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GOVERNMENT OF PUERTO RICO
PUERTO RICO PUBLIC SERVICE REGULATORY BOARD
PUERTO RICO ENERGY BUREAU

IN RE: THE PERFORMANCE OF THE PUERTO RICO ELECTRIC POWER AUTHORITY	**CASE NO.:** NEPR-MI-2019-0007 **SUBJECT:** Motion resubmitting LUMA's comments and proposals regarding PREPA's performance baselines and metrics, in compliance with Resolution and Order of December 23, 2020, and based on data published by the Energy Bureau and presented during technical conference held on January 19th, 2020.

MOTION RESUBMITTING LUMA'S COMMENTS ON PERFORMANCE BASELINES AND METRICS BASED ON DATA PRESENTED ON JANUARY 19TH, 2020 BY THE ENERGY BUREAU, AND RESUBMITTING PROPOSED PERFORMANCE METRICS AND BASELINES

TO THE PUERTO RICO ENERGY BUREAU:

COME NOW, LUMA ENERGY, LLC as Management Co., per its responsibilities under the Puerto Rico Transmission and Distribution System Operation and Maintenance Agreement (OMA) and **LUMA ENERGY SERVCO, LLC** (collectively, **LUMA**), through the undersigned legal counsel and respectfully state and request the following:

I. Introduction

On January 29, 2021, LUMA filed before this honorable Puerto Rico Energy Bureau (Energy Bureau or Bureau) a motion submitting three documents in compliance with the Energy Bureau's Resolution and Order of December 23, 2020, that requested comments by said date on the data published by the Energy Bureau on the Puerto Rico Electric Power Authority's (PREPA) current performance. (LUMA's January 29th motion). To wit, on January 29, 2021, LUMA filed (1) comments on the data published by the Energy Bureau, including the presentation offered by Bureau advisors on January 19, 2021, **Exhibit 1**; (2) proposed performance metrics and

performance baselines, **Exhibit 2**; and (3) an initial assessment and proposal of benchmarks on reliability performance, customer satisfaction and employee safety, **Exhibit 3**.

On February 1, 2021, the Energy Bureau issued a Resolution and Order that amended the procedural calendar in this proceeding and, among others, extended the period to file comments up to and including Friday, February 5, 2021. In a Resolution and Order dated February 4, 2021, the Energy Bureau invited LUMA –and PREPA– to amend or modify the initial comments within the extended February 5th deadline. In compliance with the Energy Bureau's Resolutions and Orders of December 23, 2020 and February 1st and 4th, 2021, LUMA hereby re-submits comments to the data published by the Energy Bureau and addresses the Energy Bureau's requests made during the prefiling conference held on January 19, 2021, for feedback and information on PREPA's reported performance metrics. **Exhibit 1.**

LUMA is submitting its feedback based on the process it has undertaken during the Front-End Transition period pursuant to the OMA. This entailed an initial information gathering exercise and analysis of PREPA data, processes and tools, for each metric included in the OMA. During this process, LUMA identified where there is lack of information collected or incomplete data available to determine PREPA's baseline performance. LUMA also identified gaps where current PREPA practices do not meet applicable industry standards in measuring performance.

LUMA is also filing herein, a revised document with recommendations on additional metrics based on applicable industry standards and practices. **Exhibit 2.**[1] LUMA's proposed

[1] This filing includes two revisions to Exhibit 2 on LUMA's proposed performance metrics and baselines. First, at page 12 of Exhibit 2, Section 2.3., LUMA edited its comments on OSHA Recordable Incident Rate, OSHA Dart Rate and OSHA Facilities and consolidated the information in one sub-section. Secondly, at page 24, a revision is included on the OSHA Recordable Incident Rate Baseline.

performance metrics on customer satisfaction, safety, and financial performance (Section 2.0, **Exhibit 2**) aim to improve PREPA's performance in these key areas, recognizing the current state of the utility and in accordance with public policy, the OMA, and applicable statutory requirements for the transformation of PREPA. The proposed metrics include key findings by LUMA, descriptions and calculations.

With this motion, LUMA is also filing an initial assessment regarding the use of benchmarks on reliability performance, customer satisfaction and employee safety that considers PREPA's current situation and characteristics. See **Exhibit 3.**

II. Background

In a Resolution and Order issued in this proceeding dated December 23, 2020, the Energy Bureau informed that it was proceeding in this case to set performance baselines and performance compliance benchmarks for Puerto Rico's electric system. Prior to commencing said process, as part of this case, the Energy Bureau conducted a data gathering phase during which PREPA filed quarterly reports on relevant performance data pursuant to Attachment 1 to the Resolution and Order issued by the Energy Bureau on May 14, 2019.

Upon gathering data submitted by PREPA that covered the period from June 2019 through May 2020, the Energy Bureau published several charts and graphs illustrating the compilation of the data submitted quarterly by PREPA. (Appendices A to N, Attachments 1-11 and I-V to Resolution and Order of December 23, 2020). [2] On January 19, 2021, the Energy Bureau held a technical conference where its advisors presented and explained their compilation of such raw data

[2] LUMA understands that the Energy Bureau took PREPA's raw data on its current performance without adjustments. LUMA does not have at its disposal any additional assumptions made by the Energy Bureau in preparing the graphs and charts on PREPA's current performance.

presented by PREPA. The Energy Bureau also took oral questions from the attendees and its advisors responded orally. The Energy Bureau further requested that attendees submit information that they possess with regards to the PREPA data, and requested written comments to be filed by January 29, 2021, as per the Resolution and Order of December 23, 2020. As stated in the introduction to this motion, on January 29, 2021, LUMA complied with the Energy Bureau's Resolution and Order of December 23, 2020. Today, LUMA is re-filing its comments and submissions pursuant to the orders issued by the Energy Bureau on February 1st and 4th, with some revisions to **Exhibit 2** to the January 29th submission.[3]

III. Comments

A. Metrics and Baselines.

The graphs and charts that were published by the Energy Bureau as appendices to its Resolution and Order of December 23, 2020 (Attachments 1-11 and I-V), and those presented during the technical conference of January 19, 2021, do not reference all of the metrics identified in Appendix 1 to the Energy Bureau's Resolution and Order of May 14, 2019. The data, graphs, and charts on PREPA's current performance published by the Energy Bureau serve as reference points to establish baselines on PREPA's performance on several metrics. These also include data on industry standards and Hawaii's Electrical Company's historical performance for some metrics, but do not provide said information for all of the performance metrics.

The January 19th presentation by the Energy Bureau references these comparisons to electric utility companies, but with the caveat that they serve illustrative purposes, as explained by the Energy Bureau's consultants during the technical conference. LUMA agrees with this approach

[3] *See* Note 1 *supra.*

and explanation by the Energy Bureau consultants and further understands that these comparisons are meant to provide information on PREPA's performance relative to that of other utilities. That is, the benchmarks can add context to PREPA's current performance and the meaning of the data presented. LUMA understands that these comparisons do not set performance baselines or benchmarks.

As explained in Section 2 of **Exhibit 2,** as part of its Front-End Transition activities under the OMA, LUMA found that some performance metrics cannot be properly baselined. This is mainly due to nonexistent or inadequate data, and in a few instances, industry practices suggest doubtful results even if sufficient data were available. Furthermore, there are significant gaps between PREPA's processes for data collection and calculation of metrics when compared with applicable industry standards.

Taking into consideration these clarifications, LUMA is hereby filing an initial assessment and recommendations with reference to the performance metrics that the Energy Bureau presented in the Technical Conference of January 19, 2021. **Exhibit 1.** LUMA has also identified additional performance metrics and is providing comments on those metrics to ensure alignment on public policy and to deliver customer-centric, safe, reliable, resilient, sustainable electricity. **Exhibits 1 and 2.** This additional list of proposed performance metrics as well as proposed baselines are presented with reference to applicable industry standards that are based on LUMA's assessment in the Front-End Transition and on the performance metrics set on the OMA.

LUMA requests that the Energy Bureau accept LUMA's comments, the additional proposed performance metrics, and set PREPA's baseline performance accordingly.

B. *"Benchmarks"*

Section 1. 7 of Regulation No. 9137 of December 13, 2019, *Regulation for Performance Incentive Mechanisms*, defines "metrics" and "targets", *see* subsections (10) and (21), but does not include a definition of the term "benchmarks." Relatedly, the Energy Bureau's Resolution and Order of December 23, 2020, does not identify benchmarks. LUMA recognizes the complexity of fixing a definition of "benchmark" in the abstract without consideration of the particulars of the utility and its conditions at any given time. In order to be responsive to the Energy Bureau's request, however, LUMA is providing data on selected key benchmarks as further explained in **Exhibit 3**.

As shown in this filing**,** PREPA's current performance is well below industry standards and continues to deteriorate with respect to several performance metrics. Thus, at this time benchmarks should be considered for illustrative purposes and reference points only.

WHEREFORE, LUMA respectfully requests that the Energy Bureau take notice of the aforementioned and review and accept LUMA's comments and proposed performance metrics and baselines included in **Exhibits 1, 2** and **3** to this motion.

RESPECTFULLY SUBMITTED.

In San Juan, Puerto Rico, this 5th day of February 2021.

I hereby certify that I filed this motion using the electronic filing system of the Puerto Rico Energy Bureau and that on this date, I will send an electronic copy of this motion to via electronic mail to the attorneys of record for the Puerto Rico Electric Power Authority, Joannely Marrero-Cruz, jmarrero@diazvaz.law; and Katiuska Bolaños-Lugo, kbolanos@diazvaz.law.

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Exhibit 1 - Summary of LUMA Comments on PREB Performance Metrics

The following table summarizes LUMA's comments to the metrics and baselines presented by the Puerto Rico Energy Bureau (PREB) during the technical conference held by PREB on January 19, 2021 in the case NEPR-MI-2019-0007, as well as comments on benchmarking related to these metrics. LUMA's comments are based on Front-End Transition activities to comply with its responsibilities pursuant to the Puerto Rico Transmission and Distribution System Operation and Maintenance Agreement (OMA).

Metrics Presented during January 19, 2021 Technical Conference	Comments on Metric and Baseline Data	Comments on Benchmarks
Metrics with Comparable Industry Standard		
OSHA Incident Rate / Safety Recordable Rate	Safety is a top priority for LUMA. LUMA performed a detailed review of PREPA data as part of the Front-End Transition activities, including baseline analyses, for four OSHA metrics related to activities under the OMA mainly related to transmission and distribution: OSHA Recordable Incident Rate, OSHA Fatalities, OSHA Severity Rate, and OSHA DART rate. As part of LUMA's review, current data collection processes were assessed and compared against applicable industry standards and practices for metrics. LUMA noted significant discrepancies in PREPA's 2020 data and recommends that only data from 2019 be considered in developing a baseline. LUMA has presented the results in Exhibit 2 of this submission.	LUMA recommends using OSHA data presented by Edison Electric Institute (EEI) in developing benchmarks as EEI segments comparable utility companies between Transmission and Distribution and Generation. As noted in LUMA's baseline comments, LUMA proposes comparing 2019 benchmark data to PREPA's 2019 data. PREPA's 2020 data has several issues. The 2019 data is free of these discrepancies and is more comparable to EEI's OSHA data. Please see Exhibit 3 for LUMA's discussion of OSHA benchmarks.
SAIDI	LUMA performed a detailed review of PREPA's data as part of the Front-End Transition activities. As part of LUMA's review current data collection processes were assessed and analyzed when compared against applicable industry standards and practices for metrics. LUMA has presented the results in Exhibit 2.	Please see Exhibit 3 for LUMA's discussion of Reliability Benchmarks.
Monthly SAIDI	LUMA has evaluated annual SAIDI data but has not evaluated the data on a monthly time frame. Given the nature of SAIDI data LUMA recommends reporting on an annual basis as a monthly basis can be misleading due to the natural	IEEE does not provide monthly benchmarking analyses for SAIDI and comparing to annual benchmarks would be misleading due to the natural variability of reliability throughout the year.

Exhibit 1 - Summary of LUMA Comments on PREB Performance Metrics

Metrics Presented during January 19, 2021 Technical Conference	Comments on Metric and Baseline Data	Comments on Benchmarks
	variability of reliability throughout the year due to weather, earthquakes, etc. Monthly data is also not typically compared to annual reliability metrics which is what is presented in IEEE. LUMA has presented its analysis of annual SAIDI in Exhibit 2.	
SAIFI	LUMA performed a detailed review of PREPA's data as part of the Front-End Transition activities. As part of LUMA's review current data collection processes were assessed and analyzed when compared against applicable industry standards and practices for metrics. LUMA has presented the results in Exhibit 2.	Please see Exhibit 3 for LUMA's discussion of Reliability Benchmarks.
Monthly SAIFI	LUMA has evaluated annual SAIFI data but has not evaluated the data on a monthly time frame. Given the nature of SAIFI data LUMA recommends reporting on an annual basis as a monthly basis can be misleading due to the natural variability of reliability throughout the year due to weather, earthquakes, etc. Monthly data is also not typically compared to annual reliability metrics which is what is presented in IEEE. LUMA has presented its analysis of annual SAIDI data in Exhibit 2.	IEEE does not provide monthly benchmarking analyses for SAIDI and comparing to annual benchmarks would be misleading due to the natural variability of reliability throughout the year.
CAIDI	Based on growing industry concerns that CAIDI is very limited as a performance metric and can be misleading with respect to customer experience. LUMA has presented discussion in Exhibit 2.	CAIDI is the ratio between SAIDI and SAIFI, its performance is captured through those individual metrics. LUMA proposes eliminating CAIDI.
Average Speed to Answer (ASA)	LUMA performed a detailed review of PREPA's data as part of the Front-End Transition activities and has found that the data currently available and lack of visibility into call routing systems does not support a reliable baseline calculation. PREPA has three different systems for its call centers and data	LUMA has evaluated industry data from the American Productivity and Quality Center (APQC) for benchmarking purposes.

Exhibit 1 - Summary of LUMA Comments on PREB Performance Metrics

Metrics Presented during January 19, 2021 Technical Conference	Comments on Metric and Baseline Data	Comments on Benchmarks
	from these systems are not combined to provide overall results. Based on the analysis LUMA has proposed a baseline and has presented the results in Exhibit 2.	
Number of Customer Complaints per 10,000 Customers	LUMA recommends replacing this metric with Customer Complaints to PREB due to inefficiencies in procedure and recording of Customer Complaints across multiple alternative submission platforms, as explained in Exhibit 2. LUMA performed a detailed review of the data for Customer Complaints to PREB as part of our Front-End Transition activities including current data collection processes and analyses when compared against applicable industry standards and practices for metrics. LUMA has presented the results in Exhibit 2.	Upon preliminary review, LUMA is unable to determine a comparable benchmark.
System-Level Plant Availability	This metric relates to Generation. LUMA has not completed an analysis on the metric and baselines as we do not anticipate reporting on this metric.	LUMA has not completed an analysis on Benchmarks for this metric as it relates to Generation.
System-Level Force Outage Rate	This metric relates to Generation. LUMA has not completed an analysis on the metric and baselines as we do not anticipate reporting on this metric.	LUMA has not completed an analysis on Benchmarks for this metric as it relates to Generation.
Percent of Bills Estimated vs Read	LUMA has not evaluated data, processes or analyses for this item for use as a performance metric.	LUMA has not performed a thorough analysis of benchmarks for this metric at this time.
Generation from RPS-Eligible PPOAs	Given that this process includes multiple party's performance, this metric is not the sole responsibility of LUMA. LUMA has not performed a thorough analysis of benchmarks for this metric at this time.	LUMA has not performed a thorough analysis of benchmarks for this metric at this time.
Additional Selected Metrics Identified by PREB		
Operational Expenses vs Budget	LUMA has presented its results in Exhibit 2.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference

Exhibit 1 - Summary of LUMA Comments on PREB Performance Metrics

Metrics Presented during January 19, 2021 Technical Conference	Comments on Metric and Baseline Data	Comments on Benchmarks
Capital Expenses vs Budget	LUMA has presented its results in Exhibit 2.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference
SAIDI by month and municipality	LUMA has not investigated PREPA data by month and municipality. Monthly data is discussed above. Segmenting SAIDI data by municipality may be challenging as outages occur across municipal boundaries and could lead to double counting. LUMA recommends reporting annual aggregate SAIDI.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference
Average System Heat Rate	This metric relates to Generation. LUMA has not completed an analysis on the metric and baselines as we do not anticipate reporting on this metric.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference.
Monthly Generation by Plan – Thermal Generation	This metric relates to Generation. LUMA has not completed an analysis on the metric and baselines as we do not anticipate reporting on this metric.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference.
Number of Calls Answered	This metric measures the total number of customer calls answered by PREPA's call centers. LUMA believes this metric is duplicative of other customer service metrics and provides limited analytical value. LUMA therefore has not performed analysis on PREPA's data related to this metric.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference.
Number of Disconnections by Area	LUMA has not evaluated data, processes or analyses for this item for use as a performance metric. At this time LUMA does not recommend this as a performance metric.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference.
Customers on Extended Payment Plans	LUMA has not evaluated data, processes or analyses for this item for use as a performance metric. At this time LUMA does not recommend this as a performance metric.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference.
Customers Defaulting on Extended Payment Plans	LUMA has not evaluated data, processes or analyses for this item for use as a performance metric. At this time LUMA does not recommend this as a	Not applicable, no benchmark presented during January 19, 2021 Technical Conference.

Exhibit 1 - Summary of LUMA Comments on PREB Performance Metrics

Metrics Presented during January 19, 2021 Technical Conference	Comments on Metric and Baseline Data	Comments on Benchmarks
	performance metric.	
Customers Completing Extended Payment Plans	LUMA has not evaluated data, processes or analyses for this item for use as a performance metric. At this time LUMA does not recommend this as a performance metric.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference.
Days Sales Outstanding	LUMA performed a detailed review of PREPA's data as part of our Front-End Transition activities. As part of LUMA's review, we also assessed current data collection processes and analyses when compared against applicable industry standards and practices for metrics. LUMA has presented the results in Exhibit 2 of this filing. LUMA proposes reporting this metric for two groups of customers: General Customers and Government Customers.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference.
Monthly Generation from PRS Eligible PPOAs	LUMA has not evaluated data, processes or analyses for this item for use as a performance metric.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference.
PRS-Eligible Capacity	LUMA has not evaluated data, processes or analyses for this item for use as a performance metric.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference.
Annual Energy Efficiency Savings	LUMA has not evaluated data, processes or analyses for this item for use as a performance metric.	Not applicable, no benchmark presented during January 19, 2021 Technical Conference.

As part of LUMA's Front-End Transition activities, LUMA has evaluated and proposed additional Metrics to ensure alignment with public policy and to deliver customer-centric, safe, reliable, resilient, sustainable electricity.

Exhibit 1 - Summary of LUMA Comments on PREB Performance Metrics

Additional Proposed Metrics Identified by LUMA		
LUMA Identified Metric	**Description**	**Comments on Metrics**
J.D. Power Customer Satisfaction Survey	Industry standard customer satisfaction survey. LUMA has presented this methodology in Exhibit 2.	LUMA has executed a contract with JD Power. The first round of customer CSAT survey has been completed, and the second round is in market. The CSAT baseline will be established using this statistically significant sample by service commencement date. Results from the first round of customer CSAT JD Power survey and discussion around benchmarks is presented in Exhibit 3.
First Call Resolution (FCR)	Metric that measures the percentage of calls where the customer was able to resolve their issue/need on the first attempt. LUMA has presented the results in Exhibit 2.	LUMA proposes migrating the Contact Center to the new cloud-based Contact Center platform as of Service Commencement Date to enable accurate, cohesive reporting.
Abandonment Rate (ADB)	Metric that measures the percentage of callers who hand up (abandon) while the call is still awaiting distribution. LUMA has presented the results in Exhibit 2.	LUMA proposes migrating the Contact Center to the new cloud-based Contact Center platform as of Service Commencement Date to enable accurate, cohesive reporting.
Customers Experiencing Multiple Interruptions ($CEMI_N$)	OMS metric used to identify customers who have experienced multiple outage events. LUMA has presented the results in Exhibit 2.	LUMA proposes deferring $CEMI_N$ until after the information can be corrected and a baseline determined, currently expected to be Year 4.
LUMA Identified Metric	**Description**	**Comments on Metrics**
Momentary Average Interruption Frequency Index (MAIFI)	Refers to interruptions that result from momentary outages of service. LUMA has presented its analysis in Exhibit 2.	LUMA recommends deferring this metric to a later date due to a lack of accurate customer information data. Accurate measurement of this metric requires advanced data acquisition methods and systems that are not in place at this time.
Distribution Line Inspections & Targeted Corrections	Refers to indicators that measure the number of distributions line inspection completed. LUMA has discussed this metric in Exhibit 2.	LUMA is proposing to incorporate this metric to categorize assets according to their condition and criticality to the safe and reliable functioning of the T&D System.
Transmission Line Inspections & Targeted Corrections	Refers to indicators that measure the number of transmission line inspection completed. LUMA has discussed this metric in Exhibit 2.	LUMA is proposing to incorporate this metric to categorize assets according to their condition and criticality to the safe and reliable functioning of the T&D System.
T&D Substation	Refers to indicators that measure the	LUMA is proposing to incorporate this

Exhibit 1 - Summary of LUMA Comments on PREB Performance Metrics

Additional Proposed Metrics Identified by LUMA		
LUMA Identified Metric	**Description**	**Comments on Metrics**
Inspections & Targeted Corrections	number of substation inspection completed. LUMA has discussed this metric in Exhibit 2.	metric to categorize assets according to their condition and criticality to the safe and reliable functioning of the T&D System.

Exhibit 2 - LUMA's Comments on Performance Metrics Baselines

NEPR-MI-2019-0007

February 5, 2021

Contents

1.0 Introduction & Overview 2
1.1 Introduction 2
1.2 Performance Metrics Overview 3
1.2.1 Summary of Performance Metrics 3
1.2.2 Application of Performance Metrics 6
1.2.3 Summary of Planning Team Activity 7

2.0 Review of Processes & Data 7
2.1 LUMA Performance Metrics Team 7
2.2 Customer Service 8
2.3 Technical, Safety and Regulatory 11
2.4 Financial Performance 21

3.0 Baseline Performance 22
3.1 Customer Service 22
3.1.1 J.D. Power Customer Satisfaction Survey (Residential Customers) 22
3.1.2 J.D. Power Customer Satisfaction Survey (Business Customers) 23
3.1.3 Average Speed of Answer (ASA) 23
3.1.4 Customer PREB Complaint Rate 23
3.1.5 Abandonment Rate (ABD) 24
3.2 Technical, Safety and Regulatory 24
3.2.1 OSHA Recordable Incident Rate, OSHA Fatalities, OSHA Severity Rate, OSHA DART Rate 24
3.2.2 SAIFI, SAIDI 25
3.2.3 Distribution Line Inspections and Targeted Corrections, Transmission Line Inspections and Targeted Corrections, T&D Substation Inspections and Targeted Corrections 27
3.3 Financial Performance 27
3.3.1 Operating Budget 27
3.3.2 Capital Budget – Federally Funded 27
3.3.3 Capital Budget – Non-Federally Funded 28
3.3.4 Days Sales Outstanding (DSO) 28
3.3.5 Reduction in Network Line Losses 29
3.3.6 Overtime 29

Tables & Figures

Table 1.1.1. Performance Metrics Summary 3
Table 2.1. APQC (American Productivity & Quality Center) Benchmark 10
Table 2.2. Calls Routed to Third Parties in May 2020 10
Table 2.3. APQC Benchmark 11
Table 2.4. PREPA's Interruption Cause Codes 14
Table 2.5. PREPA's Interruptions with Cause Code Included or Excluded from Metric Calculation 15
Figure 3.1. SAIDI and SAIFI Degradation Year-over-Year 26

1.0 Introduction & Overview

1.1 Introduction

On June 22, 2020, LUMA Energy, LLC as ManagementCo, LUMA Energy ServCo, LLC as ServCo (collectively, "LUMA"), the Puerto Rico Electric Power Authority ("PREPA") and the Puerto Rico Public-Private Partnerships Authority ("P3A"), entered into an Operation and Maintenance Agreement ("the OMA") under which LUMA will operate and manage PREPA's transmission and distribution system ("T&D System").

Prior to assuming management of the T&D System, LUMA is undertaking transition and planning activities as part of the Front-End Transition Services. As part of this Front-End Transition Services, and in compliance with LUMA's obligations under Section 4.2(f) of the OMA, LUMA reviewed PREPA's processes, data, and baseline performance with respect to certain Performance Metrics.

LUMA presents this analysis and Performance Metrics for consideration as part of NEPR-MI-2019-0007 to establish metrics and performance baselines.

The current performance of PREPA is well below industry standards. Establishing a robust set of Performance Metrics will begin to enable transparency, reverse negative performance trends and will further align LUMA with public policy – critical upon LUMA's commencement of T&S Services. This will advance LUMA's key goals: Prioritize Safety; Improve Customer Satisfaction; System Rebuild and Resiliency; Operational Excellence; and Sustainable Energy Transformation. The Puerto Rico Energy Board ("PREB") has also promulgated regulation concerning Performance Metrics, including NEPR-MI-2019-0014 and NEPR-MI-2019-0007. In the latter docket, PREB, through its order issued December 23, 2020, ordered that LUMA take part in the proceedings.

This submission describes the process followed by LUMA to study and evaluate PREPA's baseline performance for selected Performance Metrics. This work forms part of the Front-End Transition Services being delivered by LUMA under the OMA. LUMA has been reporting its progress during the Front-End Transition in monthly reports provided to P3A and PREB.

LUMA's review took place before December 2020 and included dedicated teams focused on this specific effort and the active participation of experts from each functional department in the organization. The process also included discussion with key stakeholders, who provided feedback on process, regulations and other context that informed this proposal. Please refer to Sections 1.2.3 Summary of Planning Team Activity and Section 2.0 Review of Processes & Data of this document for additional details.

The work performed by the LUMA teams required continuous interaction with the corresponding groups at PREPA for information gathering on current processes and available data. As part of the assessment of current practices, LUMA has determined that there are multiple gaps between PREPA's current processes and supporting data when compared against applicable industry standards and practices for the metrics listed in Annex IX of the OMA (hereafter referred to as "Annex IX"). In this submission, LUMA compares PREPA's current practices with industry standards and practices.

Because LUMA found significant gaps in both processes and data as explained in detail herein, LUMA proposes that reporting of certain metrics and their use in Annex IX be deferred until such time as LUMA

is able to provide reliable data for those metrics. In order to provide a full set of metrics, LUMA proposes the addition of some Performance Metrics in Annex IX. Determining baseline performance to enable the setting of realistic performance targets for the proposed Performance Metrics was also a challenge due to current process and data gaps as explained in detail herein.

The proposed Performance Metrics are presented with details related to each, including descriptions, calculations, and performance baselines.

It must be noted that the design of LUMA's plans will be affected in several cases by the absence and lack of quality data. LUMA's plans for improvement in the proposed Performance Metrics is reflected in our prioritization of programs and projects, and ultimately in our Initial Budgets to be submitted to PREB under a separate filing as part of LUMA's Front-End Transition Services obligations.

1.2 Performance Metrics Overview

1.2.1 Summary of Performance Metrics

The proposed Performance Metrics are listed in Table 1.1.1. These are grouped in three major Performance Categories in accordance with Annex IX of the OMA: Customer Service; Technical, Safety & Regulatory; and Financial Performance. The description has the text used in Annex IX at Effective Date, and the below indicates in summary form the clarification, addition or deferral that LUMA is proposing.

Table 1.1.1. Performance Metrics Summary

Performance Metric	OMA Description / Comments	LUMA Description
Customer Service		
J.D. Power Customer Satisfaction Survey (Residential Customers)	3rd party measure of customer satisfaction	3rd party measure of customer satisfaction
J.D. Power Customer Satisfaction Survey (Business Customers)	3rd party measure of customer satisfaction	3rd party measure of customer satisfaction
Average Speed of Answer (minutes)*	Time it takes on phone to reach an agent	The average wait time from the moment the customer enters the Automated Call Distribution (ACD) queue to the time the call is answered by an agent.
Customer Complaint Rate	Total monthly complaints registered with PREB per 10,000 customers	Total monthly complaints registered with PREB divided by the total number of customers and then multiplied by 10,000.

Exhibit 2 - LUMA's Comments on Performance Metrics Baselines

First Call Resolution* ("FCR") (deferred)	% of calls with issues that are escalated	The percentage of calls where the customer was able to resolve their issue/need on the first attempt. PREPA does not have the ability to track and report FCR. LUMA proposes deferring the calculation and reporting of this metric until a new cloud-based Contact Center platform is implemented and FCR performance tracking can be established.
Abandonment Rate*	# of abandoned calls per calls received	The percentage of callers who hang up (abandon) while the call is still in the Automated Call Distribution (ACD) queue.
Technical, Safety & Regulatory		
OSHA Recordable Incident Rate	# of work-related OSHA recordable injury cases	Total number of OSHA recordable incidents as a result of work-related injury
OSHA Fatalities*	# of work-related fatalities	All work-related fatalities
OSHA Severity Rate*	OSHA Severe Injuries # of total work-related injury cases with severity days	Total number of restricted and lost time days incurred as a result of a work-related injury
OSHA DART Rate	# of work-related injury	Total number of OSHA recordable cases with lost time days (away, restricted or transferred)
System Average Interruption Frequency Index (SAIFI)*	Measures avg. outage frequency	Indicates how often the average customer experiences a sustained interruption over a predefined period of time.†
System Average Interruption Duration Index (SAIDI)*	Measures avg. restoration time	Indicates the total duration of interruption for the average customer during a predefined period of time.†
Customer Average Interruption Duration Index (CAIDI)* (eliminated)	Measures avg. outage duration	Represents the average time required to restore service.† Based on growing industry concerns that CAIDI is very limited as a performance metric, LUMA proposes eliminating CAIDI. Since CAIDI is the ratio between SAIDI and SAIFI, CAIDI can be misleading because it can remain the same even when the SAIDI and SAIFI values decrease.

Exhibit 2 - LUMA's Comments on Performance Metrics Baselines

Customers Experiencing Multiple Interruptions ($CEMI_N$) (deferred)	Measures multiple outages in a given period	Indicates the ratio of individual customers experiencing N or more sustained interruptions to the total number of customers served.† Due to data quality issues including lack of accurate customer information and lack of customer connectivity in the Outage Management System, LUMA proposes deferring $CEMI_N$ until after the information can be corrected and a baseline determined, currently expected to be Year 4.
Momentary Average Interruption Frequency Index (MAIFI) (deferred)	Measures avg. # of momentary interruptions	Indicates the average frequency of momentary interruptions. Due to data availability and quality issues, LUMA recommends deferring the MAIFI metric until it can be accurately measured.
Additional Performance Metrics		
Distribution Line Inspections & Targeted Corrections*	N/A	The number of distribution line inspections completed, with data recorded in a database for analysis. Category 0 and Category 1 findings shall be incorporated in a plan to be addressed within 60 days of identification.
Transmission Line Inspections & Targeted Corrections	N/A	The number of transmission line inspections completed, with data recorded in a database for analysis. Category 0 and Category 1 findings shall be incorporated in a plan to be addressed within 60 days of identification.
T&D Substation Inspections & Targeted Corrections	N/A	The number of distribution and transmission substation inspections completed with data recorded in a database for analysis. Category 0 and Category 1 findings shall be incorporated in a plan to be addressed within 60 days of identification.
Financial Performance		
Operating Budget*	Measures ability to stay within budget	Measures ability to stay within budget.
Capital Budget – Federally Funded*	Measures ability to stay within budget	Measures ability to stay within budget.
Capital Budget – Non-Federally Funded*	Measures ability to stay within budget	Measures ability to stay within budget.

Days Sales Outstanding (bifurcated)	Measures ability to collect bills	Measures ability to collect customer bills. LUMA recommends calculating separate DSO metrics for General Customers (Residential, Commercial, & Wholesale), and Government Accounts to improve the transparency of collections efforts and improvements.
Reduction in Network Line Losses (deferred)	Measures ability to reduce electric losses	Measures ability to reduce electric losses. PREPA does not currently allocate losses to the components of the system. Such allocation requires the development of an appropriate model, as well as additional metering and other measures.
Overtime	Measures ability to manage salary expense	Measures ability to manage overtime costs under normal operations (excluding emergency events).
Additional Performance Metrics		
Days Sales Outstanding – General Customers	N/A	Measures ability to collect bills from general customers.
Days Sales Outstanding – Government Customers	N/A	Measures ability to collect bills from government customers.

*These Performance Metrics are also Key Performance Metrics as defined in Annex IX of the OMA.

†These descriptions are from the IEEE Guide for Electric Power Distribution Reliability Indices IEEE Std. 1366™-2012.

1.2.2 Application of Performance Metrics

The Performance Metrics summarized in Table 1.1.1 are meant for establishing targets for acceptable performance in providing electric service during normal conditions. Not included in this submission are Major Outage Event Performance Metrics that expressly characterize outage events affecting a high number of customers, having an unusually long duration and/or the result of an Act of God such as a tropical storm as abnormal and exclude utility performance during these events. As such, the Major Outage Event Performance Metrics are not intended to, cannot and do not provide any quantitative measurement of utility performance during a major event.

The Performance Metrics summarized in Table 1.1.1 of this submission apply during normal operations of the T&D System (i.e., when Major Outage Event Performance Metrics do not apply). For the purposes of this submission, Major Outage Event Performance Metrics apply during major events defined as:

> "Major outage event" means an event as a result of which (i) at least two hundred and five thousand (205,000) T&D Customers are interrupted for more than 15 minutes or (ii) at any point in time during the event, there are one thousand five hundred or more (≥1,500) active outage events for the T&D System, which are tracked in the Outage Management System (OMS). The major outage event is

> deemed ongoing so long as the interruptions/outages continue to remain above the stated cumulative amounts, in each case for a period of twenty-four hours or longer (≥24) and are caused by an act of God. If such an act of God is a storm, the storm must be designated as a named storm by the U.S. National Weather Service or a State of Emergency declared by the Government of Puerto Rico. The major outage event shall be deemed to have ended when the cumulative number of T&D customers remaining interrupted falls below ten thousand (10,000) for a continuous period of eight (8) hours.

This definition was altered from that in the OMA to further define expectations and measurable targets. LUMA plans to propose that, in accordance with the OMA, the Major Outage Event Scorecard will be used as a tool to specifically measure utility performance (including preparation and communication activities) after each major outage event.

1.2.3 Summary of Planning Team Activity

Pursuant to Section 4.2 (f) (Performance Metrics) of the OMA, a Performance Metrics Planning Team was established. An initial kickoff meeting for this planning team was held on August 13, 2020. The members of the team included representatives from LUMA, P3A, and PREPA. The team met regularly to review key aspects of the proposed Annex IX revision and provide input. LUMA considered all contributions from the planning team in the development of the proposed Performance Metrics.

2.0 Review of Processes & Data

2.1 LUMA Performance Metrics Team

LUMA began work on the revision of Annex IX Performance Metrics by assigning a Performance Metrics functional lead responsible for:

- Assembling a team of subject-matter experts (SMEs)
- Developing processes and timelines
- Facilitating team meetings
- Coordinating communications and work performed by the team
- Coordinating with LUMA leadership
- Attending initial PREPA workshops
- Developing working relationships with PREPA SMEs
- Developing materials for and attending meetings with the Performance Metrics Planning Team
- Responding to requests from the Performance Metrics Planning Team to draft a comprehensive document to file with PREB

TEAM OF PERFORMANCE METRICS SUBJECT MATTER EXPERTS

The LUMA team consisted of one or more experts in each functional area covered by the Performance Metrics. These experts coordinated the work required for their corresponding area and liaised with the team. The functional areas include:

- Customer Service
- Health, Safety, Environmental and Quality

- Asset Management
- Financial Management

These functional areas consist of several subfunctions, each with SMEs. For example, Customer Service subfunctions include Contact Center, Customer Communications, Billing, Collections, etc.

The work performed by each functional area included:

- Participating in team meetings
- Attending initial PREPA Workshops
- Developing working relationships with PREPA SMEs
- Working with PREPA personnel in assessing PREPA's existing processes, IT Systems, and data related to the Performance Metrics specified in the OMA
- Developing Requests for Information (RFIs) and submitting to PREPA as necessary to access data and processes
- Identifying gaps as compared to industry practices
- Proposing near term actions to mitigate those gaps
- Proposing revised, additional and deferred metrics, along with revised descriptions, calculations and baseline performance for Performance Metrics
- Developing supporting materials for meetings with the Performance Metrics Planning Team and other stakeholders
- Responding to requests from the Performance Metrics Planning Team and PREB advisors
- Supporting development of a comprehensive draft document for submission

The team worked for several months under COVID restrictions and risks to gather data, meet with PREPA personnel, investigate IT system functionality and capability, assess data quality and processes, identify gaps against industry practices, design practical mitigation of gaps and improvements and develop available budgets. The observations and conclusions for each of the metrics corresponding to specific functional areas are summarized below.

2.2 Customer Service

The key findings and proposals for these metrics are presented below.

J.D. POWER CUSTOMER SATISFACTION SURVEY (CSAT) (RESIDENTIAL AND BUSINESS CUSTOMERS)

Many North American utilities and regulators utilize independent surveys of their customers carried out by J.D. Power to measure customer satisfaction and overall customer service. PREPA has not used J.D. Power Customer Satisfaction surveys so there is nothing to baseline prior to this submission.

LUMA recommends establishing a baseline for both metrics during the Front-End Transition Period. LUMA has engaged J.D. Power and begun the initial surveys for both residential and commercial customers to ensure a baseline will be available at the Service Commencement Date. The J.D. Power Electric Utility Residential and Commercial surveys have been sent to a statistically valid sample of PREPA customers to establish a baseline.

The J.D. Power Customer Satisfaction metric examines six factors: power quality and reliability, price, billing and payment, corporate citizenship, communications and customer service. CSAT will be

measured by following up with surveys in four phases per year for residential customers, and in two phases per year for commercial customers.

J.D. Power has been capturing and analyzing the Voice of the Customer across more than a dozen industries globally for 51 years. They work largely with North American utility surveys and are in their 22nd year of conducting the Electric Utility Residential and Electric Utility Business Studies. All utilities that report having more than 100,000 residential customers are included in the study. The industry is divided into nine segments by type, geography, and size. Cooperatives include brands that serve cooperative residential customers. Other brands are split into four regions: East, Midwest, South, and West, then further split by size: Large and Midsize. Large utilities include those with 500,000+ customers; Midsize utilities include those with 100,000 –499,999 customers. The main comparator group for PREPA is termed South Large and - it is the large utilities in the Southern US (e.g., Florida).

CONTACT CENTER METRICS

As a preamble to Contact Center Metrics, the following information is intended to enable a clear understanding of the proposed Performance Metrics. As of the service commencement, LUMA intends to have an operational in-house contact center working from a newly implemented cloud-based Contact Center platform that will provide the following benefits:

- Agents will be able to reliably take calls using a cloud-based Contact Center platform in support of emergency and ongoing operations
- Consistent reporting to support our OMA commitments for average speed of answer and abandon rate
- A quality assurance (QA) program to review agent interactions and provide coaching and feedback on a regular basis
- First Contact Resolution monitoring and management
- Post-interaction customer surveys following phone/chat interactions
- New digital channels (e.g., chat, social media)

AVERAGE SPEED OF ANSWER (ASA)

The currently available PREPA data and IT Systems do not support a reliable measure of this metric. Lack of visibility into three separate call routing systems and overflow rules prevent accurately calculating ASA. LUMA observed significant differences in reported ASA data from month to month and when comparing data from PREPA's call-center with data from call-center vendors (e.g., 10:53 PREPA/December 2019 vs.0:14 for vendor[1]/April 2020). We suspect that these differences may be due to operations disruptions from COVID and to the different data collection methods of PREPA and vendors.

ASA is currently measured and reported independently by PREPA and its vendors[2] based on separate IT systems: Avaya, Approach and Connect, respectively. ASA should follow industry practices.

[1] Third party contact center vendors.

[2] Ibid.

Table 2.1. APQC (American Productivity & Quality Center) Benchmark

Metric ID	Measure	Category	PCF	25th	Median	75th	N	KPI
100321	Average speed of answer in seconds for agent queue calls.	Cycle Time	Cross Industry 7.2.1	12.00	15.00	30.00	28	Yes

Data from different platforms do not always match. In May 2020, the PREPA Avaya platform shows 154,683 calls transferred to third party vendors, but the vendor reports only total 151,947 calls for that period. PREPA directs overflow calls to their vendors for certain call queues after calls have waited in the PREPA queue for 5-10 minutes. ASA reported by the vendors does not include this initial wait time. The table below shows the calls routed to third parties in May 2020, but LUMA does not have enough information from the Avaya platform to know how long these calls waited in PREPA's Avaya platform before transferring to the vendors.

Table 2.2. Calls Routed to Third Parties in May 2020

VDN Name	Inbound Calls	PREPA Calls in Queue	Abandoned in PREPA Queue	Disconnects	To Vendors
CCPagosRepresentante	57,424	27	3,965	-	53,432
CCSinServicio	49,025	33	942	-	48,050
CCFromIvr	44,306	12,698	18,106	588	12,914
CCOrdenServicioSP	31,663	4,954	8,998	243	17,468
CCEmergenciaSP	12,400	9	279	-	12,112
CCMantenimientoSP	9,703	4	212	-	9,487
to 1888E.U.	1,241	-	25	1	1,215
CCIvrFailure	36	6	24	1	5
					154,683

- LUMA has requested additional information about the volume of overflow calls but has received limited information in response. Further, routing rules have changed over the six-month period adding complexity to any analysis. According to PREPA management, prior to August, calls waited in the PREPA queue for 10 minutes before being routed to the 3rd party vendors. When this was highlighted against the 2 minute ASA that was being reported, a change was made to the routing to reduce the wait time from 10 minutes to 5 minutes. During this timeline, PREPA has also routed an increasing percentage of calls to the 3rd parties. This change in policy renders the data for calls routed to vendors not comparable with the other data.

As a result, LUMA plans to migrate the Contact Center to the new cloud-based Contact Center platform as of Service Commencement Date to enable accurate, reporting consistent with industry practices.

CUSTOMER COMPLAINT RATE

The Customer Complaint Rate is a measure of the total number of customer complaints registered with the Puerto Rico Energy Bureau (PREB) per 10,000 customers. PREPA currently tracks the total number of open customer dockets sent from the PREB.

- PREPA does not currently review complaints with PREB to determine if they are justified
- Complaints are simply counted based on the number of complaints received by PREB and forwarded to PREPA

FIRST CALL RESOLUTION (FCR)

The FCR metric measures the percentage of calls where the customer was able to resolve their issue/need on the first attempt. PREPA does not have the ability to track and report FCR. PREPA today tracks the percentage of calls that are escalated to a supervisor, not the percentage of calls resolved on first contact. FCR can be calculated by asking callers if this is the first time they have called about this issue, but the ability to report on this information requires the functionality of a new cloud-based Contact Center platform that can report on additional data that is captured with the call. LUMA proposes deferring the calculation and reporting of this metric until a new cloud-based Contact Center platform is implemented and FCR performance tracking can be established.

ABANDONMENT RATE (ABD)

The Abandonment Rate (ABD) metric measures the percentage of callers who hang up (abandon) while the call is still in the Automated Call Distribution (ACD) queue. The source of the data is the Contact Center platform, and the calculation is the total number of calls that are abandoned in queue divided by the total number of calls offered to the queue. The available data does not support reliable and accurate calculations and analysis for this metric based on the following.

- During this period, PREPA was going through significant transition establishing two new vendors and experiencing call volume shifts due to COVID and the closure of regional commercial offices
- The reported ABD for each month changes significantly from month to month and between PREPA and the outsource vendors (e.g., 57.8% PREPA/May to 1.9% Vendor/April).
- ABD is currently measured and reported independently by PREPA and its vendors based on separate IT systems: Avaya, Approach and Connect. Without further testing, LUMA cannot confirm that PREPA's ASA calculations follow or are consistent with the industry practice.

Migrating the Contact Center to the new cloud-based Contact Center platform as of service commencement will enable accurate, cohesive reporting. LUMA will leverage the current PREPA contact center data to set the baseline.

Table 2.3. APQC Benchmark

Metric ID	Measure	Category	PCF	25th	Median	75th	N	KPI
102104	Calls abandoned in the agent queue as a percentage of total inbound calls.	Process Efficiency	Cross Industry 7.2.1	3.00%	4.00%	5.00%	28	No

2.3 Technical, Safety and Regulatory

The key findings and proposals for these metrics are presented below.

SAFETY

Safety Performance Metrics were established taking into consideration the PREPA Occupational Safety and Health Administration (OSHA) 300 logs (Injury & Illness Recordkeeping Forms) and the PREPA Injury

and Illness Data reports. The OSHA 300 logs are the forms that are legally required to be used to record all reportable injuries and illnesses that occur in the workplace.

The data that PREPA provided includes records from Generation, Administration and T&D. The first step in LUMA's analysis was to segregate the data to reflect T&D and Administration only. The segregated data was evaluated, cases were reviewed, and reports were validated. During this analysis, the following evidence was found:

- PREPA created their own category called *Casi Casi* in a new incident log for 2020. A large number of incidents and near misses were included on the *Casi Casi* log but were not, in LUMA's opinion, properly reported. This resulted in reports of recordable incidents inconsistent with industry standards, and therefore a significant number of recordable incidents were not included in the calculation of recordable incidents.
- Error in severity rate formula resulting in wrong calculations
- Discrepancies between OSHA log and detailed incident reports/data

LUMA will follow industry practice and OSHA regulations to track and report Safety Performance Metrics.

OSHA RECORDABLE INCIDENT RATE, OSHA SEVERITY RATE, OSHA DART RATE AND OSHA FATALITIES

Based on the findings, the OSHA Recordable Incident Rate, Severity Rate and Dart Rate will not reflect factual numbers if PREPA's 2020 records are used to calculate the baseline. However, LUMA did not find the same discrepancies in the corresponding 2019 data. We propose using the existing 2019 data to determine the baseline and target for the OSHA Recordable Incident Rate, OSHA Severity Rate and OSHA DART Rate metrics.

The data provided by PREPA indicates no OSHA Fatalities in 2019 and 2020. LUMA's evaluation did not find any issues with this data.

SAFETY METRICS INTERPRETATIONS

The OSHA published regulations and standards will be used to interpret matters related to safety Performance Metrics.

TECHNICAL

In accordance with the OMA and common industry practice, there are certain event exclusions permitted in the calculation and reporting of reliability Performance Metrics. The following defines and describes those exclusions and LUMA's findings.

Annex IX of OMA states that the calculation of technical Performance Metrics (SAIFI and SAIDI) excludes:

- Interruptions associated with outage event days using the IEEE 2.5 Beta Method (defined in IEEE Std 1366™-2012)
- Planned interruptions
- Interruptions caused by generation events

Detailed descriptions of the stated exclusions are of special importance:

THE IEEE 2.5 BETA METHOD

As defined in IEEE Std 1366™-2012[3], the Beta Method "is used to identify Major Event Days (MED), provided that the natural log transformation of the data results closely resembles a Gaussian (normal) distribution.[4] Its purpose is to allow major events to be studied separately from daily operation, and in the process, to better reveal trends in daily operation that would be hidden by the large statistical effect of major events."

- "An MED is a day in which the daily system SAIDI exceeds a threshold value, T_{MED}"
- "The MED identification T_{MED} value is calculated at the end of each reporting period (typically one year) for use during the next reporting period"
- $T_{MED} = e^{\wedge \alpha + 2.5\beta}$
  where α is the log-average of each daily SAIDI in the data set and β is the log-standard deviation of the data set
- "Five years of historical data is preferable for this method."

PLANNED INTERRUPTIONS

As defined in IEEE Std 1366™-2012, "The loss of electric power to one or more customers that results from a planned outage."[5] The key test to determine if an interruption should be classified as a planned or unplanned interruption is as follows: if it is possible to defer the interruption, then the interruption is a planned interruption; otherwise, the interruption is an unplanned interruption."

INTERRUPTIONS CAUSED BY GENERATION EVENTS

An examination of the PREPA data and conversations with PREPA Operations and Reliability Reporting SMEs revealed that the existing process for identification of interruptions caused by generation events is highly likely to produce unreliable data.

- Rather than selecting from a predefined drop-down list to indicate the component level of where an interruption originated, the system operators manually input this information in an inconsistent manner into a free form field which leads to errors and difficulty searching and filtering thousands of records to identify those interruptions caused by generation events.
- Because of the free form nature of this field and the many ways that individual operators describe what occurred, it is impossible to confirm that all generation events have been excluded.

After examination of many data entries, LUMA made the following assumptions:

- Where generation is mentioned without a related transmission line(s), the event is assumed to be a generation event
- Where generation is mentioned with a related transmission line(s), the event is assumed to be a transmission event

[3] The Institute of Electrical and Electronics Engineers, Inc., IEEE Guide for Electric Power Distribution Reliability Indices IEEE Std 1366TM-2012

[4] Ibid

[5] Ibid

Note that LUMA plans to add a field in the OMS with a drop-down selection of the system component level in which the interruption occurred (G, T, or D) for operators to directly record the necessary information.

IDENTIFIED GAPS AFFECTING PREPA'S REPORTED RELIABILITY PERFORMANCE METRICS

The Major Event Day Threshold (T_{MED}) has not been calculated since 2017 and that calculation was based on 4 years of data. The current value used is derived from assumed data that is not supported by recent operational history.

The process of restoring customer service may include restoring service to small sections of the system (typically a distribution feeder) until service has been restored to all customers.[6] According to IEEE, which sets the industry standard for collection of this performance data, each of these individual steps should be tracked to collect the start time, end time and the number of customers interrupted for each step.[7,8]

No procedure or functionality exists in the PREPA Outage Management System (OMS) to explicitly capture and track data related to Step Restoration (i.e., Partial Restoration). Currently at PREPA, the operator keeps a daily log of events manually and updates events in the interruptions database manually with his notes about which events were restored in steps. This entails manually creating events for each restoration step related to the main event, then changing the time stamps, events numbers, and cause codes to mimic what occurred in the field. The number of customers involved in each step is based on the knowledge of the operators and crews since PREPA's OMS model functionality, and process does not support capturing this information in the OMS. PREPA's current process is prone to errors and creates a difficult challenge in accurately calculating the number of customers and duration impacted for the event.

Under the current PREPA process, many interruption events are excluded from calculations based on cause code. PREPA excludes events from their calculations that are associated with 28 of PREPA's predefined 43 cause codes. Based on industry practice, events with 25 of the 28 excluded cause codes should be included in calculations. LUMA could not identify valid reasons for excluding these 25 cause codes. Please refer to Tables 2.1 and 2.2 for information regarding PREPA's cause codes.

Table 2.4. PREPA's Interruption Cause Codes

	PREPA	Industry Practice
Include	15	40
Exclude	28	3
Total	**43**	**43**

[6] The Institute of Electrical and Electronics Engineers, Inc., IEEE Guide for Electric Power Distribution Reliability Indices IEEE Std 1366™-2012 Section 4.3.2

[7] The Institute of Electrical and Electronics Engineers, Inc., IEEE Guide for Electric Power Distribution Reliability Indices IEEE Std. 1366™-2012, May 2012, pages 2-3, 17-18.

[8] The Institute of Electrical and Electronics Engineers, Inc., IEEE Guide for Collecting, Categorizing, and Utilizing Information Related to Electric Power Distribution Interruption Events IEEE Std. 1782™-2014, March 2014, pages 10 and 19.

Table 2.5. PREPA's Interruptions with Cause Code Included or Excluded from Metric Calculation

ID	CODIGO_C (Espanol)	CODE _C (English)	PREPA	Best Practice
13	REMOCION DE ASBESTO O CAJAS DE ACEITE	ASBESTOS OR OIL BOX REMOVAL	exclude	include
15	SECUNDARIA/CONDUCTOR ROTO, ABIERTO O CRU	SECONDARY / DRIVER BROKEN, OPEN OR CRU	exclude	include
16	SECUNDARIA/ESTRUCTURA AVERIADA	SECONDARY / FAILED STRUCTURE	exclude	include
17	SECUNDARIA/DESGANCHE	SECONDARY / RELEASE	exclude	include
18	POWER TRANSFORMER AVERIADO	POWER TRANSFORMER FAILED	exclude	include
19	LINEA DE TRANSMISION/MAL TIEMPO/WET ASH	TRANSMISSION LINE / BAD WEATHER / WET ASH	exclude	include
20	LINEA DE TRANSMISION/ANIMAL U OBJETO EXT	TRANSMISSION LINE / ANIMAL OR EXT OBJECT	exclude	include
21	RELEVO DE CARGA POR CONTINGENCIA	CONTINGENCY LOAD RELAY	exclude	include
22	RELEVO DE CARGA PROGRAMADO	PROGRAMMED LOAD RELAY	exclude	include
23	MAL TIEMPO/RAYOS/WET ASH	BAD WEATHER / LIGHTNING / WET ASH	include	include
24	SUBIR/BAJAR TAP	UP / DOWN TAP	exclude	include
25	DISPARO DE BARRA DE TRANSMISION	TRANSMISSION BAR TRIP	exclude	include
38	LINEA DE TRANSMISION 38KV	38KV TRANSMISSION LINE	exclude	include
39	LINEA DE TRANSMISION 115KV	115KV TRANSMISSION LINE	exclude	include
48	TRANSFORMADOR AVERIADO	FAULTY TRANSFORMER	exclude	include
51	ESTRUCTURA AVERIADA	FAILED STRUCTURE	include	include
52	CONDUCTOR ROTO, ABIERTO O CRUZADO	BROKEN, OPEN OR CROSSED CONDUCTOR	include	include
53	DESGANCHE	RELEASE	include	include
54	PARARRAYOS DEFECTUOSO	DEFECTIVE LIGHTNING ROD	include	include
56	AISLADOR ROTO, PARTIDO O SAFADO	DAMAGED OR BROKEN LOOSE INSULATOR	include	include
58	EMPALME O TERMINACION SOTERRADA AVERIADA	UNDERGROUND JOINT OR TERMINATION BROKEN DOWN OR MALFUNCTING	include	include
59	CABLE SOTERRADO AVERIADO	UNDERGROUND CABLE BROKEN	include	include
63	DESCONECTIVO DEFECTUOSO	DEFECTIVE DISCONNECT	include	include
65	HERRAJE ROTO O PODRIDO	BROKEN OR ROTTED HARDWARE	include	include
66	CAJA PRIMARIA DEFECTUOSA O QUEMADA	DEFECTIVE OR BURNT PRIMARY CASE	include	include
67	UNIDAD SECCIONADORA (SWITCHING UNIT)	SWITCHING UNIT	include	include
69	OTRAS CAUSAS(CERTIFICAR)	OTHER CAUSES (CERTIFY)	exclude	include
83	FUEGO	FIRE	exclude	include
85	ERROR HUMANO	HUMAN ERROR	exclude	include
86	ANIMAL U OBJETO EXTRAÑO	ANIMAL OR STRANGE OBJECT	exclude	include
87	SOBRECARGA	OVERLOAD	include	include

88	DISTURBIO ATMOSFERICO	ATMOSPHERIC DISTURBANCE	exclude	include
89	EQUIPO DE CONTROL DEFECTUOSO	DEFECTIVE CONTROL EQUIPMENT	include	include
90	VIA LIBRE PROGRAMADA - DISTRIBUCION	FREE SCHEDULED ROUTE - DISTRIBUTION	exclude	exclude**
91	RELEVO DE CARGA AUTOMATICO	AUTOMATIC LOAD RELAY	exclude	include
92	VIA LIBRE A SOLICITUD DEL CLIENTE	FREE ROUTE AT THE CLIENT'S REQUEST	exclude	exclude**
93	LINEA DE TRANSMISION	TRANSMISSION LINE	exclude	include
94	BREAKER DEFECTUOSO O NO OPERA	BREAKER DEFECTIVE OR NOT OPERATING	exclude	include
95	VIA LIBRE PROGRAMADA - TRANSMISION	PROGRAMMED FREE ROUTE - TRANSMISSION	exclude	exclude**
96	VIA LIBRE DE EMERGENCIA - DISTRIBUCION	EMERGENCY FREE ROUTE - DISTRIBUTION	exclude	include
97	VIA LIBRE DE EMERGENCIA - TRANSMISION	EMERGENCY FREE ROUTE - TRANSMISSION	exclude	include
98	PROTECCION DEFECTUOSA	DEFECTIVE PROTECTION	exclude	include
99	NO SE REPORTO CAUSA	NO REPORTED CAUSE	include	include

** Events with these cause codes are excluded from LUMA's Performance Metrics calculations in accordance with the OMA.

In addition to the above, transmission and substation events are excluded from PREPA's calculations. LUMA included these types of events in calculations per industry practices.

The valid data available spans the period May 2018 to August 2020 – data prior to May 2018 is either known to be faulty or not relevant to the configuration and state of today's T&D system due to destruction and emergency reconstruction after Hurricanes Irma and Maria.

ACTIONS TAKEN

Based on our assessment, PREPA has little documentation relating to why certain assumptions are made in the collection of data and calculation of reliability metrics.

As a result of this, LUMA built an interruption data analysis workbook, tested PREPA's assumptions and results, applied PREPA's practices and industry practices under various scenarios of historical data and compared the results.

The LUMA workbook was tested using sample data and results included in IEEE Std. 1366™-2012. PREPA's cause code exclusion list and system component level analyzed for reporting was also used to test the LUMA workbook. Initial results did not match and required many discussions with PREPA personnel, along with trial-and-error analyses. Based on these analyses, LUMA concluded that the current PREPA process excludes interruptions with three additional cause codes relative to what was indicated in PREPA's original list of exclusions (these have been included in Table 2.5). These are failed power transformer, animal or strange object, and defective protection. After excluding these cause codes, the LUMA workbook results matched PREPA's results within reason.

LUMA used the interruption data set from the period May 2018 through Dec 2019 to determine the Major Event Day (MED) Threshold (T_{MED}) as specified in the IEEE Guide for Electric Power Distribution Reliability Indices, IEEE P1366-2012. The T_{MED} calculation procedure in IEEE Std. 1366™-2012 specifies analyzing data up through the end of the year prior to that being currently analyzed and only excluding interruptions from the T_{MED} analysis identified as Planned Interruptions and interruptions caused by generation events. The standard also specifies only excluding interruptions from the metrics analysis identified as a Planned Interruptions, Interruptions Caused by Generation Events, and Interruptions associated with Major Event Days. These exclusions are currently the predominant practice in the US[9] and only ones stated as exclusions in Annex IX of the OMA.[10]

SYSTEM AVERAGE INTERRUPTION FREQUENCY INDEX (SAIFI) AND SYSTEM AVERAGE INTERRUPTION DURATION INDEX (SAIDI)

IEEE Std. 1366™-2012 recommends using five years of historical data in the calculation of T_{MED}. However, five years of credible relative data does not exist. Only 20 months of historical data is available for use in the IEEE Std. 1366™-2012 T_{MED} calculation procedure. The impact that using this limited period of historical data has on the resulting reliability Performance Metrics is unknown and is impractical or impossible to determine. Therefore, LUMA plans to carefully determine and evaluate T_{MED} against the previous T_{MED}s as each additional year of historical data becomes available. While proposing baselines, LUMA will monitor the data for significant changes in T_{MED} during the initial 3-year period and identify any related changes to the proposed reliability Performance Metrics that require revisiting.

CUSTOMER AVERAGE INTERRUPTION DURATION INDEX (CAIDI)

Based on growing industry concerns that CAIDI is a limited value performance metric,[11] LUMA proposes eliminating CAIDI. Since CAIDI is the ratio between SAIDI and SAIFI, CAIDI can be misleading because it can remain the same even when the SAIDI and SAIFI values decrease. In this case, while the customer experience improves, the CAIDI metrics can remain the same, indicating that there was no improvement. Also, valuable improvements to the T&D system such as adding automation will tend to improve SAIDI and SAIFI but could also cause CAIDI to increase because automation tends to reduce less complicated interruptions to less than five minutes (IEEE definition of a sustained outage). The more complicated and time-consuming interruptions are left for field personnel to repair and restore.

CUSTOMERS EXPERIENCING MULTIPLE INTERRUPTIONS ($CEMI_N$)

Setting a meaningful $CEMI_N$ metric is highly dependent on accurate customer information and sufficient customer connectivity in the Outage Management System. Due to data quality issues including a lack of accurate customer information and a lack of customer connectivity in the Outage Management System, LUMA proposes deferring $CEMI_N$. LUMA plans to perform field inspections to increase customer connectivity in the OMS which will be reflected in the GIS. A new process to update the connectivity model will be put in place to capture the new and future updates. These field inspections will be started in year one. The new process for data connectivity will also be implemented in year one. Updates on the

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[9] Based on discussions with industry SMEs. Also see Evaluation of Data Submitted in APPA's 2018 Distribution System Reliability & Operations Survey https://www.publicpower.org/system/files/documents/2018%20DSRO%20Report_0.pdf and CPUC Electric System Reliability Annual Reports https://www.cpuc.ca.gov/General.aspx?id=4529.

[10] While OMA Annex IX uses some non-standard terminology, LUMA uses terminology under IEEE Std. 1366™-2012 as cited in the OMA.

[11] Richard Brown, *Electric Power Distribution Reliability 2nd Edition*, (Boca Raton, FL: CRC Press, 2009), 58-59.

connectivity accuracy will be provided on an annual basis to allow for implementation of the $CEMI_N$ metric.

MOMENTARY AVERAGE INTERRUPTION FREQUENCY INDEX (MAIFI)

Due to data availability and quality issues, LUMA recommends deferring the MAIFI metric until it can be accurately measured. Determining a meaningful MAIFI metric is highly dependent on extensive high-quality monitoring infrastructure (e.g., Supervisory Control and Data Acquisition (SCADA), Advanced Metering Infrastructure (AMI)) and information systems due to the short duration of a momentary interruption. Given that the extensive high-quality monitoring infrastructure (e.g., SCADA, AMI) and information systems necessary are not in place, meaningful values for this metric cannot be determined. Even utilities with extensive monitoring in place find this metric problematic to track consistently. Updates on the monitoring infrastructure to enable implementation of the MAIFI metric will be provided on an annual basis.

ADDITIONAL PERFORMANCE METRICS

DISTRIBUTION LINE INSPECTIONS & TARGETED CORRECTIONS

The Distribution Line Inspections & Targeted Corrections indicator measures the number of distribution line inspections completed, with data recorded in a database for analysis. 100% of the 1,057 three-phase, main line distribution feeders will be inspected over a four-year period, ramping up the number of inspections each year. The inspections will prioritize the worst performing feeders (based on Customer Interruptions and Customer Minutes Interrupted) and critical customers as defined by FEMA (e.g., hospitals, police stations, water treatment plants etc.). These inspections will assess the physical integrity of the poles/structure (and components such as hardware and insulators), line/conductor, guy/anchor system and grounding. The assessment will be used to provide an overall health rating which will identify issues that affect safety and reliability. Serious safety issues to either the public or workers will result in immediate attention by the utility.

PREPA does not have a documented health condition assessment of the grid assets. In recent years, PREPA has not conducted programed inspections of its assets. Inspections were conducted of a sample of the system but the condition of a majority of the grid assets is basically unknown and not documented. It is apparent to experienced LUMA utility engineers from visual observations, site visits and an asset condition sampling that the grid has widespread deficiencies. As a result, LUMA has incorporated field inspections to categorize assets according to their health condition, based on estimates of condition (likelihood of failure) and criticality (consequence of failure). The overall health asset score will be based on 0 being the worse to 4 being the best.

Asset scores of 0 and 1 will be the highest risk assets and will be given the highest priority to repair and / or replace. These will be assets (Asset Score of 0 and 1) that exhibit the following:

- High risk of failure, or already failed and likely to cause:
  - A safety impact to LUMA employees and contractors and members of the public
  - A violation of regulatory or legal requirements, including Act 17 which includes requirements related to safe (based on applicable safety standards) and prudent utility practices, or
  - An outage that will be widespread, long duration and could affect critical customers.

All deficient assets will go into a work planning process to schedule repair or replacement in order to achieve objectives.

TRANSMISSION LINE INSPECTIONS & TARGETED CORRECTIONS

The Transmission Line Inspections metric measures the number of transmission line inspections completed, with data recorded in a database for analysis. 100% of the 260 transmission 230kV, 115kV, and 38kV circuits will be inspected over a four-year period, ramping up the number of inspections each year. The 230kV and 115kV lines will take priority for inspections. These inspections will assess the physical integrity of the structure (and components such as hardware and insulators), line/conductor, guy/anchor system, foundation and grounding. The assessment will be used to provide an overall health rating which will identify issues that affect safety and reliability. Serious safety issues to either the public or workers will result in immediate attention by LUMA.

PREPA does not have a documented health condition assessment of the grid assets. In recent years, PREPA has not conducted programed inspections of its assets. Inspections were conducted of a sample of the system but the condition of most of the grid assets is basically unknown and not documented. It is apparent to experienced LUMA utility engineers from visual observations, site visits and an asset condition sampling that the grid has widespread deficiencies. As a result, LUMA has incorporated field inspections to categorize assets according to their health condition, based on estimates of condition (likelihood of failure) and criticality (consequence of failure). The overall health asset score will be based on 0 being the worse to 4 being the best.

Asset scores of 0 and 1 will be the highest risk assets and will be given the highest priority to repair and / or replace. These will be assets (Asset Score of 0 and 1) that exhibit the following:

- High risk of failure, or already failed and likely to cause:
  - A safety impact to LUMA employees and contractors and members of the public
  - A violation of regulatory or legal requirements, including Act 17 which includes requirements related to safe (based on applicable safety standards) and prudent utility practices, or
  - An outage that will be widespread, affecting critical customers, and long duration.

All deficient assets will go into a work planning process to schedule repair or replacement in order to achieve the objectives.

T&D SUBSTATION INSPECTIONS & TARGETED CORRECTIONS

The Distribution and Transmission Substation Inspections metric measures the number of distribution and transmission substation inspections completed with data recorded in a database for analysis. 100% of the 392 distribution and transmission substations will be inspected over a four-year period, ramping up the number of inspections each year. Substations with critical customers and/or greatest number of customers served will take priority. These inspections will assess the physical integrity of the substation components and equipment including site/fencing/grounding, structures/foundations, high voltage equipment (breakers, power transformers, switches etc.), control building, protection control and SCADA systems, AC/DC systems and telecommunications systems. The assessments will be used to provide an overall health rating which will identify issues that affect safety and reliability. Serious safety issues to either the public or employees, resulting in immediate attention from the utility.

PREPA does not have a documented health condition assessment of the grid assets. In recent years, PREPA has not conducted programed inspections of its assets. Inspections were conducted of a sample of the system but the condition of most of the grid assets is basically unknown and not documented. It is apparent to experienced LUMA utility engineers from visual observations, site visits and an asset condition sampling that the grid has widespread deficiencies. As a result, LUMA has incorporated field inspections to categorize assets according to their health condition, based on estimates of condition (likelihood of failure) and criticality (consequence of failure). The overall health asset score will be based on 0 being the worse to 4 being the best.

Asset scores of 0 and 1 will be the highest risk assets and will be given the highest priority to repair and / or replace. These will be assets (Asset Score of 0 and 1) that exhibit the following:

- High risk of failure, or already failed and likely to cause:
  - A safety impact to LUMA employees and contractors and members of the public
  - A violation of regulatory or legal requirements, including Act 17 which includes requirements related to safe (based on applicable safety standards) and prudent utility practices, or
  - An outage that will be widespread, affecting critical customers, and long duration.

All deficient assets will go into a work planning process to schedule repair or replacement in order to achieve the objectives.

IMPACT OF FUTURE PROCESS AND IT SYSTEM IMPROVEMENTS - SAIDI & SAIFI

As described in section 4.4.1 of IEEE Guide Std 1782™-2014, entitled "Evaluating the Impact of Outage Management Process Changes":

> "Upon implementation of an automated outage management system, indexes are likely to change reflective of the differences in measuring outage events. Thus, while index levels may indicate deterioration, this is generally the result of collecting data which was not previously collected or may reflect more accuracy in the collection process. A variety of methods have been implemented to try to measure the effect of the process change."

While the above addresses moving from a manual process to an automated process, the same phenomena can occur when making any significant improvements in the outage management process or related IT systems and should be considered when comparing reliability Performance Metrics over time. Guidance from IEEE Std 1782 and IEEE Std 1366 will be considered whenever changes to the outage management process or related IT systems are contemplated and the end to end (the utility becoming aware of an interruption through its ultimate inclusion in the analysis and reporting of reliability Performance Metrics) impact evaluated and considered in the design and implementation of those changes.

TECHNICAL INTERPRETATIONS

The Institute of Electrical and Electronics Engineers, Inc. (IEEE) published standards will be used to interpret matters related to technical Performance Metrics. Where published standards do not address specific matters, IEEE standards in development and published papers and reports from IEEE committees and working groups will be used for guidance.

2.4 Financial Performance

The key findings and proposals for these metrics are presented below.

OPERATING BUDGET

A total LUMA operating budget target will be determined based on the rates set by PREB in CEPR-AP-2015-0001 (the "Rate Case") and PREPA's FY21 budget as presented in the 2020 Fiscal Plan for PREPA, certified by FOMB on June 29, 2020. All LUMA departments were provided with FY21 PREPA Budget General Ledger detail and a budget template which was utilized to profile labor and other expenditures by month, and allocate expenses, where appropriate, to the capital budget based on the amount of internal labor that would be used for capital project initiatives. Based on projections, observations made during the Front-End Transition process and historical references, the departments input their expenses taking annual expectations and remediation efforts into consideration.

The budget will form the foundation for LUMA's financial management process. Each month analyses will be performed on budget variances, along with management meetings to discuss trends and develop plans to keep the budget within the required parameters. This effort will be coupled with a monthly forecasting process which will be used to predict future levels of spend and make business decisions to keep spend levels within the required parameters.

CAPITAL BUDGET – FEDERALLY FUNDED

LUMA developed the Capital Budget-Federally Funded Programs based on key initiatives determined through LUMA's transformation prioritization process. LUMA teams received input from IEM, LUMA's subject matter experts on federal funding, to determine which initiatives would likely meet federal funding requirements. Further refinement was done based on sequencing and an estimate of feasibility for implementation during the first three fiscal years and a review of the PREPA 10 Year Infrastructure Plan submitted to FEMA in December 2020, the Damage Description and Dimensions report to FEMA for DR-4339 Hurricane Maria, and supporting documentation.

LUMA intends to adopt best practices and utilize its extensive expertise and knowledge of T&D utility construction and operations in order to manage capital projects through implementation of appropriate work breakdown structures, job costing processes and procedures and project management expertise. IEM will augment these processes to ensure compliance with federal funding requirements for all federally funded projects.

CAPITAL BUDGET – NON-FEDERALLY FUNDED

LUMA used PREPA's 2020 Fiscal Plan schedule of Necessary Maintenance Expenses ("NME") as a baseline target for NME / capital work that would not be federally funded. PREPA did not provide to LUMA data on actual spending compared to the NME budget for 2020. LUMA departments submitted budgets for NME Projects which were then reviewed and subjected to a similar prioritization process as that for the federally funded projects described above. Consideration was also given to the need for NME / capital projects to be prerequisites for planned federally funded projects or to otherwise be performed in conjunction with the planned federally funded projects. Timelines and sequencing of projects were matched to the anticipated funding available and the prioritization of all NME projects taken as a whole.

DAYS SALES OUTSTANDING (DSO)

After a thorough evaluation of the available PREPA data and employed processes, LUMA focused on leveraging existing PREPA data and processes used in the preparation of the PREPA Monthly Report to the Governing Board (MOR) to calculate a disaggregated DSO performance metric. Accounts receivable and sales data can be sourced from the M-8 report which is produced monthly by PREPA Finance during the process of creating page 12 of the MOR. This metric can be calculated by dividing the year-end amount of accounts receivables by the total year-end value of customer credit sales and multiplying the result by the number of days in that year.

Due to the very high amount and aging of government receivables a combined, total DSO is not a useful metric. Calculating separate DSO metrics for general customers (residential, commercial, & wholesale) and government accounts will improve the transparency of collections efforts and improvements.

REDUCTION IN NETWORK LINE LOSSES

Reduction in Network Line Losses measures the progress in reducing electric losses. PREPA does not currently allocate losses to the components of the system, making this metric highly limited in accuracy and usefulness. An adequate loss study will be conducted in Year 1, require at least eight months after LUMA takes control of the assets and is highly dependent on the ability to accurately update the PREPA distribution system model.

OVERTIME

Analysis of the overtime data that was provided was conducted on a per labor dollar basis. PREPA did not provide detailed information on the current timesheet system process to authorize and approve overtime.

3.0 Baseline Performance

As introduced in Section 2, "Review of Processes and Data", LUMA relied on its subject matter experts in each of its functional teams to establish and validate performance metric baselines. These teams worked judiciously with the corresponding PREPA departments in a detailed analysis of the processes, tools and data available for each performance metric. The task included initial information gathering, followed by industry benchmarking for industry practices and a gap assessment. The teams then proceeded to calculate baselines using the available acceptable data and, when technically justifiable, used corrections or projections to seek more reasonable and consistent results.

As described in Section 2, in the evaluation process LUMA found that some of the established Performance Metrics cannot be properly baselined (mainly due to nonexistent or inadequate data) and in a few instances found doubtful results even with sufficient data. This supports the deferment of such Performance Metrics or the addition of others, at least until LUMA is able to establish the proper practices for data collection and calculation. The following describes the baseline calculations (and proposed changes) for the Performance Metrics that LUMA proposes to measure and report.

3.1 Customer Service

3.1.1 J.D. Power Customer Satisfaction Survey (Residential Customers)

Description: Third party customer survey.

Calculation: The J.D. Power Customer Satisfaction metric examines six factors: power quality and reliability, price, billing and payment, corporate citizenship, communications, and customer service. Customer Satisfaction will be measured by following up with surveys in four phases per year for residential, and in two phases per year for commercial.

Data Source: J.D. Power Survey Results.

Metric baseline: PREPA has not used J.D. Power Customer Satisfaction surveys so there is nothing to baseline prior to this submission. Initial survey to be completed and baseline set prior to commencement with reporting beginning in year 1.

3.1.2 J.D. Power Customer Satisfaction Survey (Business Customers)

Description: Third party customer survey.

Calculation: The J.D. Power Customer Satisfaction metric examines six factors: power quality and reliability, price, billing and payment, corporate citizenship, communications, and customer service. Customer Satisfaction will be measured by following up with surveys in four phases per year for residential, and in two phases per year for commercial.

Data Source: J.D. Power Survey Results.

Metric baseline: PREPA has not used J.D. Power Customer Satisfaction surveys so there is nothing to baseline prior to this submission. Initial survey to be completed and baseline set prior to Service Commencement Date.

3.1.3 Average Speed of Answer (ASA)

Description: The Average Speed of Answer (ASA) metric measures the average wait time from the moment the customer enters the queue to the time the call is answered by an agent.

Calculation: Total ACD wait seconds / Total answered calls.

Data Source: PREPA's Contact Center Platform.

Metric baseline: LUMA found that the data currently available does not support a reliable baseline calculation. Current data is only available for a period of six months and the reported ASA varies significantly from month to month due to COVID and onboarding new outsource vendors. The lack of visibility into three separate call routing systems and overflow rules prevents accurately calculating baseline ASA. As a result, based on past PREPA performance and experience from industry subject matter experts, the initial baseline should be set at 10 minutes.

3.1.4 Customer PREB Complaint Rate

Description: This metric measures the total number of initial customer complaints registered with PREB. The Baseline Performance Level will be set based on PREPA historical data subject to confirmation during the Front-End Transition Period.

Calculation: The monthly value is calculated by taking the total number of initial complaints divided by the total utility customer population and then multiplying by 100,000.

Data Source: Customer complaints sent by PREB to LUMA.

Metric Baseline: LUMA used the total number of complaints received by the PREB from May 2019 to March 2020 as the baseline as it is the most normal period of operations for PREPA in the last 4 years, resulting in a baseline of 5.25%.

3.1.5 Abandonment Rate (ABD)

Description: The Abandonment Rate (ABD) metric measures the percentage of callers who hang up (abandon) while the call is still in the Automated Call Distribution (ACD) queue.

Calculation: Total calls that abandoned in queue / Total calls offered to the queue.

Data Source: PREPA's Contact center platform.

Metric baseline calculation: The data currently available from the PREPA Contact Center platform does not support a reliable baseline. Current data is only available for a period of six months and the reported ABD varies significantly from month to month due to COVID and onboarding new outsource vendors. Lack of visibility into three separate call routing systems and overflow rules prevents accurately calculating baseline ABD. As a result, based on past PREPA performance and industry subject matter expert experience, initial baseline should be set at 50% abandonment rate.

3.2 Technical, Safety and Regulatory

3.2.1 OSHA Recordable Incident Rate, OSHA Fatalities, OSHA Severity Rate, OSHA DART Rate

Description:

- OSHA Recordable Incident Rate: Total number of OSHA recordable incidents
- OSHA Fatalities: All work-related fatalities
- OSHA Severity Rate: Total number of restricted and lost time days incurred as a result of a work-related injury
- OSHA DART Rate: Total number of OSHA recordable cases with lost time days (away, restricted or transferred)

Calculation: per OSHA guidelines

Data Source: PREPA OSHA 300 logs and the PREPA injury and illness data reports (see details in Section 2.3)

OSHA Recordable Incident Rate Baseline: 8.76

OSHA Fatalities Baseline: 0

OSHA Severity Rate Baseline: 50.84

OSHA DART Rate Baseline: 5.95

3.2.2 SAIFI, SAIDI

Description:

- System Average Interruption Frequency Index (SAIFI)
- System Average Interruption Duration Index (SAIDI)

Calculation: per IEEE Std 1366™-2012

Data Source: PREPA historical data (when available)

Metric baseline calculation: In the process of investigating and validating PREPA's reliability metrics, LUMA built an interruption data analysis workbook based on IEEE Std. 1366-2012 for metric validation, tested PREPA's assumptions and results, and applied industry practices using historical data. The effort included analysis and comparisons of several years of PREPA customer interruption data and reliability metrics calculations and the findings of this investigation are:

- PREPA is a worse performer when compared to other utilities in the IEEE Reliability Benchmarking Study
- Degrading Performance seen in 2020 vs 2019
- Interruption data prior to May 2018 is not valid for current use
- PREPA has not updated the Major Event Days (MED) Threshold (T_{MED}) since 2017
- PREPA uses a beginning period customer count
- PREPA does not include transmission or substation outages that result in customer interruptions
- PREPA does not include interruptions having certain cause codes (28 of 43 are excluded)
- Many reports of no lights/no power from customer telephone calls are not transferred to the Outage Management System (OMS)
- The electrical model in the GIS system that feeds into the OMS system is not accurate or up to date
- Crew findings, actions, time stamps and estimates of customers restored are predominately based on crew knowledge and experience and entered manually
- Dispatch processes are inconsistent between the different regions/districts and dispatch records are manual and handwritten
- As data and processes are improved, metrics will change even if there is no change in customer experience – these changes could appear to cause improved or degraded performance
- The significant increase in construction as LUMA takes control will increase the number of human element (HE) outages due to the necessary large number of construction/commissioning activities (currently excluded)

LUMA established the following parameters for determining reliability Performance Metrics:

- Using the interruption data set from the period May 2018 through Dec 2019 for determining the Major Event Day (MED) Threshold (T_{MED})
- The T_{MED} calculation procedure in IEEE Std. 1366™-2012 specifies analyzing data up through the end of the year prior to that being currently analyzed
- Data for 2020 is skewed by an extremely high daily SAIFI for Jan 7, 2020 due to a magnitude 6.4 earthquake
- Only excluding interruptions from the T_{MED} and metrics analysis identified as planned interruptions or caused by generation events

- Interruptions associated with Outage Event days using the IEEE 2.5 Beta Method (defined in IEEE Std 1366™-2012)

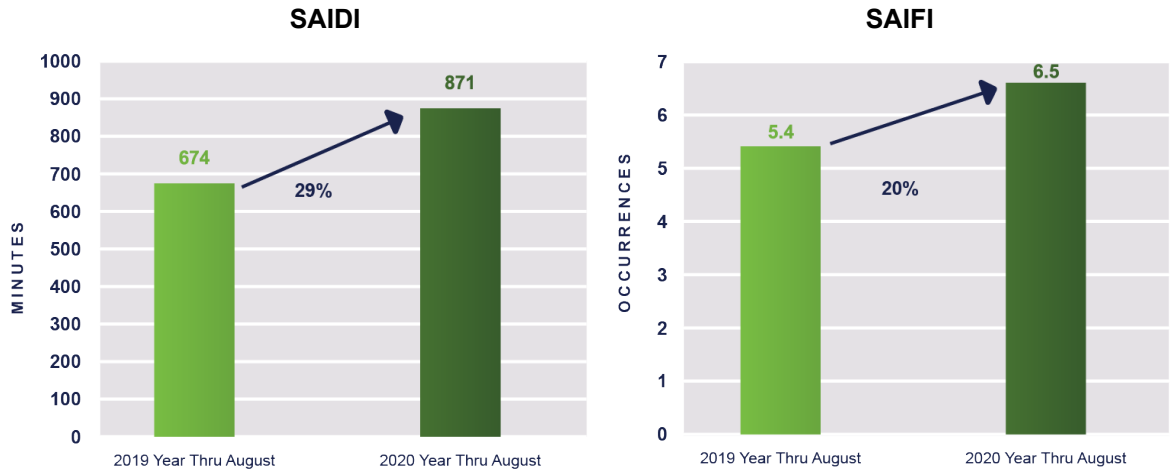
Note that the exclusions stated in the previous two bullets are stated in Annex IX of the OMA as the only exclusions from the calculation of this Technical Performance Metric. This is also currently the predominant practice in the US based on discussions with industry SMEs (see also Evaluation of Data Submitted in APPA's 2018 Distribution System Reliability & Operations Survey[12]).

Based on this analysis LUMA proceeded with specific calculations for Performance Metrics baseline as follows:

SYSTEM AVERAGE INTERRUPTION FREQUENCY INDEX (SAIFI) AND SYSTEM AVERAGE INTERRUPTION DURATION INDEX (SAIDI)

To develop a baseline for SAIDI & SAIFI, LUMA applied the definitions of IEEE Std. 1366-2012 and industry practices, calculating 2019 year-end results, 2019 through end-of-August results, and 2020 through end-of-August results (the latest data available at the time the calculations were made). Results through end-of-August results for both years were compared.

Figure 3.1. SAIDI and SAIFI Degradation Year-over-Year



As the charts indicate, the 2020 performance, based on LUMA calculations using industry standards, is significantly degraded from the 2019 performance over the first 8 months of the year, demonstrating that 2019 year-end results would not reflect an appropriate baseline. Therefore, LUMA annualized the 2020 through end-of-August results for SAIDI & SAIFI as follows:

SAIDI Baseline (minutes) = 871 minutes x (12 months ÷ 8 months) = 1,307 minutes

SAIFI Baseline (occurrences) = 6.5 occurrences x (12 months ÷ 8 months) = 9.8 occurrences

[12] https://www.publicpower.org/system/files/documents/2018%20DSRO%20Report_0.pdf and CPUC Electric System Reliability Annual Reports https://www.cpuc.ca.gov/General.aspx?id=4529

Note that applying the degradation factors shown in the charts would have resulted in baselines slightly higher than with the method chosen to estimate an appropriate baseline.

3.2.3 Distribution Line Inspections and Targeted Corrections, Transmission Line Inspections and Targeted Corrections, T&D Substation Inspections and Targeted Corrections

Infrastructure integrity and public/employee safety is paramount. LUMA will embark on the critical task of detailed inspection of PREPA's infrastructure and that effort is certainly a good target for measuring the performance of LUMA in the important period of reconstruction and upgrades. The Distribution Line Inspections and Targeted Corrections, Transmission Line Inspections and Targeted Corrections, and T&D Substation Inspections and Targeted Corrections metrics will assess the physical integrity of the poles, structures, components and equipment, providing data to develop an overall health rating from zero to four. With this information, LUMA will identify serious safety issues to either the public or workers, which will result in immediate priorities for the remediation process. Category 0 and Category 1 findings shall be incorporated in a plan to address within 60 days of identification.

LUMA proposes the use of the inspection effort in the mentioned categories as additional metrics.

Baselines: N/A (cannot be calculated since such tasks are not routinely performed by PREPA)

3.3 Financial Performance

3.3.1 Operating Budget

Description: Measures ability to stay within budget

Baseline Calculation: 100% of Operating Budget for Fiscal 2022

Data Source: LUMA received the T&D General Ledger Budget and Actual detail for seven years as well as PREPA's historical Rate Case base calculation and 2020 Fiscal Plan

Baseline: 100% of T&D Approved Operating Budget

3.3.2 Capital Budget – Federally Funded

Description: Measures ability to stay within budget.

Baseline Calculation: 100% of Federally approved Budget for Fiscal 2022.

Data Source: PREPA is currently working to begin engineering for the rebuild of damaged infrastructure following the hurricanes of 2017. After a 21-day site visit to audit PREPA's federal funding process used in connection with previously received federal funds, the COR3 deemed several of PREPA's controls and processes unfit and required a corrective action plan. Accordingly, LUMA has worked in conjunction with its federal-funding SMEs to build the federally funded capital budget utilizing the existing data that could be obtained from the PREPA DFMO group and our gained knowledge of what items were damaged that would meet the criteria for federal funding. LUMA plans to have controls in place at service commencement to manage compliance with all federal requirements and to stay within budget.

Baseline: 100% of FY22 Federally Approved Capital Spend

3.3.3 Capital Budget – Non-Federally Funded

Description: Measures ability to stay within budget.

Baseline Calculation: 100% of NME / Non-Federal Funded Capital Budget for Fiscal 2022.

Data Source: PREPA was unable to provide Budget to Actual NME detail for previous years; a schedule of planned projects was provided but LUMA was unable to confirm related spending.

LUMA built the Fiscal 2022 NME / Non-federal funded budget from the ground up based on LUMA's gained knowledge of critical project requirements.

Baseline: 100% of NME / Non-Federal Funded Capital Budget for Fiscal 2022

3.3.4 Days Sales Outstanding (DSO)

Description: This metric is a measure of the ability to collect timely payment from general client billings.

Metric baseline calculation: In determining the baseline for the Days Sales Outstanding (DSO) metric, the LUMA Customer Service team leveraged existing PREPA data and processes, with the focus being the MOR (Monthly Operating Report) that PREPA Finance creates. This process contains the data elements required to develop the proposed modified DSO calculations (accounts receivable and sales data).

During the process and data assessment LUMA found that the DSO measurements for general clients and government are vastly different. Over the last 36 months Government sales have ranged between 16% and 22% of total revenue, with an average of 18%. Using a weighted value performance metric reflects actual revenue performance data.

LUMA proposes to set DSO Baselines based on analysis of historical data. It proposes to disaggregate the calculation into separate DSO metrics for general clients (residential, commercial, & wholesale), and government accounts, to improve the transparency of collections efforts/improvements. In this calculation the following parameters are used:

- General Customers DSO Baseline at the average DSO of 131 days
- Government DSO Baseline at the average DSO of 754 days
- Weighting assignment of the performance metric calculation: 80% for General Customers DSO and 20% for Government DSO as this closely reflects gross revenues by customer segment.
- Calculation: Both General Customer and Government DSO will be calculated by dividing their respective year-end amount of accounts receivable by the total year-end value of credit sales and multiplying the result by the number of days in that year.
- "Un-collectibles reserve" which is currently included in MOR report DSO calculation will not be included in the LUMA DSO calculations.

Utilizing PREPA data for DSO is temporary as implementation of new analytics will improve timeliness and transparency of DSO metrics. Customer Service proposes transitioning DSO OMA performance metric tracking to new analytics capabilities when implemented (PREPA has initiated this project with Accenture).

3.3.5 Reduction in Network Line Losses

Description: This metric measures the utility's ability to reduce line losses, which occur due to resistance along the electrical lines.

PREPA does not currently allocate losses to the components of the system, making this metric highly limited in accuracy and usefulness. Industry practice includes:

- Analysis by customer category using appropriate load profiles
- Modeling of the T&D system with correct data
- Analysis of power and service transformer losses
- Analysis of secondary losses

An adequate loss study will require at least eight months after LUMA takes control of the assets and is highly dependent on the ability to accurately update the PREPA distribution model.

LUMA proposes deferment of this metric. The RNLL metric can be reconsidered on an annual basis per common agreement once adequate data sources become available.

Baseline: N/A

3.3.6 Overtime

Description: These metric measures management's ability to effectively manage overtime costs.

Baseline Calculation: Overtime labor dollars as a percentage of Total labor dollars

Data Source: The overtime data that was provided was on a per labor dollar basis. Using the information that was provided, LUMA's metric was based on an overtime dollar per total labor dollar spent basis.

Baseline: +23% of Average Labor Dollars

Benchmarking

1.0 Introduction

Statistical benchmarking can be used in utility regulation to provide information on performance. Use of competitive benchmarking or competitive standards is a tool to measure performance against both the typical or average utility and/or other utilities with similar characteristics and circumstances. Benchmarking is not a quick or simple process tool, but it provides a clear indication of what aspects of performance most need to be examined. It is important however to have a thorough understanding of the factors that drive the performance both within the utility and of comparable entities.

PREPA's current performance is well below industry benchmarks in almost all the metrics measured. Further, PREPA is subject to different characteristics and circumstances than many US utilities, including geography, recent storm and earthquake damage and years of deferred maintenance. LUMA believes benchmarking is a relevant exercise and can yield useful insights. A studied approach to methods employed must be taken to ensure a robust analysis, particularly when benchmarking is used for setting rates and/or economic incentives to ensure that benchmarking results in benefits to customers. As such, similar to comments made by PREB consultants during the January 19th Technical Conference, at this time benchmarks are for illustrative purposes only. Given this, LUMA presents an initial assessment of illustrative benchmarks for the following key performance categories:

- Safety
- Customer Experience
- Reliability

2.0 Safety

The Occupational Safety and Health Administration (OSHA) was created through the Occupational Safety and Health Act of 1907 to ensure safe and healthful working conditions for working men and women by setting and enforcing standards and providing training, outreach, education and assistance. As part of their work, OSHA put in place regulations that require establishments to submit information to OSHA relating to the Safety and Health of their employees. These regulations define specific metrics and the standards for measurement and records. These OSHA standards and metrics have become the industry norm and are those that LUMA will follow when collecting health and safety data for submission to OSHA.

As part of LUMA's Front-End Transition activities, LUMA reviewed PREPA's OSHA data for the following four metrics:

- OSHA Fatalities
- OSHA Severity Rate
- OSHA Recordable Incident Rate
- OSHA DART Rate

LUMA has only evaluated PREPA's data on transmission and distribution operations and recommends that any benchmarks for PREPA's transmission and distribution data be based on comparable

transmission and distribution utilities. The U.S. Bureau of Labor Statistics for Electric Utilities (NAICS 2211) benchmark presented by PREB on January 19th, 2021 includes power generation, transmission and distribution and is potentially a comparable benchmark for PREPA as an integrated utility. The Edison Electric Institute (EEI) provides comparable benchmarks specific to transmission and distribution operations in the United States.

PREPA's 2019 data versus the average, median and group rate EEI OSHA data is shown in the figure below for three of LUMA's four proposed metrics. OSHA Fatalities is zero for both PREPA and the average of comparable transmission and distribution establishments. PREPA's Recordable Incident Rate for 2019 is 8.76 and the EEI T&D average rate is 1.78, with the worst performing T&D comparable at a rate of 4.32. PREPA's Severity Rate for 2019 is 50.84 while the EEI T&D average rate is 26.12, with the worst performing T&D comparable of 89.22. PREPA's Dart Rate for 2019 is 5.95 and the EEI T&D average rate is 1.05, with the worst performing T&D comparable of 3.0.

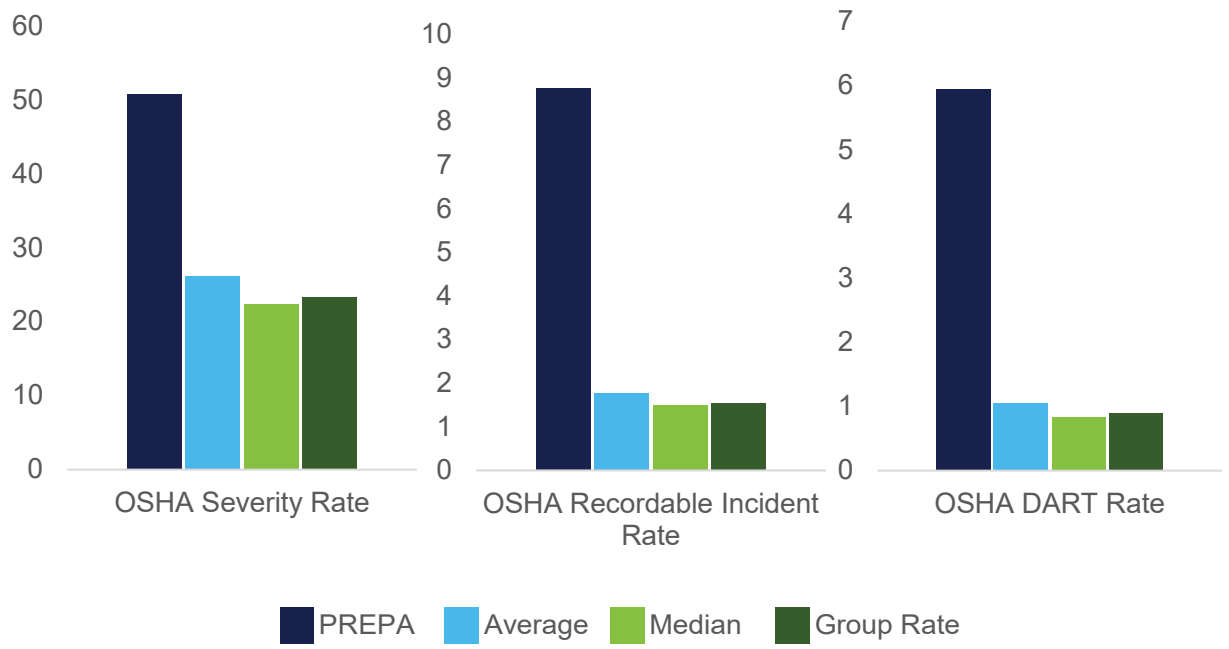


Figure 1. 2019 PREPA OSHA data Comparison with EEI T&D group data.

3.0 Customer Experience

For over 50 years, J.D. Power has been an industry leading data and insights company that amplifies the voice of the customer through research and insights that enable utilities to use customer satisfaction data as a tool to prioritize improvements. J.D. Power recently conducted the first wave of the Electric Utility Residential Customer Satisfaction Study for PREPA residential customers to determine a baseline (Note: Business customer results are in progress). Approximately 2,000 customers were surveyed across six attributes: price, corporate citizenship, quality and reliability, communication, customer care, and billing & payments. The survey measures overall customer satisfaction across critical experience factors in a systematic method that is consistent across all companies who participate in the survey. J.D. Power's consistent method and data reporting provides utilities with the ability to benchmark. Current J.D. Power analyses have provided benchmarking data consisting of 144 U.S. electric utilities.

Exhibit 3 - Benchmarks

LUMA has received the results from the first survey providing indicative measures; however, the baseline will be set once the second survey results are completed. The results presented below are from the first survey and are directionally relevant from a baselining perspective.

The Customer Satisfaction Score (CSAT) for PREPA, as reported by J.D. Power, is 395. J.D. Power CSAT scores are reported on a scale of zero to 1000. The next lowest score from the sample of electric utilities is over 300 points higher.

The CSAT is a composite of six weighted attributes. Attribute scores for PREPA are presented below:

Table 1 J.D. Power Electric Utility Residential Customer Satisfaction Study Results

Attribute	PREPA Index	2020 Electric Utility Residential Customer Satisfaction Study 2020 Index
Price	276	699
Corporate Citizenship	279	708
Power Quality & Reliability	323	783
Communication	330	720
Customer Care	600	812
Billing & Payment	652	805
Overall	**395**	**751**

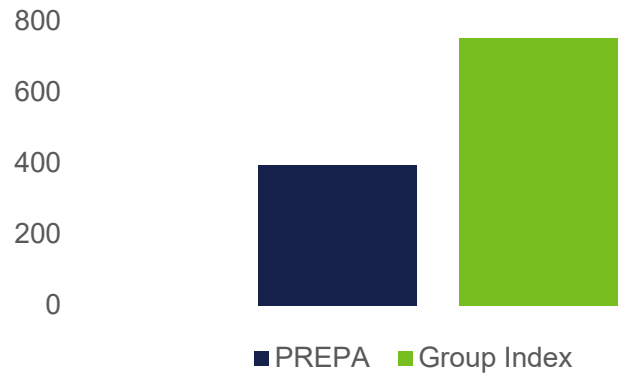


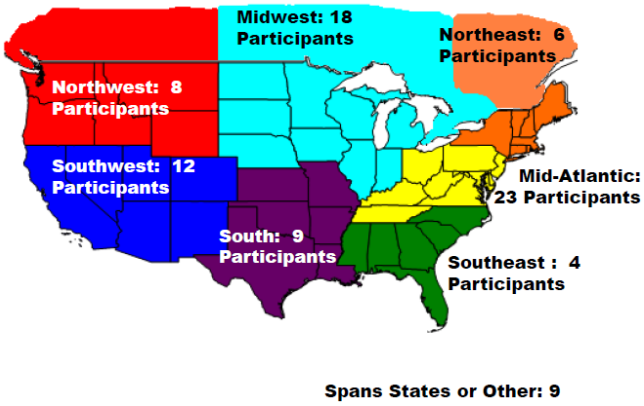
Figure 2. 2020 J.D. Power Electric Utility Residential Customer Satisfaction Study - Overall Customer Satisfaction Index

4.0 Reliability

BENCHMARKS

The Institute of Electrical and Electronics Engineers (IEEE) has a longstanding reputation as being the world's largest technical professional organization. As part of its many activities, IEEE develops and publishes standards related to the collection, measurement and calculation of key electrical reliability indices including System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI). In order to benchmark a utility's performance in SAIDI and SAIFI against that of other utilities, IEEE provides rules on how data can be collected, measured and calculated according to the same standards.

The annual IEEE Benchmark study was initiated by the IEEE Power, Energy and Society (PES) Distribution Reliability Working Group in 2003 following a major update to the IEEE Guide for Electric Power Distribution Reliability Indices IEEE Std 1366™. The intent is to provide information for users to assess their performance relative to peers. Participation is limited to North American electric utilities and is done at no cost. Results are publicly available, but participants are anonymous, assigned a key identifier to retain anonymity, and the participation list is not revealed to anyone. Each participant can share their results if they choose to do so. Participants provide their outage data following a set of instructions and a member of the working group performs the calculations and prepares the report to ensure as much consistency as possible. The most recent study, released in 2020 using 2019 data, included entries from 89 utilities.



The IEEE Benchmark study is used throughout the electric utility industry to compare reliability data. Given the anonymous nature of the IEEE Benchmark study, it is not possible to segment SAIDI and SAIFI metrics for utilities with similar characteristics and circumstances as PREPA. Therefore, LUMA recommends looking at the data as a whole when benchmarking and focusing on the nearest quartile medians when discussing benchmarks.

Exhibit 3 - Benchmarks

CURRENT STATE OF THE PREPA GRID

In its current state, PREPA's electric power grid significantly underperforms the industry in terms of reliability. The most tracked and reported reliability metrics are SAIFI and SAIDI; they represent a standard method to measure grid performance of electric utilities. They can vary greatly among utilities depending on climate (commonality of snow, ice and/or windstorms), terrain (mountainous, desert or coastal), load density (urban or rural) and system design (radial, looped or 3-wire). The median performance for all utilities reporting in the IEEE Benchmark Year 2020 Results for 2019 Data[1] is a SAIFI of 1.12 interruptions per year and a SAIDI of 126 minutes per year.

SAIFI
System Average Interruption Frequency Index

How often the average customer experiences a sustained interruption over a predefined period of time.

SAIDI
System Average Interruption Duration Index

The total duration of interruption for the average customer during a predefined period of time.

Reference: IEEE Guide for Electric Power Distribution Reliability Indices IEEE Std. 1366™-2012.

PREPA's reliability indices are much worse than the worst performing utility benchmarked by the IEEE PES Distribution Reliability working group[2]. As shown in Figure 3 and Figure 4 below, PREPA's 2019 SAIDI is 1,097 minutes and SAIFI is 9.8 occurrences: as calculated by LUMA using PREPA data and industry best practices. For consistency with industry practices, transmission and substation related outages were included in the calculation of SAIDI and SAIFI. PREPA currently does not include transmission or substation related outages or outages due to many of the causes listed in their Cause Code list for published reliability metrics. The numbers that PREPA publishes are also calculated using an outdated Major Event Day (MED) threshold; a more recent MED threshold is higher, driving SAIDI and SAIFI metrics even higher (worse). The MED threshold is used to identify days in the most recent year of outage data when stress on the electric system exceeded that experienced under normal operating conditions and is the result of a statistical analysis (defined by the IEEE) of historical outage data. Abnormal stress can be caused by extreme weather, earthquakes, etc. With transmission, substation and distribution outages and all but generation and planned outages included, reliability metrics are literally off the chart. These results are consistent with the physical deterioration of the electric grid over a long period and the limited effectiveness of service restoration after interruptions.

[1] IEEE Benchmark Year 2020 Results for 2019 Data, 2020 Distribution Reliability Working Group Virtual Meeting, https://cmte.ieee.org/pes-drwg/wp-content/uploads/sites/61/2020-IEEE-DRWG-Benchmarking-Results.pdf

[2] Ibid.

Exhibit 3 - Benchmarks

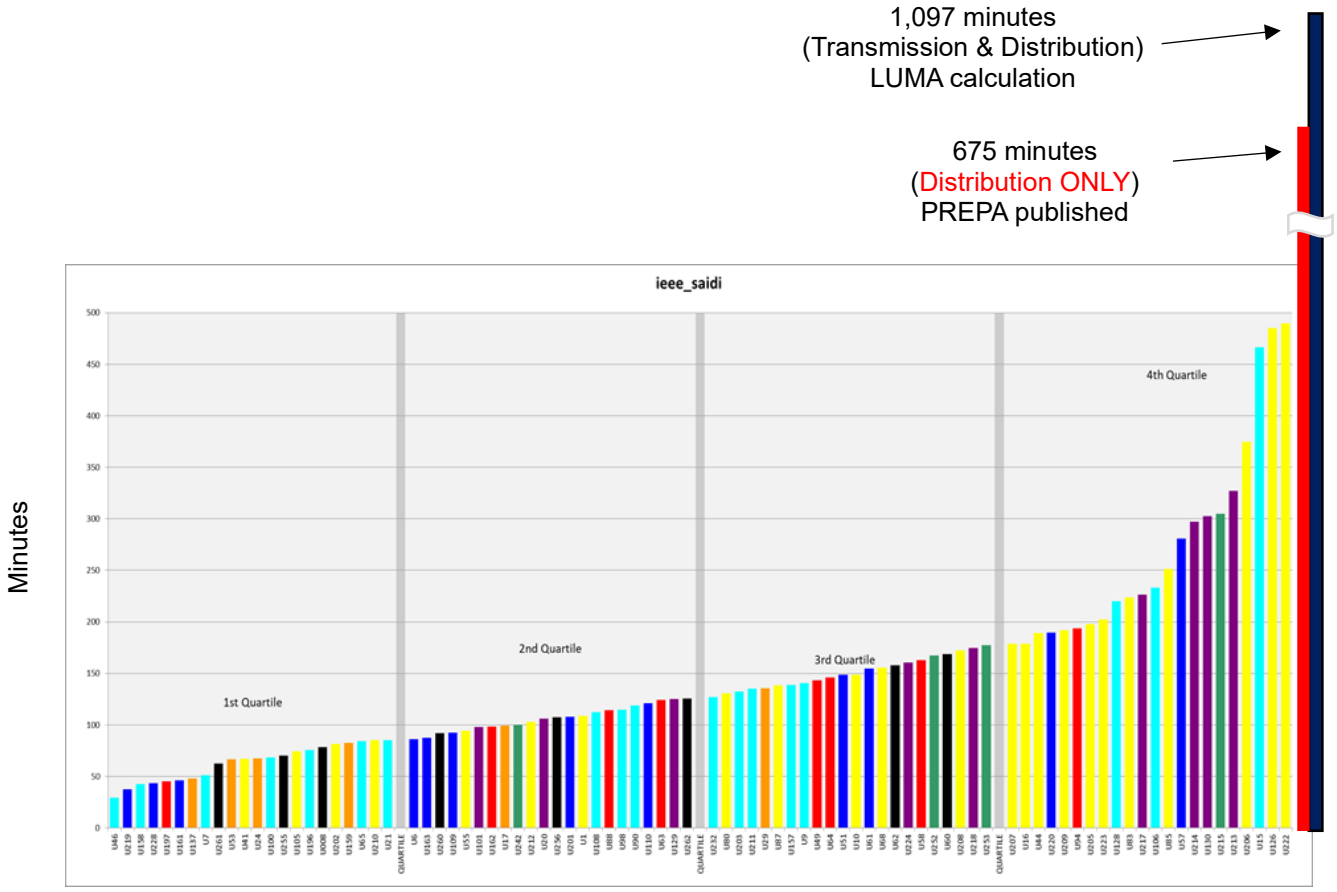


Figure 3. IEEE 2020 SAIDI Benchmark Report – PREPA Comparison[3]

[3] Ibid.

Exhibit 3 - Benchmarks

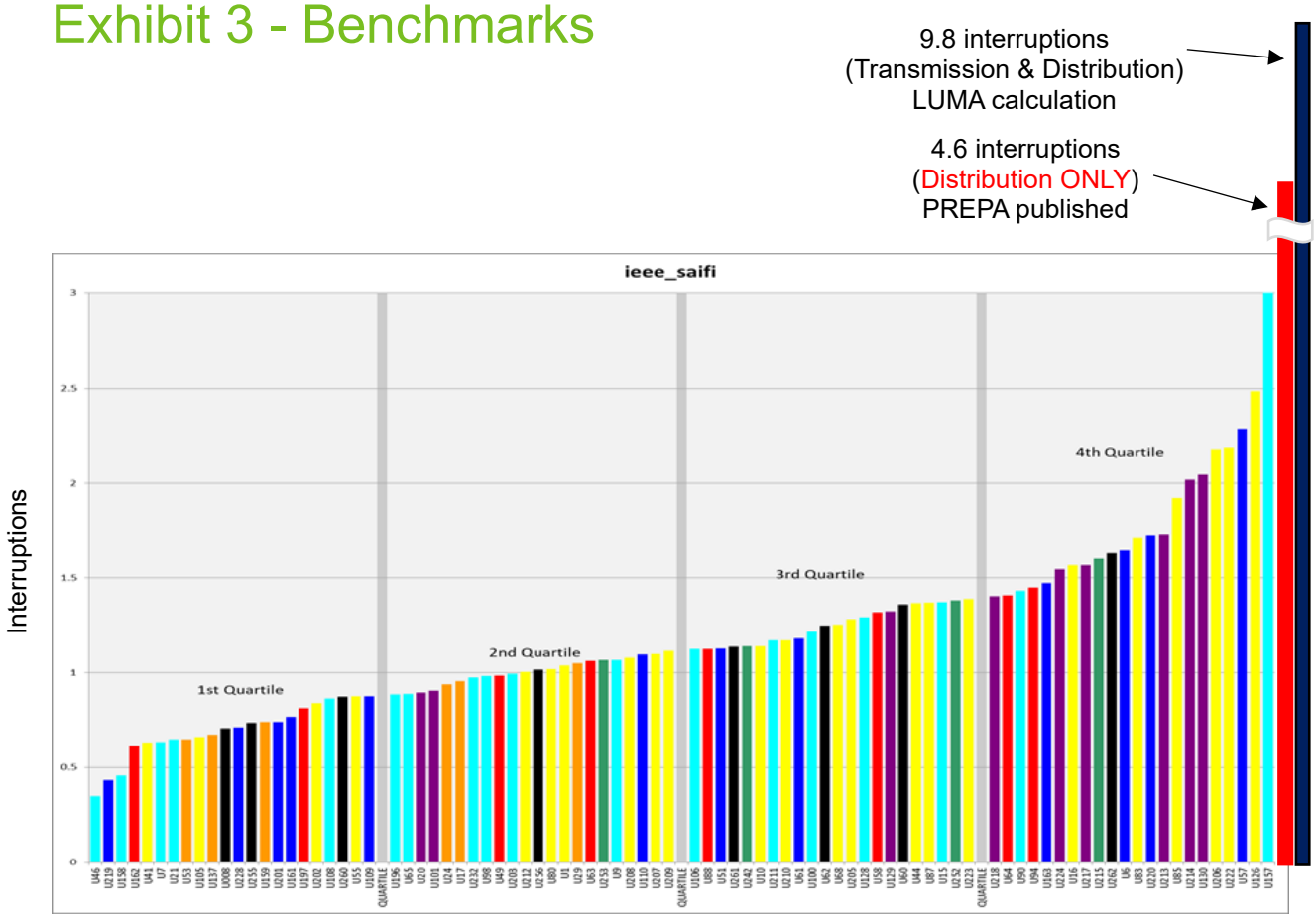


Figure 4. IEEE 2020 SAIFI Benchmark Report – PREPA Comparison[4]

Reliability indices are an indicator of the health of grid assets. The performance of an electric grid is a function of many things that can affect reliability, not the least of which is equipment maintenance. Over time physical components of the electric system age and deteriorate due to exposure to the elements. As the degree of physical wear and tear increases, the probability of failure or mis-operation increases. Therefore, many of the contributors to poor system reliability are connected to the operational health of its primary assets. A well designed and maintained grid should have less outages than a poorly maintained grid.

Therefore, grid operators monitor and track outages and associated reliability indices to gauge the health and safety of their grid. If SAIFI and SAIDI are trending down or staying at acceptable levels, one would conclude the grid is healthy and operating as designed. If yearly reliability trends worsen (trending up), it is an indicator that the system is deteriorating and requires attention and remediation. And, if unattended, the problems increase and often accelerate.

In Puerto Rico, the lack of maintenance and poor practices were exasperated and further exposed during recent major hurricanes. A recent report by Sargent & Lundy[5] reveals that multiple components of the system are in disrepair. For context, PREPA's SAIDI and SAIFI metrics, as calculated by LUMA, are more

[4] Ibid.

[5] T&D Condition Assessment Report, Sargent & Lundy SL-014468.TD, May 15, 2019.

Exhibit 3 - Benchmarks

than double (~1,000 vs ~500) and triple (~10 vs ~3) the worst performance in SAID and SAIFI, respectively. This means PREPA falls significantly below the lowest performers in the industry.

FUTURE TREND OF RELIABILITY

The future trend of PREPA's reliability, measured via SAIDI and SAIFI metrics, was worsening (trending upward) before and after the hurricane event in 2017. There is no indication that the performance trend will change unless strategic investments and operational efficiencies are put in place. The deteriorating trend will likely continue until substantial and significant investments are made for a period of years; only then will the trends reverse and improve. Without proper maintenance practices, the frequency of failure can increase faster than normal repairs are made.

LUMA analyzed results from Year to Date (YTD) to the end of August 2019 and YTD to the end of August 2020 (the latest data available at the time of the calculations) to compare reliability performance. Comparing the results of SAIDI and SAIFI indicate that SAIDI degraded by 29% and SAIFI by 20%, respectively - as shown in Figure 5. While this substantial change in SAIDI and SAIFI is not by itself a statistical long term trendline, the evidence does indicate that the Puerto Rico electric grid continues to deteriorate. These concerning performance metrics call for timely, substantial, and targeted investments in the electric grid and improved maintenance practices. As system performance continues to worsen over time, not only will the reliability of the system will be impacted, but the risks to employee and public safety will increase, potentially impacting not only employees but customers and residents on the island.

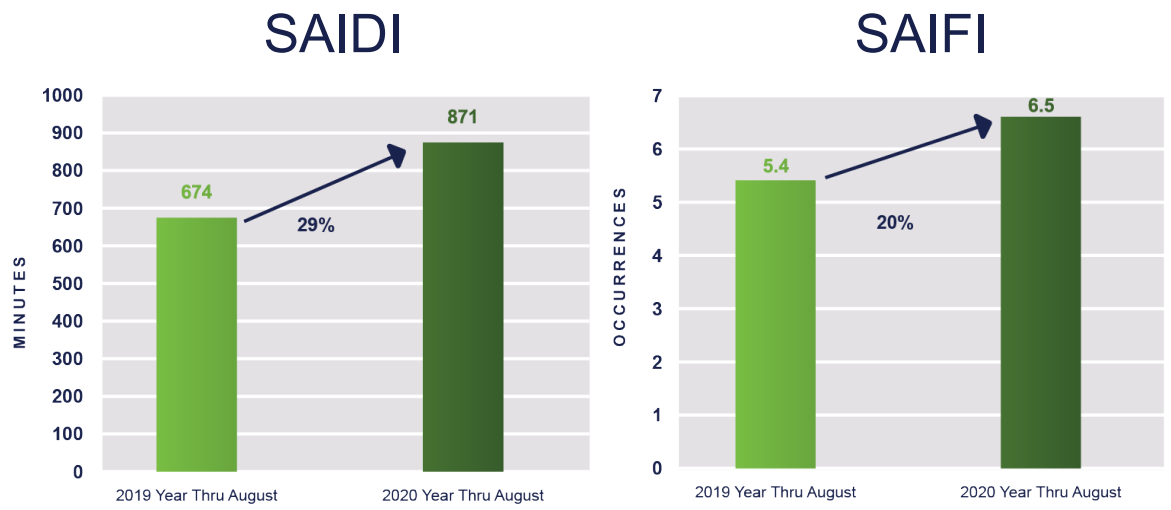


Figure 5. 2020 to 2019 SAIDI Comparison (left) and 2020 to 2019 SAIFI Comparison (right) based on LUMA calculations using industry standards