commercial	10.38	15.31	-32.2%	9.87	5.2%
Rate 40 – Large Commercial	8.17	12.39	-34.1%	9.12	-10.4%
Rate 50 – Large Industrial STD	9.40	8.59	9.5%	8.43	11.5%
Rate 50 – Large Industrial TOU	9.30	10.02	-7.3%	10.79	-13.8%
Rate 60 – Street light/Traffic	15.99	12.65	26.4%	15.94	0.3%
Rate 70 STD	8.67	10.65	-18.7%	6.24	38.8%
Rate 70 TOU	7.62	11.34	-32.8%	7.50	1.6%
	11.96	13.44	-11.0%	11.49	4.1%

 Table 8-4: Calculated Average Non-fuel tariff by Customer Class (excluding IPP)

As mentioned previously, the 2018/2019 rates continued to be applicable throughout the 2020 calendar year in the absence of the Final Determination.

As a result, the OUR's average tariff for 2020 is estimated on the basis of the recently approved tariffs and is reflective of the relatively higher forward-looking Revenue Requirement. An average of J\$13.44/kWh is derived using the approved ARTs and the forecasted kWh sales.

On the other hand, JPS' realised average tariff for the year is recorded at J\$11.96/kWh, a variance of J\$1.48 or approximately 11% lower. This is due to the simple fact that customers continued to be billed at the old rates and would therefore not have experienced a tariff adjustment during the year.

The direction of this variance is also carried across customer categories, with significant doubledigit divergence from JPS' realised values. General Service, Large Industrial STD, and Streetlight/Traffic Signal customers were exceptions, with JPS' average tariff being higher relative to the derived values for the OUR as per their Determinations.

The J\$0.47 cents relatively higher realised average tariff in 2020 could be attributed to the overall reduction in energy sales for the year compared to 2019.

8.3 Tariff Structure Revision Proposal

8.3.1 Streetlight Customer Charge Per Lamp Fixture

JPS resubmits its proposal for a modification of the customer charge for this category for the OUR's consideration as had been outlined in its 2019-2024 Rate Review Application.

In the Final Determination, the OUR approved the continuation of the customer charge of J\$3,185 being applied at the aggregate level to each Municipal Council account. This results in JPS collecting a total of J\$ 1.5M per month in customer charges across all 115,700 currently installed lamps. This represents a minor percentage of approximately 2% in overall non-fuel revenues from the class, excluding IPP.

Condition 28(6) of the Licence mandated JPS to implement a Smart LED street-lighting programme with added intelligent features for reading, monitoring, dimming, and video surveillance technology. On completion of the project by the end of 2021 and the ensuing years to come, these features will significantly change the maintenance cost structure for the Smart Street lights, and specifically the cost associated with each lamp when compared to the analogue fixtures currently being replaced. JPS anticipates that by the completion of the streetlight project in 2021, costs will largely be fixed in nature

Additionally, with the LED technology there will be a significant reduction in energy being used by each lamp as well as on a collective basis. This will likely lead to an outcome in which JPS will have fewer kWh from this rate category to recover its investment and operating and maintenance costs. This is also compounded by the potential of the lamps for dimming, and therefore further reducing kWh consumption.

To improve allocative efficiency, and for greater alignment with the established principles of Cost Causation and Transparency as required by the Licence and Final Criteria, JPS proposes a modification of the RT 60 Street light tariff to now include a monthly customer charge per fixture. This shift is also in keeping with the current practice of a customer charge being associated with a single and unique premise.

The proposed change is primarily to align the fixed investments with a fixed stream of revenue through a more transparent and cost-reflective customer charge. This change will not be injurious to the Municipal Corporations as they will continue to see a reduction in their monthly bill.

8.3.2 Methodology for change in computing kVA Demand for Time-of-Use customers

Arising from the Final Determination and its subsequent Addendum in January 2021, the OUR issued a decision that requires a change in how kVA demand charges are determined and billed for Large Commercial and Industrial customers (RT40,50, and 70).

Determination 29A states: "that JPS shall effect customizations to its CIS by the next Annual Review in 2021 that will allow billing of demand charges as follows:

- **On-Peak Period:** Billing Demand in this period each month shall be the maximum demand for the On-Peak hours of that month. The minimum 25 kVA does not apply.
- **Partial-Peak Period:** The Billing Demand in this period each month shall be the maximum demand for the **Partial-Peak hours of that month,** or 80% of the maximum demand for <u>the partial-peak hours</u> during the five-month period immediately preceding the month for which the bill is rendered, whichever is higher but not less than 25 kVA.
- **Off-Peak Period:** The Billing Demand in this period each month shall be the maximum demand for **the Off-Peak hours of that month**, or 80% of the maximum Off-Peak demand during the five-month immediately preceding the month for which the bill is rendered, whichever is higher but not less than 25 kVA.

It is JPS' view that the specific text and definition of the Partial-Peak register contains an error for computation of the ratchet, by including the "Peak" hours as well. JPS is interpreting the ratchet to be applicable to the Partial-Peak hours, only, in consistency with the intent of the changes proposed. As such the JPS request that the OUR provides clarification.

Implementation of Determination 29A requires technological modification by JPS and will also have an impact on kVA billing determinants used to compute the proposed tariffs for the 2021/22 tariff period.

Customers will also be impacted, primarily by the simplification by which their kVA demand is computed and thus allowing for greater ease of understanding.

The difference can be summarized in *Table 8-5* below:

TOU Period	Current kVA Method	New kVA Method
Peak	 Maximum kVA demand recorded between Peak hours of 6PM-10PM. No minimum kVA of 25 applied 	No Change
Partial-Peak	Maximum kVA recorded each month during Peak and Partial Peaks hours 6PM -6AM	 Maximum kVA recorded each month during Partial Peak 6AM - 6PM
	Or • 80% of the maximum record during the Peak and Partial-Peak hours of 6PM -6AM over the last immediate 5 months • Min of 25kVA applied.	Or • 80% of the maximum record during the hours of Partial-Peak 6AM - 6PM over the last immediate 5 months • Min of 25kVA applied
Off-Peak	 Maximum kVA recorded each month during across all 24 hrs Or 	 Maximum kVA recorded each month during Off-Peak hours of 10PM -6AM Or
	 80% of the maximum recorded across all 24hrs over the last immediate 5 months Min of 25kVA applied 	 80% of the maximum record during the Off-Peak hours of 10PM -6AM over the last immediate 5 months Min of 25kVA applied

Table 8-5: kVA Analysis; Current Methodology vs. Determination 29A

8.3.3 Review and Analysis of Impact of kVA Demand

In the interest of prudency, JPS conducted an aggregated analysis to determine the likely impact of the approved kVA demand computation on its billing determinants and by extension its customers. For this exercise a review was done using 2020 billing and metering information from the CIS and related systems.

Table 8-6 presents a summary of the analysis. The *New kVA Billing Methodology* column represents the computation of the kVA demand as per the OUR's Determination 29A outlined in the Addendum Notice. This is compared to the kVA billing as it now exists (prior to the change).

Customer Category	Current Billed kVA	New kVA Billing Methodology	Variance
Sum of MT40	803,213	785,809	-2.17%
KVAL – Partial Peak	283,786	283,313	-0.17%
KVAO – Off-Peak	292,609	275,678	-5.79%
KVAP - Peak	226,818	226,818	0.00%
Sum of MT50	466,408	442,138	-5.20%
KVAL – Partial Peak	164,163	159,468	-2.86%
KVAO – Off-Peak	180,095	160,520	-10.87%
KVAP - Peak	122,150	122,150	0.00%
Sum of MT70	347,921	335,532	-3.56%
KVAL – Partial Peak	121,390	119,431	-1.61%
KVAO – Off-Peak	121,519	111,089	-8.58%
KVAP - Peak	105,012	105,012	0.00%

Table 8-6: Billed kVA comparison with New Billing Methodology

As anticipated, no change was observed for the Peak period across any of the rate classes examined. This is consistent, as the method for computing the kVA demand for this TOU register has not changed.

The overall kVA demand for rate categories is likely to see reductions, primarily attributed to a decline of the amount billed during the Off-Peak period. It is estimated that RT50 customers may see the largest reductions relative to the previous methodology, with a 5.2% variance in total demand and approximately 11% during the Off-Peak period.

A 3.6% is reduction is estimated for RT70 customers, with a noticeable 8.6% less demand during the Off-Peak period relative to the current methodology.

The Impact of the potential lower aggregate kVA demand for these two classes, as well as the TOU break out under the new kVA billing methodology, will have to be factored in deriving their billing determinants for the 2021/22 Tariff basket, and ultimately assessing the impact of their respective demand charges.

8.4 2021/2022 Tariff Basket Considerations

8.4.1 2021 Outlook and Demand Forecast

Economic activity in Jamaica has been severely impacted by the Covid-19 pandemic. It has adversely affected output, employment levels, household consumption, and business activities. The Jamaican economy is estimated to have contracted by 10.2% during 2020. The steepest decline in output was recorded in industries associated with travel and tourism as well as the Mining & Quarrying industry. The economic shock induced by the pandemic continues to disrupt local economic activities.

Uncertainty remains at large within the global economy albeit countries have now taken measures with their respective vaccination programmes, recovery is projected to vary significantly across countries (IMF, 2021). In particular, the Planning Institute of Jamaica (PIOJ) in their latest review of Jamaica's economic performance in February 2021, projects that the Jamaican economy will return to its pre-COVID-19 level of economic activity in three years, by FY2023/24. Aggregate demand is anticipated to remain low and below pre-Covid levels. The impact of this will continue to be experienced within the electricity sector through lower levels of energy sales in 2021.

The Planning Institute of Jamaica (PIOJ) in their latest review projects economic growth to recover partially for the FY2021/22 within the range of 4-8%. Notwithstanding the expectations for growth, the Jamaican economy is not expected to return to its pre-COVID-19 levels before FY2023/24. The forecasted uptick in domestic activities is primarily underpinned by the vaccination programme underway globally and the measures implemented to manage the spread of the pandemic locally and internationally.

In light of the current economic conditions, JPS anticipates a recovery across all its billing determinants. The OUR's approved forecast is projecting an increase of 8.8% (259 GWh) in energy sales over 2020 whereas JPS is anticipating a modest recovery of 2.6% (75.7GWh). The majority of the improvement in energy sales is expected to be realized from the large industrial and commercial rate classes. Rate 70, Rate 50, and Rate 40 are expected to grow by approximately 10%, 4.4%, and 3.4% respectively. The growth in these rate classes is forecasted against the expectation of a recovery in all industry segments with stronger growth expectations for industries associated with travel and tourism (PIOJ, 2021). The Hotels and Restaurant Sector (29.4%) and the Transport, Storage, and Communication sector (7.7%) together account for more than 30% of JPS' total energy sales.

Furthermore, stakeholders in the Tourism sector have an optimistic outlook for recovery during 2021⁶. They anticipate an uptick in arrival of approximately 60-70% of the total recorded in 2019

⁶ https://jamaica-gleaner.com/article/news/20210321/tourism-interests-anticipate-brighter-summer

for quarters 2 and 3 of 2021. Hoteliers such as Ocean Coral Spring, Royalton Resorts/Blue Diamond Resorts are forecasting bookings of 80-90% for June 2021 onwards while hoteliers such as Azul Beach Resort are forecasting bookings at approximately 50 - 55% for a similar period. 75% - 80% of the uptick in arrivals for 2021 relative to 2020 is anticipated from the United States, which accounts for approximately 68% of total arrivals on average while 60% -70% is expected from the UK, which accounts for approximately 12% of total arrivals on average. Arrivals are expected from Canada during the latter part of 2021.

JPS is anticipating growth of 1.1% and 1.2% in the rate 20 and rate 10 categories over 2020 while the OUR's projects a growth of 2.2% for rate 10 and 11.6% for rate 20. JPS estimates that the growth in rate 10 consumption will return to its pre-Covid level during 2021. YTD March 2021, rate 10 sales is 0.55% below the similar period in 2020. The slower recovery in sales for JPS's small commercial customers is forecasted against the backdrop that small and medium-sized enterprises have been severely affected by the Covid-19 pandemic. A survey conducted by the Small Business Association of Jamaica indicated that 35% of its more than 300-membership closed their doors due to Covid-19⁷ in 2020.

JPS expects rate 60 to decline by 4.2% relative to 2020. The decline is supported by the installation of 20,000 LED bulbs to replace HPS counterparts during 2021. The OUR is however forecasting a decline of 21.6%.

The OUR projects a growth of 3.5% (23,907) in JPS' customer base during 2021 while JPS anticipates an increase of 1.1% (7,213).

Demand (MVA) is projected to decline by 4.3% by the OUR while JPS is estimating an increase of 2.7% by the end of 2021.

	2020 Actual	2021 OUR	2021 JPS	2020 Actual	2020
Energy (GWH)					
Rate 10	1,139	1,164	1,152	2.2%	1.2%
Rate 20	554	618	560	11.6%	1.1%
Rate 40	740	817	765	10.5%	3.4%
Rate 50	228	308	238	35.0%	4.4%
Rate 60	52	40	49	-21.6%	-4.2%
Rate 70	226	249	248	10.5%	10.0%
	2,938	3,197	3,014	8.8%	2.6%
Demand (MVA)					
Rate 40	3,060	3,210	3,097	4.9%	1.2%
Rate 50	1,121	1,006	1,137	-10.3%	1.4%
Rate 70	1,131	867	1,223	-23.3%	8.1%
	5,313	5,083	5,457	-4.3%	2.7%
Customer Count (monthly avg)					
Residential	610,210	635,516	617,023	4.1%	1.1%
Other	72,014	70,615	72,414	-1.9%	0.6%
	682,224	706,131	689,437	3.5%	1.1%
Avg RT10 Cons. (kWh/customer)	155.5	152.6	153.3	-1.9%	-1.4%

 Table 8-7: JPS proposed 2021 Demand Forecast

⁷ https://jis.gov.jm/coj-extends-covid-19-closure-relief-includes-overseas-companies/

8.5 2021/22 Tariff Basket and Rates

The proposed ART resulting from the PBRM and growth factor adjustments is J\$49.13B (including losses), a net increase of 12.3% from the 2020 ART, or J\$49.95B (including losses), representing a 14.8% increase.

With respect to establishing the billing determinants to calculate tariffs for 2021, JPS notes that

Schedule 3 Paragraph 45 of the Licence states that "*The target billing determinants shall be based* on the actual billing determinants for the immediately preceding calendar year." This condition also provides an opportunity for the OUR to adjust the target billing determinants for known and measurable changes. Determination 24 recognizes this by allowing for a review of the demand forecast at this Annual Review.

In of the foregoing, JPS proposes a revision for the 2021 demand forecast for the OUR's consideration. However, for purposes of the tariff impact comparison under the other options also referred to in the Licence and the Determination, JPS has prepared an assessment for scenarios where the 2021 billing determinants are based on the following:

- i. JPS' 2020 actuals,
- ii. The OUR-approved 2021 demand forecast as per Determination; and
- iii. JPS' proposed revision to the approved 2021 demand forecast in the Determination

Table 8-8 below summarizes the likely average tariff impact under all three scenarios, with the ART remaining constant, the current average tariff being the rates implemented in February 2021, and the variable of change being the billing determinants as stated above. The table also captures a high-level snapshot of the scenario where the ART is exclusive of the losses surcharge component (further details are including in the Appendix D: ART without Losses Surcharge).

		Current Average		Ave	rage Tariff J\$/I	kWh			
Class		Tariff	Total Revenue			2021 JPS	2020		2021 JPS
		runn		2020 Actuals	2021 OUR	Proposed	Actuals	2021 OUR	Proposed
Rate 10		17.56	22,504,096,134	19.76	19.34	19.53	12.5%	10.11%	11.2%
Rate 20		10.73	6,606,279,834	11.92	10.69	11.79	11.1%	-0.4%	9.9%
Rate 40	STD	15.40	11,302,432,059	17.93	16.08	17.34	16.4%	4.4%	12.5%
Rate 40	TOU	11.62	1,498,154,857	13.68	13.10	13.22	17.7%	12.7%	13.8%
Rate 50	STD	11.20	2,307,096,464	12.40	9.14	11.87	10.7%	-18.4%	6.0%
Rate 50	TOU	13.42	582,253,807	13.89	10.51	13.30	3.5%	-21.7%	-0.9%
Rate 70	STD	12.41	3,102,236,290	16.23	14.80	15.20	30.8%	19.3%	22.5%
Rate 70	TOU	13.15	498,855,659	14.38	12.50	11.24	9.4%	-5.0%	-14.5%
Rate 60		12.62	729,401,266	14.15	18.04	14.77	12.1%	43.0%	17.0%
TOTAL No	on-Fuel	14.58	49,130,806,369	16.72	15.37	16.30	14.7%	5.4%	11.8%
Average	Fuel Rate	25.85		25.85	25.85	25.85			
Average	IPP Rate	11.41		11.41	11.41	11.41			
Overall R	ate	51.85		53.99	52.63	53.57	4.1%	1.5%	3.3%
No Losses Surcha		rge							
Total Non	-Fuel	14.58	49,953,279,739	17.00	15.63	16.58	16.6%	7.2%	13.7%
Overall R	ate	51.85		54.27	52.89	53.84	4.7%	2.0%	3.8%

 Table 8-8: Average Tariff Outcome: Three likely Demand Forecasts Scenarios⁸

As discussed, 2020 sales results showed a dramatic reduction prior to 2019 and were even lower than the OUR's projection for the year. Consequently, carrying it forward as the 2021 target will likely result in the largest non-fuel tariff increase of all the scenarios at approximately 14.7%.

Alternatively, given the slow pace of economic recovery, JPS considers the 8.8% in sales growth required to come in at the OUR's target is unlikely, albeit its appeal for a lower non-fuel rate impact of 5.4%. This is likely to result in the under-recovery of revenues, by aiming for a lower rate, especially considering that sales are highly unlikely to return to pre-pandemic levels in the near-term, and consequently result in a necessary but disproportionate true-up adjustment in 2022, precipitating a further rate increase, beyond that which would have been required under normal circumstances. Furthermore, JPS has not recorded sales growth close to 8.8% since the early eighties and nineties, when Jamaica's economy underwent significant structural changes. Sales growth after the 2008 financial crisis was recorded at 3.2% whilst the average growth over 2009-2019 is 0.44%.

JPS' revised and proposed forecast whilst lower than the OUR's target is above JPS' 2020 performance and more amicable to past performance as well as expectations. A growth of 2.6% is anticipated for 2021 with an average non-fuel rate increase of approximately 11.8%.

Considering the factors outlined above, as well as in the previous sections, the uncertainty of the pandemic undermining a return to normal economic activities, and an evaluation of the OUR's 2021 forecast, JPS proposes a revised billing determinant position could be adopted for the 2021/22 tariff period in the *Table 8-9* below. This proposal is being made having considered; the

⁸ For further details, see Appendix D: ART with Losses Surcharge

economic realities, the Licence provisions, the Final Determination, and the potential rate impact to customers.

Table 8-9 shows JPS 2021/22 revised demand forecast and billing determinants for consideration by the OUR.

				Energy	kWh			Deman	d-KVA	
Class		Average	Std	Off-Peak	Part Peak	On-Peak	Std	Off-Peak	Part Peak	On-Peak
		Guotomor	Utu.	Unifoun	Turroun	Unitouk	0101	onroun	r urtr oun	onroun
Rate 10	LV < 100	617,023	559,703,311							
Rate 10	LV > 100	-	592,440,717							
Rate 20	LV	69,837	560,285,434							
		- /	-							
Rate 40	LV - STD	1,787	651,957,994				2,294,539			
Rate 40	LV - TOU	112		53,023,838	47,827,406	12,438,257		278,912	289,791	234,204
Rate 50	MV -STD	126	194,284,921				680,323			
Rate 50	MV -TOU	23		19,138,326	17,705,928	6,921,870		165,475	164,984	125,831
Rate 70	MV -STD	20	204,080,440				847,164			
Rate 70	MV -TOU	4		20,953,956	18,009,617	5,410,619		125,980	134,181	115,954
Rate 60	S	188	48,814,594							
Rate 60	Т	317	581,891							
TOTAL		689,437	2,812,149,302	93,116,120	83,542,951	24,770,745	3,822,026	570,367	588,956	475,990

Table 8-9: JPS revised 2021 Billing Determinants for consideration

However, in keeping with the strict Licence provisions for use of the prior year Actuals, the tables below and consequently the 2021 tariff basket will be computed using the 2020 Billing Determinants as shown in *Table 8-10*.

Table 8-10: JPS' 2020 Actuals

				Energy	kWh			Deman	d-KVA	
	Class	Average								
		Customer	Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak
Rate 10	LV <100	610,210	552,276,574	-	-	-	-	-	-	-
Rate 10	LV > 100		586,381,053	-	-	-	-	-	-	-
Rate 20	LV	69,470	554,108,981	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
Rate 40	LV - STD	1,763	630,258,873	-	-	-	2,255,708	-	-	-
Rate 40	LV - TOU	110	-	51,517,938	46,181,738	11,819,210	-	292,971	284,050	227,693
Rate 50	MV -STD	125	186,086,942	-	-	-	665,661	-	-	-
Rate 50	MV -TOU	23	-	18,900,928	19,773,972	3,244,484	-	168,348	164,667	122,270
Rate 70	MV -STD	21	191,107,295	-	-	-	783,298	-	-	-
Rate 70	MV -TOU	4	-	16,358,652	14,102,508	4,227,912	-	121,519	121,390	105,012
Rate 60	S	179	50,938,283	-	-	-	-	-	-	-
Rate 60	Т	302	607,206	-	-	-	-	-	-	-
TOTAL		682,206	2,751,765,207	86,777,518	80,058,217	19,291,606	3,704,667	582,838	570,107	454,975

Taking the 2021 proposed ART as outlined in the PBRM chapter in Table6-1 2021 Annual Revenue Target Calculation, the 2021 revenue basket is derived *vis-à-vis* a 12.3% increase (including Z-Factor) to the component revenue buckets. This yields a total of J\$49.13 for 2021.

Table 8-11 shows JPS' 2020 Non-Fuel Revenue Basket at J\$43.75B, with revenues from customer, energy, and demand charges amounting to J\$5B, J\$28.B, and J\$10.7B respectively. These values assume the current tariffs times the 2020 actual billing determinants.

		Customer		Energy-J	\$/kWh			Demand-	J\$/KVA		
Class		Clastomer	Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak	Total Revenue
Rate 10	LV <100	3,850,548,720	3,998,482,393	-	-	-	-	-	-	-	7,849,031,113
Rate 10	LV > 100		12,190,862,083	-	-	-	-	-	-	-	12,190,862,083
Rate 20	LV	934,697,692	4,948,193,205	-		-	-	-		-	5,882,890,897
		-		-	-	-	-	-	-	-	-
Rate 40	LV - STD	167,092,762	3,794,158,415	-	-	-	6,103,562,356	-	-	-	10,064,813,533
Rate 40	LV - TOU	10,443,298	-	260,680,767	239,683,219	68,551,418	-	94,720,545	316,389,271	343,638,090	1,334,106,606
Rate 50	MV -STD	11,857,330	794,591,243	-		-	1,248,020,376	-		-	2,054,468,949
Rate 50	MV -TOU	2,180,295		79,383,896	85,225,817	15,605,970	-	51,802,326	142,003,869	142,294,728	518,496,901
Rate 70	MV -STD	1,982,805	814,117,076	-		-	1,946,440,928	-		-	2,762,540,808
Rate 70	MV -TOU	347,583		74,922,626	66,281,788	22,196,538	-	37,540,926	104,471,531	138,469,873	444,230,866
Rate 60	S	6,829,348	623,993,969	-		-	-	-		-	630,823,316
Rate 60	Т	11,537,265	7,171,103	-	-	-	-	-	-	-	18,708,368
TOTAL		4,997,517,097	27,171,569,486	414,987,289	391,190,824	106,353,926	9,298,023,660	184,063,797	562,864,671	624,402,691	43,750,973,441

Table 8-11: Actual Non-Fuel 2020 Revenues

Table 8-12 below shows the Non-fuel rates associated with the 2020 revenue basket above.

 Table 8-12: 2020 Approved Non-Fuel Tariffs (Current Tariffs)

				Energ	gy-J\$/kWh			Demand-	J\$/KVA	
Class		Customer Charge	Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak
Current Rates										
Rate 10	LV <100	525.85	7.24							
Rate 10	LV >100	525.85	20.79							
Rate 20	LV	1,121.2	8.93							
Rate 40	LV - Std	7,899.62	6.02				2,705.83			
Rate 40	LV - TOU	7,899.62		5.06	5.19	5.80		323.31	1,113.85	1,509.22
Rate 50	MV - Std	7,899.62	4.27				1,874.86			
Rate 50	MV - TOU	7,899.62		4.20	4.31	4.81		307.71	862.37	1,163.77
Rate 70	MV -STD	7,899.62	4.26				2,484.93			
Rate 70	MV -TOU	7,899.62		4.58	4.70	5.25		308.93	860.63	1,318.61
Rate 60	S	3,185.33	12.25							
Rate 60	т	3 185 33	11.81							

The proposed tariffs for 2021 are computed by taking the quotient of the revenue components of the 2021 ART, and the 2020 Billing Determinants.

		Customer		Energy-J	5/kWh			Demand-	J\$/KVA		
Class		Clastomer	Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak	Total Revenue
			18,179,877,598								
Rate 10	LV < 100	4,323,986,342	4,490,108,948	-	-	-	-	-	-	-	8,814,095,290
Rate 10	LV > 100	-	13,689,768,650	-	-	-	-	-	-	-	13,689,768,650
Rate 20	LV	1,049,621,846	5,556,589,825	-	-	-	-	-	-	-	6,606,211,671
			-	-	-	-	-	-	-	-	-
Rate 40	LV - STD	187,637,367	4,260,662,664	-	-	-	6,854,015,412	-	-	-	11,302,315,442
Rate 40	LV - TOU	11,727,335	-	292,732,324	269,153,059	76,980,040	-	106,366,747	355,290,372	385,889,523	1,498,139,399
Rate 50	MV -STD	13,315,227	892,288,848	-	-	-	1,401,468,584	-	-	-	2,307,072,659
Rate 50	MV -TOU	2,448,370	-	89,144,407	95,704,612	17,524,776	-	58,171,592	159,463,711	159,790,333	582,247,799
Rate 70	MV -STD	2,226,597	914,215,447	-	-		2,185,762,238	-	-	-	3,102,204,282
Rate 70	MV -TOU	390,320	-	84,134,609	74,431,351	24,925,675	-	42,156,707	117,316,650	155,495,199	498,850,512
Rate 60	S	7,669,038	700,716,078	-	-	-	-	-	-	-	708,385,116
Rate 60	Т	12,955,810	8,052,814	-	-	-	-	-	-	-	21,008,623
TOTAL		5,611,978,252	30,512,403,274	466,011,340	439,289,022	119,430,491	10,441,246,234	206,695,045	632,070,732	701,175,055	49,130,299,445

Table 8-13: Proposed 2021/22 Non-Fuel Revenue Basket

 Table 8-14: 2020 Actuals and Proposed 2021 Billing Determinants

				Energy	kWh		Demand-KVA			
Class		Average								
		Customer	Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak
Rate 10	LV <100	610,210	552,276,574	-	-	-	-	-	-	-
Rate 10	LV > 100		586,381,053	-	-	-	-	-	-	-
Rate 20	LV	69,470	554,108,981	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-
Rate 40	LV - STD	1,763	630,258,873	-	-	-	2,255,708	-	-	-
Rate 40	LV - TOU	110	-	51,517,938	46,181,738	11,819,210	-	292,971	284,050	227,693
Rate 50	MV -STD	125	186,086,942	-	-	-	665,661	-	-	-
Rate 50	MV -TOU	23	-	18,900,928	19,773,972	3,244,484	-	168,348	164,667	122,270
Rate 70	MV -STD	21	191,107,295	-	-	-	783,298	-	-	-
Rate 70	MV -TOU	4	-	16,358,652	14,102,508	4,227,912	-	121,519	121,390	105,012
Rate 60	S	179	50,938,283	-	-	-	-	-	-	-
Rate 60	Т	302	607,206	-	-	-	-	-	-	-
TOTAL		682,206	2,751,765,207	86,777,518	80,058,217	19,291,606	3,704,667	582,838	570,107	454,975

Table 8-15: Proposed 2021/22 Non-Fuel Tariffs

		Customer		Energy-J	6/kWh			Demand-	J\$/KVA	
Class		Clastomer	Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak
Rate 10	LV < 100	590.50	8.13							
Rate 10	LV > 100	590.50	23.35							
Rate 20	LV	1,259.09	10.03							
Rate 40	LV - STD	8,870.90	6.76				3,038.52			
Rate 40	LV - TOU	8,870.90		5.68	5.83	6.51		363.06	1,250.80	1,694.78
Rate 50	MV-STD	8,870.90	4.80				2,105.38			
Rate 50	MV-TOU	8,870.90		4.72	4.84	5.40		345.54	968.40	1,306.86
Rate 70	MV-STD	8,870.90	4.78				2,790.46			
Rate 70	MV-TOU	8,870.90		5.14	5.28	5.90		346.91	966.45	1,480.74
Rate 60	S	3,576.98	13.76							
Rate 60	т	3,576.98	13.26							

8.5.1 Streetlight Customer Charge per Bulb

In keeping with Section 8.3.1 of this chapter and JPS' proposal for the introduction of the customer charge per fixture for street lighting service, the revenues associated with the class have been redistributed in line with an increase in fixed cost recovery for the approximately 115,700 installed lamps. The total revenues from the class will remain the same. Total will also remain at J\$41.13B for 2021.

The following tables present the revenue adjustment in keeping with the per bulb charge for Street lighting.

		Customor		Energy-J\$	/kWh			Demand-	J\$/KVA		
Class		Charge	Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak	Total Revenue
Rate 10	LV <100	3,850,548,720	3,998,482,393	-	-	-	-	-	-	-	7,849,031,113
Rate 10	LV > 100	-	12,190,862,083	-	-		-	-		-	12,190,862,083
Rate 20	LV	934,697,692	4,948,193,205	-	-	-	-	-	-	-	5,882,890,897
			-	-	-	-	-	-	-	-	-
Rate 40	LV - STD	167,092,762	3,794,158,415	-	-	-	6,103,562,356	-	-	-	10,064,813,533
Rate 40	LV - TOU	10,443,298	-	260,680,767	239,683,219	68,551,418	-	94,720,545	316,389,271	343,638,090	1,334,106,606
Rate 50	MV-STD	11,857,330	794,591,243	-	-		1,248,020,376	-		-	2,054,468,949
Rate 50	MV-TOU	2,180,295	-	79,383,896	85,225,817	15,605,970	-	51,802,326	142,003,869	142,294,728	518,496,901
Rate 70	MV-STD	1,982,805	814,117,076	-	-		1,946,440,928	-	-	-	2,762,540,808
Rate 70	MV-TOU	347,583	-	74,922,626	66,281,788	22,196,538	-	37,540,926	104,471,531	138,469,873	444,230,866
Rate 60	S	473,117,487.08	157,705,829	-	-	-	-	-	-	-	630,823,316
Rate 60	т	11,537,265	7,171,103	-	-		-	-	-	-	18,708,368
TOTAL		4,997,517,097	27,171,569,486	414,987,289	391,190,824	106,353,926	9,298,023,660	184,063,797	562,864,671	624,402,691	43,750,973,441

Table 8-16: 2020 Non-fuel Revenues adjusted for the increased fixed cost/revenue recovery

Table 8-17: 2021 Proposed Non-Fuel Revenue Basket - inclusive of RT 60S Per Bulb revenue

Class		Customor		Energy-J\$	Demand-J\$/KVA						
		Charge	Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak	Total Revenue
			18,179,877,598								
Rate 10	LV <100	4,323,986,342	4,490,108,948	-	-	-	-	-	-	-	8,814,095,290
Rate 10	LV > 100	-	13,689,768,650	-	-	-	-	-	-	-	13,689,768,650
Rate 20	LV	1,049,621,846	5,556,589,825	-	-	-	-	-	-	-	6,606,211,671
			•	-	-	-	•	-	-	-	
Rate 40	LV - STD	187,637,367	4,260,662,664	-	-	-	6,854,015,412	-	-	-	11,302,315,442
Rate 40	LV - TOU	11,727,335	-	292,732,324	269,153,059	76,980,040	-	106,366,747	355,290,372	385,889,523	1,498,139,399
Rate 50	MV-STD	13,315,227	892,288,848	-	-	-	1,401,468,584	-	-	-	2,307,072,659
Rate 50	MV-TOU	2,448,370	-	89,144,407	95,704,612	17,524,776	-	58,171,592	159,463,711	159,790,333	582,247,799
Rate 70	MV-STD	2,226,597	914,215,447	-	-	-	2,185,762,238	-	-	-	3,102,204,282
Rate 70	MV-TOU	390,320	-	84,134,609	74,431,351	24,925,675	-	42,156,707	117,316,650	155,495,199	498,850,512
Rate 60	S	531,288,837	177,096,279	-	-	-	-	-	-	-	708,385,116
Rate 60	т	12,955,810	8,052,814	-	-	-	-	-	-	-	21,008,623
TOTAL		6,135,598,051	29,988,783,474	466,011,340	439,289,022	119,430,491	10,441,246,234	206,695,045	632,070,732	701,175,055	49,130,299,445

		Customor		Energy-J\$	/kWh		Demand-J\$/KVA			
Class		Charge	Std.	Off-Peak	Part Peak	On-Peak	Std.	Off-Peak	Part Peak	On-Peak
Rate 10	LV <100	590.50	8.13							
Rate 10	LV > 100	590.50	23.35							
Rate 20	LV	1,259.09	10.03							
Rate 40	LV - STD	8,870.90	6.76				3,038.52			
Rate 40	LV - TOU	8,870.90		5.68	5.83	6.51		363.06	1,250.80	1,694.78
Rate 50	MV-STD	8,870.90	4.80				2,105.38			
Rate 50	MV-TOU	8,870.90		4.72	4.84	5.40		345.54	968.40	1,306.86
Rate 70	MV-STD	8,870.90	4.78				2,790.46			
Rate 70	MV-TOU	8,870.90		5.14	5.28	5.90		346.91	966.45	1,480.74
Rate 60	S	382.66	3.48							
Rate 60	т	3,576.98	13.26							

Table 8-18: Proposed 2021/22 Non-Fuel Tariffs (Incl. Per Bulb Charge for RT60S)

8.6 Bill Impact Assessment

The average bill impact arising from JPS' proposed non-fuel tariff is estimated to be approximately 3.5%. Assuming an average fuel and IPP rates of J\$25.85/kWh and J\$11.41/kWh respectively, the total bill impact (including Fuel and IPP charges) will be a range of upward adjustment of 3.8% for a typical residential customer 2.2% for Rate 20 customers. Rate 40 and Rate 50 customers are estimated to see an increase within the range of 3 - 4% respectively. Rate 70 Standard customers are likely to see an increase of 4.3%, while Rate 70 TOU may experience a 3.5% increase.

The following tables present the estimated bill impact for customers across the various rate class using the average monthly consumption for the class.

A residential customer with an average consumption of 160 kWh per month will see an increase of approximately 3.7% or a marginal increase of J\$323.00 over their current bill

	Current Bill			Estimated New Bill					
Description	Usage	Rate	Charges (\$)	Description	Usage	Rate	Charges (\$)		
Non-Fuel Charges				Non-Fuel Charges					
Energy 1st	100	7.24	724.00	Energy 1st	100	8.13	813.00		
Energy Next	60	20.79	1,247.40	EnergyNext	60	23.35	1,401.00		
Customer Charge		525.85	525.85	Customer Charge		590.50	590.50		
Sub Total			2,497.25	Sub Total			2,804.50		
F/E Adjustment			95.62	F/E Adjustment			107.38		
Total Non-Fuel Charges			2,592.87	Total Non-Fuel Charges			2,911.88		
Base/Exchange Rate	145	151.9400		Base/Exchange Rate	145	151.9400			
Fuel & IPP Charges	160	25.853	4, 136. 43	Fuel Charges	160	25.853	4,136.43		
IPP Variable Charges	160	12.870	2,059.20	IPP Charges	160	12.870	2,059.20		
Tariff Adjustment	160	(0.523)	(83.68)	Tariff Adjustment	160	(0.523)	(83.680)		
Taxable Charges			597.86	Taxable C harges			624.44		
GCT @ 15.0%			89.68	GCT @ 15.0%			93.67		
Bill Total			8, 794, 50	Bill Total			9,117.50		
				SUMMARY					
				Estimated New Bill			9,117,50		
				Current Bill			8,794.50		
				Net Change	4	Amount	323.00		
				-	F	ercentage	3.67%		

Figure 8-3: Bill Impact for a Residential Customer at 160 kWh

A Rate 20 customer with an average consumption of 750 kWh per month will likely see an increase of 2.3% or approximately J\$1,150 more compared to their current bill.

	Current Bill			Estimated New Bill					
Description	Usage	Rate	Charges (\$)	Description	Usage	Rate	Charges (\$)		
Non-Fuel Charges				Non-Fuel Charges					
Energy	750	8.93	6,697.50	Energy 1st	750	10.03	7,522.50		
Customer Charge		1,121.23	1,121.23	Customer Charge		1,259.09	1,259.09		
Sub Total			7,818.73	Sub Total			8,781.59		
F/E Adjustment			299.38	F/E Adjustment			336.24		
Total Non-Fuel Charges			8,118.11	Total Non-Fuel Charges			9,117.83		
Base/Exchange Rate	145	151.9400		Base/Exchange Rate	145	151.9400			
Fuel Charges	750	25.853	19,389.51	Fuel Charges	750	25.853	19,389.51		
IPP Variable Charges	750	22.430	16,822.50	IPP Charges	750	22.430	16,822.50		
Tariff Adjustment	750	(0.523)	(392.25)	Tariff Adjustment	750	(0.523)	(392.25)		
Taxable Charges			43,937.86	Taxable Charges			44,937.59		
GCT @ 15.0%			6,590.68	GCT @ 15.0%			6,740.64		
Bill Total			50,528.54	Bill Total			51,678.23		
				SUMMARY					
				Estimated New Bill			51,678.23		
				Current Bill			50, 528. 54		
				Net Change	1	Amount	1, 149.69		
					F	Percentage	2.28%		

Figure 8-4: Bill Impact for a Small Commercial at 750 kWh

The Standard Rate 40 customer with an average consumption of 35,000 kWh for the month and a kVA demand of 100 is estimated to see an increase of approximately 4.1% over the current bill.

Figure 8-5: Bill Impact for a Rate 40 Customer at 35,000 kWh and 100kVA

	Current Bi	II		Esti	Estimated New Bill				
MT70 STD	Usage	Rate	Charges	MT70 STD	Usage	Rate	Charges		
kWh Std	35,000.0	6.02	210,700.00	kWh Std	35,000.0	6.76	236,600.00		
kVA Std	100.0	2,705.83	270,583.00	kVA Std	100.0	3,038.52	303,852.00		
Customer Charge		7,899.62	7,899.62	Customer Charge		8,870.9	8,870.90		
Subtotal			489,182.62	Subtotal			549,322.90		
F/E Adjust	145.0	151.94	18,730.63	F/E Adjust	145.0	151.94	21,033.38		
Fuel Charge	35,000.0	24.819	868,649.92	Fuel Charge	35,000.0	24.819	868,649.92		
IPP Fixed Charge	100.0	664.67	66,466.62	IPP Fixed Charge	100.0	664.67	66,466.62		
IPP Variable Charge	35,000.0	2.43	85,050.00	IPP Variable Charge	35,000.0	2.43	85,050.00		
Tariff Adjustment	35,000.0	(0.523)	(18,305.00)	Tariff Adjustment	35,000.0	(0.523)	(18,305.00)		
Taxable Charges			1,509,774.79	Taxable Charges			1,572,217.82		
GCT Charge		15.0%	226,466.22	GCT Charge		15.0%	235,832.67		
Total Bill			1,736,241.01	Total Bill			1,808,050.49		
					Bill Imp	act ->>	4.14%		
				SUMMARY					
				Estimated New Bill			1,808,050.49		
			Current Bill			1,736,241.01			
				Net Change		Amount	71,809.49		
						Percentage	4.14%		
The Standard Rate 50 customer with an average consumption of 500,000 kWh for the month and a kVA demand of 1,500 is estimated to see an increase of approximately 2.9% over the current bill.

Current Bill				Estimated New Bill			
MT70 STD	Usage	Rate	Charges	MT70 STD	Usage	Rate	Charges
kWh Std	500,000.0	4.27	2,135,000.00	kWh Std	500,000.0	4.80	2,400,000.00
kVA Std	1,500.0	1,874.86	2,812,290.00	kVA Std	1,500.0	2,105.38	3,158,070.00
Customer Charge		7,899.62	7,899.62	Customer Charge		8,870.9	8,870.90
Subtotal			4,955,189.62	Subtotal			5,566,940.90
F/E Adjust	145.0	151.94	189,732.50	F/E Adjust	145.0	151.94	213,156.25
Fuel Charge	500,000.0	24.819	12,409,284.52	Fuel Charge	500,000.0	24.819	12,409,284.52
IPP Fixed Charge	1,500.0	1,745.29	2,617,940.93	IPP Fixed Charge	1,500.0	1,745.29	2,617,940.93
IPP Variable Charge	500,000.0	4.71	2,355,000.00	IPP Variable Charge	500,000.0	4.71	2,355,000.00
Tariff Adjustment	500,000.0	(0.523)	(261,500.00)	Tariff Adjustment	500,000.0	(0.523)	(261,500.00)
Taxable Charges			22,265,647.56	Taxable Charges			22,900,822.59
GCT Charge		15.0%	3,339,847.13	GCT Charge		15.0%	3,435,123.39
Total Bill			25,605,494.70	Total Bill			26,335,945.98
					Bill Impact ->>		2.85%
				SUMMARY			
				Estimated New Bill			26.335.945.98
				Current Bill			25.605.494.70
				Net Chanae		Amount	730.451.28
				5		Percentage	2.85%

Figure 8-6: Bill Impact for a Rate 50 Customer at 500,000 kWh and 1,500 kVA

The Standard Rate 70 customer with an average consumption of 1,000,000 kWh for the month and a kVA demand of 2,500 is estimated to see an increase of approximately 3.7% over the current bill.

Current Bill				Estimated New Bill			
MT70 STD	Usage	Rate	Charges	MT70 STD	Usage	Rate	Charges
kWh Std	1,000,000	4.26	4,260,000.00	kWh Std	1,000,000	4.80	4,800,000.00
kVA Std	2,500	2,484.93	6,212,325.00	kVA Std	2,500	2,790.46	6,976,150.00
Customer Charge		7,899.62	7,899.62	Customer Charge		8,870.9	8,870.90
Subtotal			10,480,224.62	Subtotal			11,785,020.90
F/E Adjust	145.0	151.94	401,284.19	F/E Adjust	145.0	151.94	451,244.39
Fuel Charge	1,000,000.0	24.819	24,818,569.03	Fuel Charge	1,000,000.0	24.819	24,818,569.03
IPP Fixed Charge	2,500.0	424.14	1,060,340.63	IPP Fixed Charge	2,500.0	424.14	1,060,340.63
IPP Variable Charge	1,000,000.0	0.24	240,000.00	IPP Variable Charge	1,000,000.0	0.24	240,000.00
Tariff Adjustment	1,000,000.0	(0.523)	(523,000.00)	Tariff Adjustment	1,000,000.0	(0.523)	(523,000.00)
Taxable Charges			36,477,418.46	Taxable Charges			37,832,174.94
GCT Charge		15.0%	5,471,612.77	GCT Charge		15.0%	5,674,826.24
Total Bill			41,949,031.23	Total Bill			43,507,001.19
					Bill Impact ->>		3.71%
				SUMMARY			
				Estimated New Bill			43,507,001.19
				Current Bill			41,949,031.23
				Net Change		Amount	1,557,969.95
				-		Percentage	3.71%
						5	

Figure 8-7: Bill Impact for a Rate 70 Customer at 1,000,000 kWh and 2,500 kVA

9. Other Regulatory Matters

9.1 Standby Tariff

Determination 26 of the Final Determination approved Standby Tariffs in lieu of JPS' proposed Distributed Energy Resource (DER) framework and tariff. The OUR further invited JPS to review, amend and resubmit its DER proposal for their reconsideration.

Notwithstanding the comments raised by the OUR, the proposal for DER tariff was on the merit and recognition of the current and rapidly evolving state of the electricity sector due to a combination of factors such as advancements in solar PVC and other distributed generation technologies at lower cost, concerns about climate change and greenhouse emissions, a changing regulatory and legislative energy landscape, as well as customer preference to name a few.

The standby tariffs as currently described in the Rate Schedule have preceded the current developments in the sector by decades and were developed before the wide-scale availability and accessibility of these distributed generation technologies. As such they are not appropriate nor fit for the current environment, compounded by JPS' regulatory obligations.

Further, the separation of Standby into Firm and Non-firm services is not cost reflective of the capacity, backup, and supply provided by the grid to customers, who are increasingly opting to own and operate production equipment to meet or offset their own electricity supply requirement. This not only contravenes the cost-causation tariff design principles, well established through precedents set out by the OUR, as well as espoused in other jurisdictions, but also enables an environment in which well-resourced large customers are able to hedge their investment in self-generation against a standby tariff that is oblivious of fixed network costs. This will only result in the detriment to remaining customers, through a cycle of increased electricity prices.

The OUR's Determination is inconsistent with its stated agreement in principle for the establishment of a revised distributed generation framework. It is also suggestive of a *Reserve Capacity Charge* that is distinguishable from normal Demand Charges. This is incorrect and not supported by its own Rate Schedule or Determination Notice.

At this Annual Rate Review, JPS proposes that the OUR, pending the resubmission of a DER tariff and framework, and as an interim measure in adhering to the principles of cost-reflectiveness, equity, allocative efficiency, and revenue sustainability, make adjustments to the Rate Schedule to omit the Non-Firm Standby class. This is because it does not follow any logical precepts to rate design and creates an arbitrage at the expense and disadvantage of regular customers. This would avoid the creation of an unsustainable customer expectation to have the OUR's Standby Tariff otherwise available within the current context.

Moreover, the non-firm clause as defined within the Rate Schedule which states that "Service will be provided at the discretion of JPS, based on the availability of the supply demanded by the customer," is impractical given the current total capacity of the system and JPS' regulatory obligation to serve. This is exacerbated by the lack of any governing framework for Standby services. The applicability also emphasizes the outdated nature of the concept and tariff construct, which was developed during a period where Jamaica's generation capacity was subject to

shortages. This is no longer the case and is unlikely to ever again occur given the improvements made in system planning over recent decades, and recently underscored by the incorporation of an Integrated Resource Plan (IRP).

JPS underscores its interest and support for further development of the sector, inclusive of the empowerment of customers through choice. However, this must be balanced within a framework that is fair and equitable to all concerned, especially poor and vulnerable households who will be disproportionately adversely affected by continued grid defection that is enabled by a standby tariff that is not cost reflective and that has outlived its context for which it was developed and an electricity system that no longer exist.

9.2 Distributed Energy Resource Tariff and Framework

The OUR in its Final Determination stated that "JPS proposed DER rates requires additional work before it can be implemented. In light of this, the Office has decided that JPS may, if it elects to do so, present its revised DER construct at the next Annual Review for regulator consideration."

JPS' 2019/24 Rate Review Application outlined the need and merit for a review of the role of distributed generation, in full recognition of the tectonic shifts occurring within the electricity sector as an increasing number of customers opt to supplement or remove their demand from the grid through the use of distributed generation technologies, renewable or otherwise. Government policies and initiatives are supportive of this shift as stated within the National Energy Policy. These shifts were also underscored by the OUR in its review of the proposed DER tariff, albeit its disproval in its existing format.

Given the importance of the DER, and the level of rigour that is expected in any modification that is to be presented, and the need for engagement with the OUR and other stakeholders, JPS finds it prudent to defer its resubmission of its DER tariff to August 2021.

9.3 Transition of Net Billing Customers to Time-of-Use

Determination 26(b) states that: "Existing Net-billing customers in the RT10 and RT20 classes shall be transferred to the RT10 TOU and the RT20 TOU 6-months after the effective date of this Determination Notice. During the transition period leading up to the transfer, JPS shall engage customers in a well-structured education /promotion programme concerning the nature of TOU rates."

The above Determination requires JPS to transition existing residential and small commercial Net-Billing customers to the OUR's approved respective variable charge only TOU tariffs. This decision is counter to JPS' proposal to have these customers transitioned to a more appropriate tariff for customers with distributed generation.

JPS has formally written to the OUR expressing its concerns related to the TOU tariffs, and the appropriateness of these customers migrating to such a rate. Notwithstanding the inherent deficiencies of the OUR's TOU rate design, Net-Billing customers are uniquely characterized by their intermittent, unpredictable consumption patterns, and low load factor. As such energy-

based tariffs designed for grid-reliant customers are inadequate to recover the fixed network capacity cost they impose on the grid.

The appropriate billing construct for these customers must include a demand charge. JPS is therefore reiterating its position to await a review of the DER tariff and framework before the decision is made to migrate these customers.

9.4 RT10 & RT20 TOU Rate Design

Determination 26 approved the implementation of Time-of-Use (TOU) for Residential and Small Commercial customers and states that "the billing of customers in these two rate classes shall exclude the use of demand charges, and therefore the recovery of revenues shall be based entirely on the customer and energy charges."

JPS has expressed its concern with the approved rates. Notwithstanding the non-approval of associated demand charges, the residential time-of-use tariffs are inherently distorted and are not cost-reflective. While JPS agrees in principle and in fact proposed the introduction of TOU tariffs for these customers, the OUR's rate design is contrary to generally accepted tariff principles and are in conflict with the objectives of time-of-use rates, primarily to reduce peak demand and lower needed network investments over the medium/long-term horizon. The rates if implemented as is, will also disadvantage JPS by reducing its ability to recover cost and put at risk its financial viability.

9.4.1 Deferral of TOU Rate Implementation

The benefits of the expansion of TOU tariffs to the wider customer base is fully understood by JPS. If properly implemented there is the potential to significantly transform the way households and businesses utilize energy. The medium and long-term benefits to the system are well documented.

Properly designed, TOU tariffs are intended to be revenue-neutral to the utility, provide a price signal to customers during the period of higher electricity cost of production, usually defined as the Peak, as well as we provide customers, having modified their consumption patterns to realize savings on their electricity bills.

The TOU tariff as currently designed cannot be implemented due to the risk of financial hemorrhage to JPS. As such, it is proposed that a thorough review of the rate be conducted, supported by an analysis of updated or new customer information, behavioural patterns, and assumptions, especially those brought on by the pandemic.

Another factor to consider includes, the definition of an appropriate eligibility criteria, that would be targeted toward households and businesses most likely to benefit from the TOU tariff by shifting their load. These are usually customers with above-average residential or small commercial relative to the bulk of other customers within their rate class.

A third major point is the application of GCT to residential customers above the tax threshold of 150 kWh/ month. This will pose a unique challenge for the TOU option. Currently, GCT charges are applied to the difference between the customer's total monthly consumption and the tax threshold consumption of 150 kWh. The introduction of TOU rates will fundamentally affect how GCT charges are determined for residential customers. Tariffs will vary across the TOU periods leading to different bands of consumption values with no methodology for determining how the 150 kWh is accumulated and by extension, how the taxes are to be applied.

JPS proposes that due consideration to the matters outlined above, and a full review of the rate design be conducted. JPS is also proposing to resubmit an updated evaluation and estimate of the RT 10 and RT 20 TOU tariffs by August 2021.

9.5 Prepaid IPP Decoupling

The Final Determination approved the separation of IPP charges from JPS' non-fuel tariffs in accordance with the Final Criteria. However, the prepaid rates for residential and small commercial customers continued to have an embedded IPP charge. As a result, prepaid customer would not have seen a separate IPP line item on their receipts at the time of top up or purchase.

In keeping with the approval of the separation of IPP from all JPS' non-fuel cost, JPS proposes the Decoupling of IPP charges from residential and small commercial prepaid rates. As a results the fuel charge will no longer be reflective of an IPP surcharge, but would now only be the pure fuel charge. The prepaid tariff will also see a downward movement as it will no longer include any charges associated with purchased power.

9.6 Electric Vehicles

Determination 26 of the Final Determination approved a TOU tariff for Public Electricity Vehicle charges on the basis of their approved residential TOU tariff plus a 5% premium. With the distortion in the residential TOU already examined, the same concerns are extended to the rates recently approved for Electric Vehicles.

The OUR is reminded that JPS' tariff proposal was premised on an interim basis and within the context of a business plan and associated costs for the installation of Rate-Based charging units across the island, intended for the purpose of spurring interest and supporting ongoing stakeholder discussion on the transition towards the electrification of the transport sector. These tariffs were also within context of a non-existent EV load on the island that could be assessed and studied to facilitate further refinement of the rate design and ascribed only to JPS' installed charging units.

Without prejudice or any suggestion, at this time, toward the market outlook and framework for publicly available charging units, the existing regulations and governance framework of the electricity sector, assigns JPS as the exclusive distributor and supply provider for electricity throughout Jamaica.

It is against this background, the OUR's Determination as well as its 2020 Rate Schedule is ambiguous and JPS requires that the Office clarifies its position on the rate that was approved - in the interest of improving the public's awareness.

Further, in keeping with the objection and concerns regarding the approved TOU rate for residential customers, JPS' proposes a review and modification to the EV tariff that ensures that the rate is cost-reflective and revenue adequate in keeping with the tenets of the Licence

10. Appendices

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